SPE 412 Evaluating Exceptional Children. (3)
fa and spr ng
Normat ve and r ter on referen ed d agnost c techn q es, n d ng format ve eva uat on Emphas zes app cat on Requ res da y ract cum Prerequ s te TC adm s on.

SPE 413 Methods in Language, Reading, and Arithmetic for Exceptional Children. (3)
fa and spr ng
Methods techn que nd m ter s for se n prescr t ve tea h g Requ res da y pract cum rereq s te. T a m s

SPE 414 Methods and Strategies in Behavior Management. (3)
fa and spr ng
Org n zat n and de very of nstruct on nc ud n f r at ve eva uat on techn ques Techn ques of behav r manage e t Req es da y p act cum Prerequ s te TC adm s on.

SPE 415 Socia Behavior Problems of Exceptional Children. (3)
fa and spr ng
Ana y s and ntervent on nto soc a behav or prob ems f ex ept ona pop t ons Req res da y p act um Prere u te C adm ss on

SPE 455 Early Childhood and the Handicapped. (3)
fa
Ear y h dhood educat n as t app es to the h nd apped h d

SPE 478 Student Teaching n Spec al Education. (3–15)
fa and spr ng
Y grade on y Fee Prereq s te. TC a m ss n

SPE 494 Special Topics. (1–4)
fa and spr ng
T p cs may nc ude the fo ow ng
• nstru t on n Content Areas Sc ence Soc a Stud es 3
Prerequ s te TC adm s on

SPE 496 Field Experience. (0)
se ected emesters
App es course ontent n a spe a ed cat n sett g E phas zes observat on p p management p an g a d de ver g n truct on and a sessment Fee Prerequ s te C adm ss on

SPE 498 Pro-Sem'nar. (1 7)
fa and spr ng
Top cs may n de the f ow ng.
• F e d Exper ence. 1 3
App es c u se nte t a pec a educat on sett ng Emphas zes observat on pup management p ann ng and de ver ng nstruct on nd assessme t Fee Prerequ te C adm s on

SPE 510 Inclusionary Curriculum for Spec'al Education Teachers. (3)
fa and s mmer
Curr cu a pract ces used n nc us on c assr m

SPE 511 The Exceptional Child. (3)
fa , spr ng summer
Educat ona needs of except ona ch dren a d adu t Not recom me de f tudents who have comp eted SPE 11

SPE 512 Individuals w th Mental Retardation. (3)
fa , spr ng, summer
Et o ogy d agnos s and management f nd v dua s w th menta ret r dat on Current trends n prevent on programm ng and teacher prepa at on Not recommended for t de t who have comp eted SPE 312.

SPE 514 Bilingual Multicultural Aspects of Special Educat on. (3)
fa spr g summer
Theor es and ssues re ated t the educat on of b ng a and u tura y d ver e ex ept ona ch dren

SPE 515 Methods for the Remed ation of Learn ng Problems of Exceptional Children. (3)
spr g
Methods and mater a for remed at ng the bas c academ c prob ems of except ona h dren Pre equ s tes. SPE 511 a met od our e n teach ng ead ng and mathemat cs

SPE 522 Academic Assessment of Exceptional Children. (3)
fa
Normat ve and cr ter on referenced assessment of earn ng prob ems n except ona ch dre nc udes format ve eva uat on Requ res p act cum Le ture pract cum Prerequ s tes SPE 311 or 511 ; e e entary methods ourses, progr m approva

SPE 523 Prescriptive Teaching with Exceptiona Chi dren. (3)
fa
angu ge read ng and a thmet c methods te hn que and mater a s used n nd v dua zed nst u t on Requ res pra t cum ectu e pr ct um Prereq s tes SPE 11 or 511 e ementary methods urses program approva Pre or corequ s te SPE 522

SPE 524 Effective Classroom Behavior Management. (3)
sp g
Organ zat on and de very f nstruct o nc ud ng format ve eva uat on and techn ques of academ behav or ma agement for ex ept ona ch dren Requ res p act um Lecture, pract cum Prerequ s tes SPE 311 or 511 522, 523 program approva

SPE 525 Soc al Behavior Interventions. (3)
spr ng
Ana y s and ntervent on to so a behav or prob em of except on students Foc ses on trateg e to change n a adapt ve o a behav o Requ es pract cum Prerequ tes SPE 311 or 511 or 522 r 523 program approva

SPE 531 Behav'or Management Approaches with Exceptional Children. (3)
fa and summer
Behav or management approaches for c a sroom beh v o of excep t ona h dren. Prerequ s te SPE 511 or ts equ va ent

SPE 536 Characteristics of Children with Behavioral Disorders. (3)
fa sp ng summer
Var ab es contr but ng to behav or pattern of behav ora y d sordered ch dren

SPE 551 Teaching Young Children with Special Needs. (3)
spr ng
Methods mater a s, and curr cu um fo presch o and pr mary ged h dren w th spec a needs Prerequ s tes SPE 455 and 511 or t e r equ va ent

SPE 552 Management of Individuals with Severe Handicaps. (3)
spr ng
In truct on and management of s hoo aged a d adu t d v dua s w th evere, phy ca or mu t p e hand aps Prerequ s tes SPE 511 r ts equ a ent nstructor approva

SPE 553 Developmental Functional Assessment (3)
fa
Tea er f used deve opmenta fun t ona assessment of pres hoo a d severe y phys ca y and mu t p y hand capped nd v d a s Requ re f e d exper ence Prerequ s tes SPE 511 and 512 an 574 or the r equ va ent

SPE 554 The Parent/School Partnership. (3)
spr ng
nc udes know edge and pr cedures f r nvo vement and t a n ng of parents and areg vers of preschoo and severe y hand app d nd v dua s Requ re f e d e per ence. Pre equ s tes SPE 455 and 511 or the r equ va ents

SPE 561 Characteristics Diagnosis of Learning Disabilities. (3)
fa spr ng summer
Theo es re ated to earn ng d sab t e nc ud ng dent f cat on and cha acte st c

SPE 562 Methods of Teaching Students with Learning Disabilities. (3)
se ected semesters
Var ous method and nter ent on strateg es for remed t ng ea n ng d sab t e of ch dren and youth Prerequ s te SPE 361 or 561

SPE 574 Educational Evaluation of Except onal Children. (3)
fa
Des gn and stat st ca o s derat o s of normat ve and r ter n refer en ed tests Co ect on record ng and ana ys s of data from format ve eva uat o Prerequ s tes SPE 511 or ts equ va ent a methods course n te ch ng re d ng nd mathemat s.

L tera y a d c t ca nq y **MA** m the at **CS** pute t t t q ttat e p at on **HU** man t e and f ne arts **SB** so a and beha o a s e **SG** tu a e ce ge e e ur e **SQ** nat ce e q tt t ve C c t ra d ve s ty n the n ted St te G g b H h t r ca e Gene St page 83

SPE 575 Current Issues in the Education of Exceptional Children. (3)
fa
Ma nstream ng, n ncategor ca f nanc ng ega d agnost c abe ng eg s at ve and other cr t a and controvers a ssues re ated to the educat on of except ona ch dren

SPE 577 Mainstreaming Methods. (3)
spr ng
Addresse suc essfu ma nstream ng methods pract ca prob em so v ng ses ons re ated to teacher s c assroom eeds and nd v dua contracts focus ng on ma nstream ng ssues Genera educators encouraged

SPE 578 Student Teach ng in Special Educat'on. (3–15)
fa and spr ng
Y grade on y Fee Prerequ s tes c mp et on of spec f ed courses, approva by the spec a educat on program coord nator

SPE 582 C assroom Research with Except'onal Children. (3)
summer
Introduces nterpret ng research Spec f c resea h techn ques w th pr mary empha s on lassroom re ear h nc ud ng app ed behav or ana ys s

SPE 585 Creativity: Research and Development. (3)
spri g
Exp ores nature of creat v ty n terms of ph osoph ca underp nn ngs emp r ca ev den e human deve opment se f actua zat on and the eco ogy surround ng the creat ve event

SPE 586 Advising the Gifted Child. (3)
once a year
F cuses on educat ona p an g and gu dance oc a and emot na devel pment and fam y prob em so v ng regard ng needs of g fted ch dre

SPE 587 Controversies in Educating the Gifted. (3)
fa
In depth ana ys s of major co trove s es n educat ng the g fted nc ud ng nature nurture the ro e of menta test and ex d fferences.

SPE 588 The Gifted Child. (3)
fa and summe
G fted ch dren s character st cs dent f cat on needs, sch o and home env ronments def n t ons and m sunderstand ngs Research by Pres ey Stanley Terman and other

SPE 589 Methods in Teaching the Gifted. (3)
spr ng and summer
Methods n teach ng e ementary and secondary schoo g fted ch dren nc ud ng d v d a zed and computer as ted struct on team tea h ng Prerequ s te. SPE 588

SPE 774 Characteristics and Causation of Exceptionality. (3)
fa
n depth ana ys s of terat re perta n ng to causes of except ona ty and earn ng educat ona persona soc a and cogn t ve haracter s t c Lecture d scus on

SPE 775 Eva uation and Intervention in Special Educat on. (3)
spr ng
n depth ana ys s of resear h and terature on eva uat on procedures and ntervent n approaches for ex ept ona nd v dua s at a age ev e s Lecture d scus on

SPE 781 Research and Evaluation n Spec al Education (3)
spr ng
Issues and prob ems n conduct ng re earch and or eva uat on pro grams nvolv ng except ona ch dren

Omnibus Courses. For an exp anat o f course offered but not spec f al y sted n th s cata og ee Omn bus Courses page 56

Division of Educational Leadership and Policy Studies

www.ed.asu.edu elps
480 965-6357
ED 120

Terrence G. Wiley, Director

Regents' Professor: Ber ner

Professors: Appleton, Barone, Fenske G ass, Gonza ez Hanson Molnar Norton, Smith, Turner, Va verde Webb, W ey

Associate Professors: Danz g Hunn cutt, Margo s, Pena, Rund Wilkinson

Assistant Professors: Moses Powers

Clinical Professor: Dyer

Clinical Associate Professor: Macey

Research Professor: de os Santos

PROGRAM AREAS

Educational Administrat on and Supervision
Educational Policy Studies
Higher and Postsecondary Education
Social and Philosophical Foundations

Degrees: M.A . M.Ed., Ed D., Ph.D.

GRADUATE PROGRAMS

The faculty in the Division of Educational Leadership and Policy Studies offer several graduate degrees in a num ber of majors.

For more information on courses, faculty, and programs contact the division office or see the *Gra luate Catale g*

EDUCATIONAL ADMINISTRATION AND SUPERVISION (EDA)

See the *Graduate Catal og* for the EDA courses.

HIGHER AND POSTSECONDARY EDUCATION (HED)

See the *Gra luate Cata og* for the HED courses.

SOCIAL AND PHILOSOPHICAL FOUNDATIONS (SPF)

SPF 301 Culture and Schooling. (3)
fa and spr ng
For the profess ona teacher preparat on program Overv ew of the cu tu a , soc a and po t ca m eus n wh ch forma schoo ng takes p ace n the Un ted States Le ture rec tat on Prerequ te ed cat on major *Genera Stud es L*

SPF 401 Theory and Practice in Education. (1 2)
fa and spr ng
For the profe ona tea her preparat on program Ana ys s and nter pretat on of c assroom behav or from perspect ves der ved from ph osophy soc a sc ence and aw Prerequ s te ed at on major

SPF 501 Cu ture and School ng. (3)
fa and spr ng
ntroduces soc a sc ence c ncepts of cu t re and t e u t ra m eu n wh ch schoo ng takes p ace the Un ted States Lecture rec tat on

SPF 510 Introduction to Organization and Administration of American Public Schools. (3)
fa and spr ng
Exp ores organ zat na structure and adm n strat on of pub c ed a t on through the app cat on of ega and eth ca concepts and re evant nformat on of the soc a sc ences C ss sted as EDA 510 Cred t s a owed for on y EDA 510 or SPF 510

SPF 511 School and Society. (3)
fa spr ng s mmer
nterre at onsh p of schoo and soc ety and the ro e of edu at on n soc a change

SPF 515 Gender and Education. (3)
spr ng
Ana yzes re at onsh ps of gender and educat on emphas z ng ana y ses and cr t ques of trad t ona concept on of k ow edge, dent ty and fem n st theory Sem nar

SPF 520 Cultural Diversity in Education. (3)
spr ng
Ph osoph and soc o og ca nvest gat on of cu tura d vers ty n the Un ted States and how t re ates to educat on

SPF 530 Sociology of Education. (3)
fa
Current ssues n the soc o ogy of educat on strat f cat on soc a mob ty

SPF 533 Comparat've Education in the Western World. (3)
se ected semesters
Educat ona pra t ces and trad t ons n the ead ng nat ns of Europe and the Sov et Un on

SPF 544 Ph losoph ca Foundations of Education. (3)
fa
T eor es of educat on n anc ent med eva and modern c a s ca and ontemporary ph osoph es

SPF 566 H'story of Education. (3)
spr ng
Deve opment of educat ona nst tut ons and deas n the Western wor d, from an ent t mes to the 20th century

SPF 603 Visua Ethnography in Education. (3)
fa
Advanced qua tat ve methods c ass comb n ng ethnography w th the use of v deo and st photography n data gather ng and presentat on Sem nar Corequ s te COE 503

SPF 612 Evaluation Theory. (3)
fa
Exp ores the ma or theor es f eva uat on nqu ry ead ng to va ue udgments n edu at ona po cy through exam nat on of cases

SPF 622 Organizational Theory. (3)
spr ng
Ma or v ews of organ zat ons and the r nf uen e on ro e def n t on and part c pant behav ors n edu at ona organ zat on Sem nar d scu s on Cro s sted as HED 688 Cred t s a owed for on y HED 688 o SPF 622

SPF 711 Social and Historical Foundations of Education. (3)
spr ng
Exp ores t e h story of socio og ca thought espec a y theor e of the re at on between educat ona ystems and the so a cu tura wor d

Omnibus Courses. For an exp anat on of c u ses offe ed but ot pec f ca y sted n th s cata og ee Omn bus Courses page 56

Division of Psychology in Education

coe.asu.edu psy ched
480 965-3384
EDB 302

Elsie G. J. Moore, Director

Regents' Professors: Ber ner, Ku havy

Professors: Barona, Bernste n B tter, B anchard, C a born Garc a G ass, Green, Hackett Horan, Kerr, K nn er, K e n Krus M Wh rter Ne sen, Rob nson Kurp us Santos de Barona, Sm th, Strom, Su van, Tracey, Z m es

Associate Professors: Arc n ega Arredondo, Behrens Brown, Brush Hood, Moore, Savenye, Stafford

Assistant Professors: Brem, Ju an Kochenderfer Ladd Nakagawa Ota Wang Thompson

Clinical Associate Professor: Homer

Clinical Assistant Professors: G dden Tracey Igoe Stamm

PROGRAM AREAS

Counseling Psychology
Counselor Education
Educational Psycho ogy
  Learning
  Lifesp n Developmental Psychology
  Measuren ent, Statistics, and Methodological Studies
  School Psycho ogy
Educati nal Techno ogy

Degrees: M A , M C , M Ed Ph D

GRADUATE PROGRAMS

The faculty in the Div s on of Psyc ology in Education offer graduate de rees in a number of major

For more nform ation on courses facu ty, and pro rams, contact the div sion office or see the *Gr aduate Catal g*

COUNSELOR EDUCATION (CED)

CED 111 Exploration of Education. (3)
fa and spr ng
Educat on as an nstrument n the deve opment of the nd v dua a d s ciety and ts s gn f can e as an Amer an nst tut n
Genera Stud es SB

L te a y a d t a q y **MA** the at **CS** m ute t t t q ant tat ve a p t n **HU** h nte nd fne art **SB** a a d behav ora en e **SG** nat e g era re r e **SQ** t ra e e q a t tat ve C cu tu er ty t e U te tate G g b H h to a e Gene a tud es age 8

CED 294 Special Topics. (1–4)
fa and spr g
Top cs may nc ude t e fo w ng
- Career Deve pme t 1 3
- F undat ons of eader p 1 3
- eader p C oqu um 1 3
- Tr 1

CED 394 Spec'a Top'cs. (1–4)
fa and spr ng
Top s ay nc ude the fo ow ng
- Spe Top n Leader p 1
  Cour e br ng together a fac ty member w t no more than 12 stu de t to d scus and ear a o t a spec f c nte re t or top c op cs d s g ed to engage students nte ectu d a ogue n one of the t emes of eadersh p d vers ty and se v ce re pon b ty Pass fa e ect ve taught n t e c ass m of McC ntock Re den e Ha Open to freshmen throug en or undergr duates a majors we c me

CED 484 Internsh p. (1–12)
fa and spr ng
o c may nc ude the fo ow ng
- Leadersh p te nsh p
- Leadersh p te nsh p and Cap tone

CED 493 Honors Thesis. (1–6)
fa and spr g

CED 494 Special Topics. 1–4)
fa and spr g
Top cs m y n ude t e fo ow n
- Paraprofess ona Tra n g 3

CED 498 Pro-Seminar (1 7)
fa and spr ng
T p cs m y n ude the fo ow
- Res dent Ass stant Expe ence 2

CED 512 Introduct on to Helping Relationships. (3)
fa pr ng summer
ntr du e the k s sed n the he p ng profe ons and an exam nes the sett ngs n wh h t ey occur

CED 522 Theories of Counsel ng and Psychotherapy (3)
fa sp ng summer
Presents maj r t e r es of psycho og ca nterventi o as we as under y ng persona ty theory upon wh ch they are based

CED 523 Psychological Tests (3)
fa pr ng summer
Standard zed tests n t e st dy f the nd v d a , w t mphas s o te t s ore nterpretat on c unse ng P erequ s te COE 502 or t equ v a ent

CED 527 Community Counseling. (3)
fa and summe
Commun ty fo u w t emp as s on o treach prevent n, psych edu at on ons t ng and advo acy fr m a systemat c mu t cu tura per pect ve e ture d cu on v s tat on exper ent a act v t es

CED 534 Occupat ons and Careers. (3)
fa sp g summer
The wor d f work ca eer deve pment educat on a d tra n ng for cupat o a ent y and mob ty

CED 545 Analys s of the Individual. (3)
fa , pr ng summ
Theory and method comm y u ed n study ng the nd v dua Observat ona methods d agnost nterv ew , st uctured and sem stru tured meth d for as ess ng pe s a ty Pre or o equ s te CED 523

CED 567 Group Dynamics and Counse ing. (3)
fa spr ng summer
Group process fact s t eory nd d vers ty s ue determ n ng effe t ve nteract on sma gro . Emphas s p ced on ecturettes se f warene s and exper ent a omponent e turettes d scuss n, exper e t a P erequ s te adm s on to graduate degree program

CED 577 Counsel ng Prepract cum. (3)
fa sp ng s mmer
Fo u n rac soc a a d cu tu a fa tors n t e deve opment of he p ng re at on h p thr ugh ntegrat n of gn t ve and affe t ve se f awarene w th ounse ng sk e tur ab Prerequ te adm ss on to M C or ch o unse r cert f cat on program Pre r c requ s te CED 52

CED 655 Student Development Programs 'n Higher Education. (3)
o ce a year
Emerg ng co ceptua mode s f student deve pment Overv ew of tudent per onne and tude t affa rs progra c mmun ty o e es four year c ege nd un ver t es Ob ervat n n campuses

CED 656 The American College Student. (3)
spr ng
verv ew f Amer ca c ege stude t fro demograph c background chara ter st cs a d va ue tt tudes perspect ves n udes a ess, per tence and degree co p et on ecture gr up d scuss on resear h pr ects Cros ted a HED 679 red t a owed for n y ED 656 or D 679

CED 672 Marriage and Family Counseling. (3)
fa
ntrodu es n a r age and fam y nse ng theor e Emphas ze a ystems mmun c t on mode t z ng cocounse n

CED 684 Internship in Community Counseling. (3–6)
fa pr ng, summer

Omnibus Courses. or an exp an t on of courses offered but n t s ec f a y sted n th s c ta og ee mn bus Co rses age 56

COUNSELING PSYCHOLOGY (CPY)

See the *Graduate Catalog* for the CPY courses

EDUCATIONAL PSYCHOLOGY (EDP)

EDP 301 Learning and Motivation in Education. (2)
fa and sp ng
App es ear g and mot vat on pr nc p es to edu at o ntexts us ng a case format Prerequ te educat on ma r

EDP 302 Assessment and Evaluation in Education. (1)
fa and sp ng
App es asse sment and eva uat o pr n p es to educat n context ng a case forn at Prerequ te educat on major

EDP 303 Human Development. (3)
fa and pr ng
Se ected a pect of d and ado e ent de e opme t mphas zes poss b t es for nf uen e by teachers and parent. Prerequ s tes CD 232 o ts equ a ent educat n ma r
Genera St d es

EDP 310 Educational Psychology. (1–6)
fa , spr ng ummer
P esents h man beh v r n edu at ona s tuat ns thr ug nstruc t ona mod es May be repeated f red t f r t t of h rs
Genera Stud es SB

EDP 313 Ch ldhood and Adolescence. (3)
fa pr ng summer
Pr n p es under y ng tota deve pme t f pre and a y ado escent c dren Empha ze phy a te ectua soc a a d em t ona deve pment w th pract ca mp cat n for tea hers grades 5 9 Pre requ te E P 303 or adm ss n to Co ege of Educat on postb cca aureate program

EDP 454 Statistical Data Analysis in Education. (3)
fa spr ng mmer
Ro e of data ana ys s n resea a d de so ak ng E e ent of exp oratory data ana y descr pt ve ndex a d stat t ca nfer ence Lecture ab Prerequ te MAT 17
Genera Stud es CS

EDP 502 ntroduction to Data Analysis 3)
fa spr ng ummer
Descr pt ve tat st cs v ua approac e e t mat on nd nferent a methods for un var ate and b var ate edu at on e earc p ob ems Exper en e u ng stat t ca oftware Cro ted a COE 502 C ed t s a owed fo on y COE 502 or E 5 2

EDP 503 Introduct on to Qualitative Research. (3)
fa . pr ng u mer
Term no gy sto a deve opme t approaches nc ud ng ethnog a phy ethnomethodo ogy cr t a theory gro nded theory. a d herme neut and qua tat ve versu quant tat ve so a s e es methods f nq ry Cross sted as COE 503 red t a wed f r on y E 5 3 EDP 503

EDP 504 Learning and Instruct on. (3)
fa spr ng summer
ntr du e p y ho ogy of earn ng and nstruct on n udes the foun dat on of ea n g theor es and the app cat on to educat ona prac t e Cro s sted a COE 504 red t s a wed fo o y E 504 or EDP 504

EDP 510 Essentials of Classroom Learn ng (3)
fa spr ng summer
The ret ca and emp r a fou dat f ea n g the c a s om m eu Cr t ca expo ure t re ear h and method n struct na psy ho ogy

EDP 513 Child Development (3)
fa spr ng summ r
Exam ne prob ems and a h evements exper enced by h en ow ng up n a techn og a s c ety Emphas ze d cove ng the h ds perspect ve

EDP 514 Psychology of the Adolescent (3)
fa spr ng summer
Cogn t ve p y a and oc a deve opment of ado es e t n ontem porary soc ety mpact f fam y hoo and wo kp ace o ado esce t deve opment Prerequ s te DP 310 or PGS 10 r t equ va ent

EDP 530 Theoretical Issues and Research in Human Develop ment. (3)
fa
Psycho og ca theor e re earch and met o re eva t to human deve opment, emphas z ng t e re at betwee ea y de pme t a d ater performan e

EDP 535 Applied Behavior Analysis. (3)
fa
Pr n p es of co d t on ng as app ed to behav or Current resear on the exper menta ana y of behav or ed at ona psycho ogy

EDP 536 Physiology of Behavioral Disorders. (3)
fa
Cr t a tudy of nervou ystem bra n funct on fo fundamenta behav ors and ystem dysf nct ons menta ne o og ca d order Prereq s te nstructor approva

EDP 540 Theoretical Views of Learning (3)
fa and sp ng
C ass a and gn t ve t eor e of ear g p re ent or entat o s ustrat ve exper menta and rat ona fou dat ons mp cat ons f r edu cat na pra t ce

EDP 542 Research Methods in the Learn ng Sciences. (3)
spr ng
St dents read des gn and carry out or g na research the earn ng sc ences ecture d s us on Prerequ s tes EDP 540 n truct r approva

EDP 544 Psycho ogy of Reading. (3)
fa
A ternate ana yses of the read ng pro ess de gns and procedure f r nvest gat ng nstr ct na and non n tru t ona var ab es e ated to ead ng ach evement

EDP 545 Higher-Order Processes n the Learning Sciences (3)
spr ng
Exam es or g na resear h o nduct n deduct on ana ogy a d tran fer know edge rep ese tat on and other sues n earn ng D uss on Prerequ s te EDP 540 or nstruct r approva

EDP 550 Introduct on to Measurement n Education (3)
fa and sp ng
Nature nd types of educat ona mea ures Cr t qu ng a d se ect g appropr ate meas r ng dev es o st ct ng mea ur ng dev e S c a controvers e about tests Le t re ab P erequ s te EDP 50 or nstructor approva

EDP 552 Multiple Regress on and Corre ation Methods. (3)
fa spr ng summ r
ducat o a app at s of regre o te hn q e Q ant tat ve and qua tat v pred tor curv ear trend and nter ct ns Emp a zes a a yz ng dat nd nterpret ng re u t ecture ab Pr requ s te EDP 502 or n tr ct r approv

EDP 554 Analysis-of-Var ance Methods (3)
fa pr ng ummer
Educat na app at on f ANOVA te hn q e Between and w th n sub ect de gns mu t p e mpar ons Emphas ze us ng tat t ca softwa e and nterpret ng res t e t ab Pre eq s t s ED 502 55

EDP 556 Data Processing Techn ques 'n Measurement and Research. (3)
o e a year
e f stat t a pa kages for data a ys s Empha e d ta man age ent data tru ture and re ted tat t a pro edure Le ture ab P erequ s te EDP 552 re or requ te EDP 54 r n tru tor approva

EDP 560 Individual Intel ectua Assessment. (3
fa and spr ng
s ue ad trat o and t rp etat on f d v dua te gence te t Theoret a ba t a on de at n a d d agno t c u e of te t es t Fee rerequ s te d on t a program pr fe ona psyc gy or n tru t r ppro a

EDP 561 Lab n Psychological Assessment. (3)
sp ng
Lab exper en e adm n trat on scor ng and nterpretat n f nd v dua nte ge ce tests Lab Prerequ te ad on to a pr gram n profe o a p ycho ogy r t uctor appr va Corequ s te EDP 560

EDP 562 Schoo Psychology: Eth cs Theory, and Practice. (3)
fa
P v de f r at on ga d g the et c st ry a d the ry of r rent ch psyc gy pr t e

EDP 563 Intervent ons in School Psychology (3)
fa
E m nes case b ed nsu t t on and cons tat on research re evant t s hoo psy h y pra t ce e d exper en e Pre qu s te scho p y o o y p og am or tr t app ova

EDP 564 Academic Interventions. (3)
spr ng
Sk s bu d ng c urse emp s ng a adem c nte vent ons and o t me ba ed ed at ona d P ere te EDP 535

EDP 566 D agnosis of Learning D fficult'es. (3
pr ng
n ca d gn ss f earn n d ff t em has z ec f a dem c p b ems e an te pretat on of d ag ost c n t ents n pract ca cho s tuat on Prerequ te EDP 56 a d 562 o t er eq va e t n t t r a p va

EDP 567 Schoo Psycholog'cal Serv'ces to Minority Students. (3)
sp ng
H st r a s e t v a d m r u n psyc g a and a a em a s nt d t r/ ton w t mn rty s hoo en

EDP 568 D'agnosis and Interventions for Ch ldren and Adoles cents with Emot onal Handicaps (3)
fa
C a d agn f m t a ha d p n h dren and ado e ents w t emp on te pretat on of d ag ost n truments a des gn ng app opr ate nterventi o s cho s tt ng Lecture ab P qu s tes EDP 566 PSY 578 r t equ a ent

EDP 651 Methods and Pract ces of Qual tative Research. 3)
spr ng
Adva d urse for st dents fam a w th the ry and e tant work Top c ude data e ton a ys s o tn a d an extens ve f e dwork proje t Prerequ te OE 5

L t ra v a d rt a ury **MA** them t **CS** p ter t t t q t t t e at n **HU** h t nd fn rt **SB** o a d ehav o a e **SG** atu e e a e **SQ** n tu en e q t t t e **C** t e ty t e te t t **G** b H h t S Ge e t age

EDP 652 Multivariate Procedures for Data Analys's. (3)
fa
E ucat ona app cat ons f mu t var ate method n ud ng MANOVA d scr m nant ana ys s and exp oratory factor ana y s Emphas zes ana yz g dat and report ng re u ts Lectu e ab Prerequ te EDP 554 or stru tor approva

EDP 654 Structural Equation Modeling in Educational Research (3)
spr ng
Edu at ona app cat ons of onf rmatory factor ana y s path ana y s and fu atent var ab e mode s Exper ence n conduct ng ana yses and report ng resu ts Le t re ab Prerequ s te· EDP 652 or nstructor approva

Omnibus Courses. For an exp anat on of o r e offered but not spec f ca y sted n th s cata og see mn b s Cou se page 56

EDUCATIONAL TECHNOLOGY (EDT)

EDT 300 Computers in Education. (1)
fa spr ng summer
ntroduces genera computer app cat on teacher ut ty prog ams Wor d W de Web and eva uat on of ed cat ona software Requ red for majors n the Co ege of Educat on

EDT 321 Computer Literacy. (3)
fa spr ng summer
Survey of the ro e of computers n b s ness and educat Laboratory exper ence n us ng word pr cess ng databa e and spreadsheet s ft ware 2 hours ecture 2 hours ab
Genera Stud es CS

EDT 323 Computer Applicat ons. (3)
fa spr ng s mmer
ntroduces c mputer app at ns such as HyperCa d te ecommu at ons author ng Languages and expert systems. Le t re ab
Genera St d es CS

EDT 405 Presentat'on Technology for Mult media (3)
fa
Exp ores mu t med a hardwa e and s ftware u ed c eat n presen tat ons for educat ona corpo ate and commerc a app at on

EDT 406 Computer Graph cs and An mation. (3)
spr ng
Stud es and app e des gn and an mat on tech ques for se n v deo or computer based pre entat o s

EDT 455 Authoring Tools (3)
fa spr ng summer
Use of urrent author g t o to de gn and de ver omputer ased str ct ona mater a s

EDT 501 Foundations and Issues in Educational Techno ogy. (3)
fa and spr ng
nt odu t on to edu at o a te n ogy Exam nes ac omp me ts and ssue n the f e d

EDT 502 Design and Development of Instruction. (3)
fa and spr ng
De gn deve opment a d format ve eva uat on of ob e t ves based nstruct na mater a s

EDT 503 Instructional Med a Des gn. (3)
fa and spr ng
Uses med a e ct on de gn and pr du t o pr c p e to prepare des n spe f c t ons for ut ons to nst uct a mes age and pr d u ts P e r o qu s te EDT 5 2

EDT 504 Development of Computer-Based Instruction. (3)
fa a d spr ng
Sy temat des gn deve pment and format ve e a uat on of om puter based nstruct n Prerequ te EDT 455 o nstructor approva 502

EDT 505 Multimedia Presentation Technolog'es (3)
fa
Exp o es the de gn of mu t med a pre entat on and the ut zat on of too s and res r to effect ve y de ver those pre entat ons Le t re ab

EDT 506 Educationa Eva uation. (3)
pr g
Procedures fo eva uat ng educat ona programs tra n ng ystems and new techno ogy app cat ons Prerequ s te EDT 502

EDT 511 Technology Applications in Education. (3)
fa and summer
ntegrat on and eva uat o of emerg g te hn og es nto K 12 and ad t teach ng and earn ng On ne and ecture

EDT 520 Educational Technology and Training (3)
spr ng
App cat ons of edu at o a te o ogy to tra n ng and human perf r mance systems n bus ness ndustry and government emphas z ng tre ds an p ect mana ement Lect re ab P e equ s tes. EDT 50 5 2

EDT 523 Distance Educat on Theory and Pract ce. (3)
fa
xp o es deve opment of d stance earn ng pr n p es by e am n ng nat ona n nternat ona y tems and app cat ons O ne a d c ture

EDT 525 Web Resources for Educators (3)
spr ng
Exp ores Web based and d stance ea n ng app cat ns fo ed cato s O ne a d ectur

EDT 527 Instructional Video Production. (3)
spr ng
Des gn and product on of nst t ona v de Le t re ab Pr equ s te EDT 503 or nstr ctor app ova

EDT 528 Deve opment of Web-Based nstruct on. (3)
fa
Des gn and deve opment of on ne nst u t on us g advanced techno og es Prerequ s te EDT 502

EDT 531 Hypermed'a. (3)
fa
De gn deve pment a d eva uat on of open ended non near com puter ba ed too and app at ons Lecture ab Prerequ s tes EDT 455 or n tru tor approva 502

EDT 701 Research in Educational Technology. (3)
p g
Rev ew and an ys of researc tud es ed at ona techno gy Metho o gy f r de gn ng condu t ng and repo t ng ed at na techn ogy re earch P e equ s tes EDT 5 1 502 n tructor approva

EDT 702 Research in Technology Based Education. 3)
fa
C t a exp sure to theor e resea and meth s n te h o ogy ba ed educat on

EDT 703 Research in Distance Education (3)
spr ng
Se ar w th em has s on resea h n te ecomm n at on and d tan e edu at on

EDT 704 Emerg ng Techno og es in Education (3)
spr ng
Exam e t e e and mpa t of emerg ng te h o og es educat on

EDT 780 Advanced Instructional Deve opment (3)
spr n
o duct g and do ment ng e ected nstru t ona deve pment act v t es Prerequ tes EDT 5 2 n truct r approva

EDT 792 Advanced Educationa Technology Research. (3)
fa an spr ng
D g exe ut n of du at ona te h o ogy esear on e ected top s ereq s te EDT ~ 1 st t app ova

Omnibus Courses. F r an e p anat on of ou e offered but not sp c f a y sted n th ata og s e Om bus C u se page 56

College of Engineering and Applied Sciences

www.eas.asu.edu **Peter E. Crouch, Ph.D., Dean**

PURPOSE

The purpose of the College of Engineering and Applied Sciences is to provide students with a range of educational opportunities by which they may achieve competence in the major branches of engineering, in computer science, and construction. Considerable effort is spent on the development and delivery of well rounded programs that enhance student preparation for professional careers, lifelong learning, and responsible participation as a member of society.

For more information, access the college's Web site at www.eas.asu.edu

ORGANIZATION

The College of Engineering and Applied Sciences is composed of the following academic and service units (with seven departments making up the School of Engineering :

Del E. Webb School of Construction

School of Engineering
Department of Bioengineering
Department of Chemical and Materials Engineering
Department of Civil and Environmental Engineering
Department of Computer Science and Engineering
Department of Electrical Engineering
Department of Industrial Engineering
Department of Mechanical and Aerospace Engineering

Research Centers. The college is committed to the development of research programs of national prominence and to the concept that research is an important part of its educational role. The college encourages the participation of qualified undergraduate students and graduate students in various research activities. Most of the faculty are involved in government or industry sponsored research programs in a wide variety of topics. A partial list of these topics includes aerodynamics, biotechnology, computer design, computer integrated manufacturing, environmental fluid dynamics, innovative engineering education, microelectronics manufacturing, power systems, semiconductor materials and devices, signal processing, solar energy, solid state electronic devices, structural dynamics, telecommunications, thermosciences and transportation systems. This research is carried out in the departments and schools listed above and in the following interdisciplinary research centers:

Center for Low Power Electronics
Center for Research on Education in Science, Mathematics, Engineering, and Technology
Center for Solid State Electronics Research
Center for System Science and Engineering Research
Institute for Manufacturing Enterprise Systems
Telecommunications Research Center

Center for Professional Development. The Center for Professional Development, often in cooperation with the college's academic units and research centers, provides a variety of technical conferences seminars, short courses, and televised and satellite transmitted programs to enable engineers, scientists, and managers to continue the lifelong learning that is so necessary in a constantly changing world. Programs may be conducted on campus, at various off campus locations, or at company sites upon request. For more information, visit the Center for Professional Development in ECG 148, call 480 965 1740, or access the center's Web site at www.eas.asu.edu/cpd

ADMISSION

The admission criteria and standards for the B.S. in Computer Science and the B.S.E. in Computer Systems Engineering programs are currently under review and are changing effective spring 2002. For current information, visit the Computer Science and Engineering advising office in GWC 302, call 480 965 3199, or access the Web site at cse.asu.edu.

L literacy **a** and **d** technology **q** ry **MA** mathematics **CS** computer statistics quantitative approaches **HU** humanities and fine arts **SB** and **a** and behavioral sciences **SG** natural sciences **ge** general core course **SQ** natural science quantitative **C** cultural diversity in the United States **G** global **H** historical See General Studies page

Professional Status Requirements

			Minimum Scores			Transfer GPA[1]	
Student	School	High School Rank	ABOR GPA	ACT	SAT	Resident	Nonresident
Resident	Construction	Upper 25%	3.00	23	1140		
	Engineering	Upper 25%	3.00	23	1140		
Nonresident	Construction	Upper 25%	3.00	24	1140		
	Engineering	Upper 25%	3.00	24	1140		
Transfer	Construction					2.25	2.50
	Engineering					2.50	2.50

[1] The cumulative GPA is calculated from all credits from ASU as well as all transfer credit from other colleges and universities.

Individuals wishing to be admitted to freshman standing in the College of Engineering and Applied Sciences should have completed certain secondary school units. These units are identified in the requirements for each of the two schools in the college. If these conditions are not met, additional university course work, possibly unacceptable for degree credit, may be required.

Entrance requirements of this college may differ from those of other ASU academic units. Students may be admitted under one of two different classifications, professional or preprofessional.

Professional Status. For admission to professional status, Arizona residents and nonresidents must meet one of the requirements as listed in the appropriate section of the "Professional Status Requirements" table, on this page. In addition, students who are required to take the Test of English as a Foreign Language (TOEFL) must earn a score of at least 550 (213) on the computerized version.

Students admitted to the university after successful completion of the General Education Development examination are admitted as preprofessional students within their major. Professional status is attained by meeting the minimum ACT or SAT score required for admission as listed in the "Professional Status Requirements" table, on this page.

For Computer Science and Computer Systems Engineering professional status requirements, see "Admission Requirements," page 245.

Preprofessional Status. In the College of Engineering and Applied Sciences there are two versions of *preprofessional status*. One applies to a college-level preprofessional status; the conditions associated with the CEAS preprofessional status are described in the following material. The second version is of concern only to students interested in pursuing majors within the Department of Computer Science and Engineering (CSE). For descriptive material on the CSE preprofessional status, see "Department of Computer Science and Engineering," page 245, or access the CSE Web site at cse.asu.edu.

A student not admissible to professional status within the college but otherwise regularly admissible to ASU as stated in "Undergraduate Admission," page 58, may be admitted as a *preprofessional* student to any one of the academic programs of the college. A student admitted to this classification follows the freshman-sophomore sequence of courses as required by the chosen major. Courses are selected with the assistance of an academic advisor. After completing a minimum of 30 semester hours of required or approved elective courses with a cumulative CPA equivalent to that required of transfer students and corresponding to the school or *students may apply for admission to professional status*. Preprofessional students are not permitted to register for 300- and 400-level courses in the college until their status is changed to the professional classification.

Readmission. Students applying for readmission to professional status for any program in this college must have a cumulative GPA for all college course work equal to that of the transfer admission requirements shown in the "Professional Status Requirements" table, on this page.

Transfer into and Within the College. Students transferring between academic programs within the college or from other colleges within the university must meet both the cumulative GPA requirement and the catalog requirements of the desired program in effect at the time of transfer. Students who are transferring from an Arizona community college and have been in continuous residence may continue under the catalog in effect at the time of their entrance into the community college.

Transfer Students. A student who contemplates transferring to this college from another institution, whether a community college or four-year institution, should carefully study the catalog material pertaining to the particular program and consult an advisor in this college before enrolling in the other institution. These steps assure a smooth transition at the time of transfer. Transfer students may request admission to either preprofessional or professional status in any of the programs offered by this college.

The minimum requirements for admission of resident, nonresident, and transfer students to the professional program are shown in the "Professional Status Requirements" table, on this page. The academic units may impose additional admission and graduation requirements beyond the minimum specified by the college.

Credits granted for transferred courses deemed equivalent to corresponding courses in the selected program of study, subject to grade and ASU resident credit requirements. No grades lower than "C" are accepted as transfer credit to meet the graduation requirements of this college.

College of Engineering and Applied Sciences Baccalaureate Degrees and Majors

Major	Degree	Concentration	Administered By
Del E. Webb School of Construction			
Construction	B.S	General building construction, heavy construction, residential construction, specialty construction	Del E Webb School of Construction
School of Engineering			
Aerospace Engineering[1]	B.S.E.		Department of Mechanical and Aerospace Engineering
Bioengineering[1]	B.S.E		Department of Bioengineering
Chemical Engineering	B.S.E		Department of Chemical and Materials Engineering
Civil Engineering[1]	B.S.E.	Construction engineering, environmental engineering	Department of Civil and Environmental Engineering
Computer Science[1]	B.S.	Software Engineering	Department of Computer Science and Engineering
Computer Systems Engineering[1]	B S E		Department of Computer Science and Engineering
Electrical Engineering	B.S.E.		Department of Electrical Engineering
Engineering Interdisciplinary Studies[2]	B.S.		School of Engineering
Engineering Special Studies[1]	B.S.E.	Premedical engineering	School of Engineering
Industrial Engineering	B.S.E		Department of Industrial Engineering
Materials Science and Engineering	B.S.E.		Department of Chemical and Materials Engineering
Mechanical Engineering[1]	B S E		Department of Mechanical and Aerospace Engineering

[1] This major requires a minimum of 15 semester hours to complete. Applications for this program are not being accepted at this time.

Credits transferred from a community college or two-year institution are applied only as lower-division credits. For a listing of the acceptable courses transferable to the various college degree programs, prospective Arizona community college transfer students should consult their advisors and refer to the ASU transfer guides available on the Web at www.asu.edu/provost/articulation.

It should be noted that some courses taken in other ASU colleges or other universities may be acceptable for general university credit but may not be acceptable toward the degree requirements of this college. Determination of these particular courses acceptable to a specific degree program is made within the appropriate academic unit with the approval of the dean.

ADVISING

For assistance and counseling in planning a program of study, each student in this college is assigned a faculty advisor who is familiar with the chosen field of specialization and who must be consulted before registering each semester. The student should inform the advisor of any outside work or activity so that course loads may be adjusted accordingly.

Most students attending college find it necessary to obtain part-time employment; consequently, it is suggested that a careful balance of work and class requirements be considered to avoid academic problems.

Students enrolled in an undergraduate degree program in this college may register for a maximum of 19 semester hours each semester. Any student wanting to register for more than the maximum must submit a petition and have an approval on file before registering for the overload.

Students who are enrolled in an undergraduate nondegree status in this college must obtain advising and approval to register before registering each semester from the director of Student Academic Services in ECG 205. For more information see "Admission to Undergraduate Nondegree Applicants," page 64.

UNDERGRADUATE DEGREES

The faculty in the College of Engineering and Applied Sciences offer programs leading to the B.S. and B.S.E. degrees with majors in the subjects shown in the "College of Engineering and Applied Sciences Baccalaureate Degrees and Majors" on this page. Each major is administered by the academic unit indicated.

L literacy **N** critical inquiry **MA** mathematical **CS** computer science **Q** quantitative reasoning **HU** humanities, arts and design **SB** social and behavioral sciences **SG** natural sciences **G** general studies **C** cultural diversity in the United States **G** global awareness

College of Engineering and Applied Sciences Graduate Degrees and Majors

Major	Degree	Concentration	Administered By
Del E. Webb School of Construction			
Construction	M.S.	Construction science, facilities, management	Del E. Webb School of Construction
School of Engineering			
Aerospace Engineering	M.S., M.S.E., Ph.D.		Department of Mechanical and Aerospace Engineering
Bioengineering	M.S., Ph.D.		Department of Bioengineering
Chemical Engineering	M.S., M.S.E., Ph.D.		Department of Chemical and Materials Engineering
Civil Engineering	M.S., M.S.E., Ph.D.		Department of Civil and Environmental Engineering
Computer Science	M.C.S., M.S., Ph.D.		Department of Computer Science and Engineering
Electrical Engineering	M.S., M.S.E., Ph.D.		Department of Electrical Engineering
Engineering	M.E.[1]		School of Engineering
Engineering Science	M.S., M.S.E., Ph.D.		School of Engineering
Industrial Engineering	M.S., M.S.E., Ph.D.		Department of Industrial Engineering
Materials Engineering	M.S., M.S.E.		Department of Chemical and Materials Engineering
Materials Science	M.S.[2]		Committee on the Science and Engineering of Materials
Mechanical Engineering	M.S., M.S.E., Ph.D.		Department of Mechanical and Aerospace Engineering
Science and Engineering of Materials	Ph.D.[2]	High-resolution nanostructure analysis, solid state device materials design	Committee on the Science and Engineering of Materials

[1] This collaborative program is offered by the three state universities.

[2] This program is administered by the Graduate College.

Integrated B.S.E.-M.S. Program. To provide greater program flexibility, qualified students of the School of Engineering may undertake a program with an integrated fourth and fifth year sequence of study in one of several fields of specialization in engineering. This program provides an opportunity to meet the increasing demands of the profession for graduates who can begin their engineering careers at an advanced level.

Students admitted to this program are assigned a faculty committee that supervises a program of study in which there is a progression in the course work and in which earlier work is given application in the later engineering courses for both the bachelor's and master's degrees. Entry into the integrated program requires an application submitted to the dean through the faculty advisor and the department chair. Applications are reviewed by a school committee that recommends the appropriate action to the dean. The application may be submitted in the fifth semester.

GRADUATE DEGREES

The faculty in the College of Engineering and Applied Sciences offer master's and doctoral degrees as shown in the "College of Engineering and Applied Sciences Graduate Degrees and Majors" table, on this page. School of Engineering faculty participate in offering the Master of Engineering (M.E.) as a collaborative degree program offered by Arizona's three state universities. For more information, see the *Graduate Catalog*.

ASU EXTENDED CAMPUS

The College of Extended Education was created in 1990 to extend the resources of ASU throughout Maricopa County, the state, and the region. The College of Extended Education is a university-wide college that oversees the ASU Extended Campus and forms partnerships with other ASU colleges, including the College of Engineering and Applied Sciences, to meet the instructional and informational needs of a diverse community.

The ASU Extended Campus goes beyond the boundaries of the university's three physical campuses to provide access to quality academic credit and degree programs for working adults through flexible schedules, a vast network of off-campus sites; classes scheduled days, evenings, and weekends; and innovative delivery technologies including television, the Internet, and Independent Learning. The Extended Campus also offers a variety of professional continuing education and community outreach programs.

For more information, see "ASU Extended Campus," page 703, or access the Web site at www.asu.edu/xed

UNDERGRADUATE DEGREE REQUIREMENTS

For detailed information on the degree requirements of a major in the College of Engineering and Applied Sciences, refer to that department's or school's individual description on the following pages.

UNIVERSITY GRADUATION REQUIREMENTS

In addition to department and school requirements, students must meet all university graduation requirements (see "University Graduation Requirements" page 79). A well planned program of study enables students to meet all requirements in a timely fashion. Students are encouraged to consult with an academic advisor in planning a program to ensure that they comply with all necessary requirements.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy a university requirement of a minimum of 35 hours of approved course work in General Studies. General Studies courses are listed in the "General Studies Courses" table, page 86, in the course descriptions in this catalog, in the *Schedule of Classes*, and in the *Summer Sessions Bulletin* or on the Web. Consult with an advisor for an approved list of courses.

First-Year Composition Requirement

As a minimum, completion of ENG 101 and 102, or ENG 107 and 108, or ENG 105 with grades of "C" or higher is required for graduation from ASU in any baccalaureate program. See "First Year Composition Requirement" page 79. Any student whose written or spoken English in any course is unsatisfactory may be directed by the appropriate director or department chair to take additional course work.

COLLEGE DEGREE REQUIREMENTS

Pass Fail Grades

Students enrolled in the college do not receive degree credit for pass fail courses taken at this institution. In addition, no course in this college is offered for pass fail credit. Students requesting credit for pass fail courses taken at another institution must file a Petition for Adjustment to Curriculum Requirements to the department of their major. Each request is judged on its particular merits.

Entry into Upper-Division Courses

Before enrolling in courses at the 300 level and above, students must be in good academic standing in professional program status in this college and have the approval of their advisors. A student who is not in good academic standing must secure approval from his or her advisor and the college's Student Academic Services. Students whose grades in 300 level courses are unsatisfactory may be required to retake one or more courses for which credit has previously been granted.

The departments and schools have certain additional requirements that must be met in addition to the above college requirements, and students should consult them for details.

Non-CFAS Students. Students who are not admissible to programs in this college and who enroll in another college at ASU may not register for any 300 or 400 level courses in this college unless they are required in their degree programs and the students have the proper course prerequisites.

Currency of Course Work

Courses taken more than five years before admission to degree programs at this college are not normally accepted for transfer credit at the option of the department in which the applicant wishes to enroll. Courses completed within the five years preceding admission are judged as to their applicability to the student's curriculum.

ACADEMIC STANDARDS

Probation. A student is expected to make satisfactory progress toward completion of degree requirements to continue enrollment in the college. Any one of the following conditions is considered unsatisfactory progress and results in the student being placed on probationary status:

1. a semester or summer session with a GPA less than or equal to 1.50;
2. two successive semesters with GPAs less than 2.00; or
3. an ASU cumulative GPA less than 2.00.

Students on probation are subject to disqualification if:

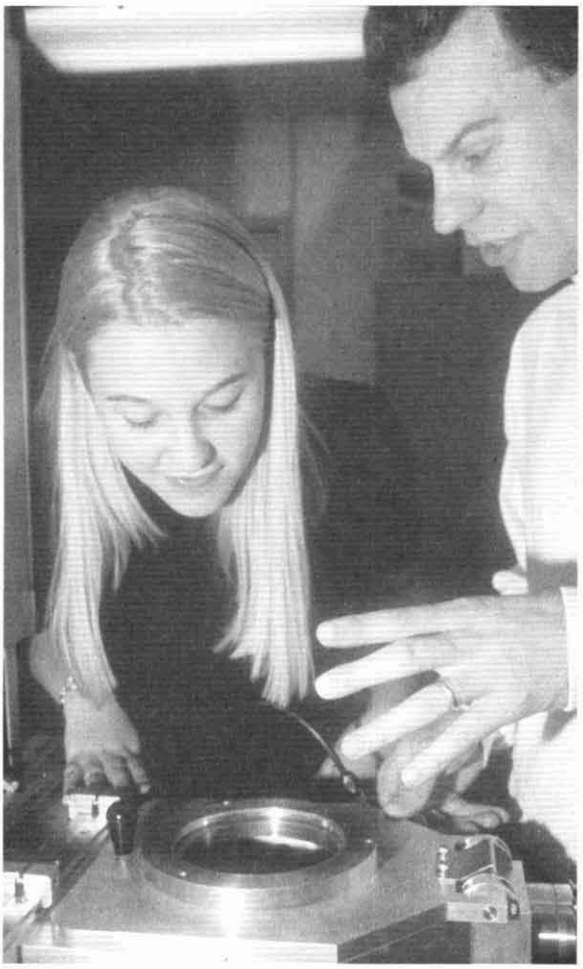
1. they do not attain a semester GPA of 2.25,
2. their cumulative GPA is below 2.00 at the end of the probationary semester, or
3. they are placed on probation for two consecutive semesters.

Courses completed during the summer sessions may not be used to reevaluate a student's fall semester probationary status.

Students on academic probation are not allowed to register for more than 13 semester hours of course work. Probationary students may not register for the next semester without a special permit from an advisor in Student Academic Services. Special permits are not given until grades are recorded by the registrar for the current semester.

Disqualification. During a semester on academic probation a student who fails to meet the retention standards specified above is disqualified. Students may request a review of their disqualification status by contacting the director of Student Academic Services in ECG 205. Any disqualified student who is accepted by another college at ASU may not register for courses in this college unless the courses are required for the new major. Disqualified students who do register for courses in this college may be withdrawn from these courses at any time during that semester. Furthermore, students at the university who have been disqualified academically by this college are not eligible to enroll in summer session courses in this college until the disqualification period has expired and they have been reinstated.

Literacy and Critical Analysis **MA** mathematics **CS** computer and quantitative applications **HU** humanities, arts and design **SB** social and behavioral sciences **SQ** natural sciences **C** cultural diversity in the United States **G** global awareness **H** historical awareness. See General Studies page 3



Student and instructor work together in engineering lab.

Tim Trumble photo

Reinstatement. The college does not accept an application for reinstatement until the disqualified student has remained out of this college for at least a 12-month period. Merely having remained in a disqualified status for this period of time does not, in itself, constitute a basis for reinstatement. Proof of ability to do satisfactory college work in the chosen discipline is required, for example, completing at least 15 semester hours of pertinent courses in the discipline at a community college with a GPA of 2.50 or higher, and a cumulative GPA of 2.50 or higher for all courses completed.

Student Academic Services. The College of Engineering and Applied Sciences maintains a unit to assist individual students in various matters. This office coordinates the work of the College Academic Standards Committee; administers the probation, disqualification, and readmission processes, student disciplinary actions, and grade grievances; and reviews and processes requests for medical and compassionate withdrawal. This office also administers the college's scholarship program. Additional information is available at www.eas.asu.edu/sas.

STUDENT RESPONSIBILITIES

Course Prerequisites. Students should consult the *Schedule of Classes* and the catalog for course prerequisites. Students who register for courses without the designated prerequisites may be withdrawn without the student's consent at any time before the final examination. Such withdrawal may be initiated by the instructor, the chair of the department offering the course, the director of Student Academic Services, or the dean of the college. In such cases, students will not receive monetary reimbursement. However, such withdrawal is considered to be unrestricted as described under "Grading System," page 72, and does not count against the number of restricted withdrawals allowed.

SPECIAL OPPORTUNITIES

Cooperative Education. The co-op program is a work-study plan of education that alternates periods of academic study with periods of employment in business, industry, or government. Students who choose this program ideally complete 12 months of employment and graduate with both the academic background and practical experience gained from working with professionals in a chosen field.

A student in the college is eligible to apply to the co-op program upon completion of 45 or more hours of classes required for the selected major. Transfer students are required to complete at least one semester at ASU before beginning work. All student applicants must have a GPA of at least 2.50 and the approval of an advisor and the dean of the college.

To maintain continuous student status in the university, each co-op student must be enrolled in ASE 399 Cooperative Work Experience for one semester hour during each work session. Such credit cannot be applied toward degree requirements. For more information, visit Student Academic Services in ECG 205, or call 480/965-1750, and visit the Career Services office in SSV 329, or call 480/965-2350.

Foundation Coalition. ASU is a member of the Foundation Coalition, a National Science Foundation-funded group of seven institutions of higher learning across the U.S. that is working to improve engineering education. Foundation Coalition programs are intended to

1. demonstrate and promote the interrelationships of subject matter within the curriculum;
2. improve the interpersonal skills of students and the understanding of concepts through the use of more teaming and cooperative learning environments;
3. increase the use of technology in the curriculum; and
4. assess and evaluate intended improvements.

Such changes address the desires of employers, increase the numbers of baccalaureate degrees earned by members of currently underrepresented groups, and promote curriculum improvement. Foundation Coalition programs are available to all freshmen and sophomores in the School of Engineering and to juniors and seniors in Electrical Engineering and Industrial Engineering.

Foundation Coalition programs offer students a more hands-on, team-based, computer-intensive approach to the

curriculum. The freshman programs provide an important opportunity for new students to get to know a small group of students making a large university seem less overwhelming. The programs also involve more interactions with faculty and access to special tutors. All students get a team based, computer intensive education in ECE 100 or ECE 194 Introduction to Engineering Design, and the Foundation Coalition program extends this experience to many more subjects and courses.

Freshmen Foundation Coalition programs offer both an integrated set of courses that include engineering, calculus, physics, and English in both the first and second semesters, and smaller course packages that include engineering, math, science, and English. In these packages, the same set of students take all of the courses in the package in high tech, team promoting classrooms while the faculty work together to deliver a unified set of courses. Sophomore programs involve courses in mathematics, mechanics, and electrical circuits.

Students interested in these programs should see their department advisor, visit the Foundation Coalition Office in ECG 303, call 480 965 9350 or access the Web site at www.eas.asu.edu/fufc.

Minority Engineering Program. The staff of the Minority Engineering Program (MEP) is available to assist the academic and professional development of prospective, newly admitted, and continuing students through a variety of support services. In addition, advice on financial aid, scholarships, and employment is provided. For more information, visit the MEP office in ECG 307, call 480 965 8275 or access the MEP Web site at www.eas.asu.edu/~omep.

Women in Applied Sciences and Engineering Program. The Women in Applied Sciences and Engineering (WISE) Program hosts seminars and workshops, and provides outreach programs to high school and community college students to acquaint students with a variety of technical careers. The WISE Center, in room ECG 214, is open for study groups, tutoring, and informal discussions. For more information, call 480 965 6882, or access the Web site at www.eas.asu.edu/~wise.

Honor Societies. Students in the College of Engineering and Applied Sciences are encouraged to seek information concerning entry into those honor societies for which they may qualify. Membership in such organizations enhances the student's professional stature. The following honor societies are active within the college:

Alpha Pi Mu Industrial Engineering Honor Society
Chi Epsilon Civil Engineering Honor Society
Eta Kappa Nu Electrical Engineering Honor Society
Pi Tau Sigma Mechanical Engineering Honor Society
Sigma Gamma Tau Aerospace Engineering Honor Society
Sigma Lambda Chi Construction Honor Society
Tau Beta Pi National Engineering Honor Society
Upsilon Pi Epsilon National Computer Science Honor Society

Information on any of these organizations may be obtained from the respective department or school offices.

Honors Students. The College of Engineering and Applied Sciences participates in the programs of the Barrett Honors College which provides enhanced educational experiences to academically superior undergraduate students. Participating students can major in any academic program. A description of the requirements and the opportunities offered by the Barrett Honors College can be found in "Curriculum" page 118.

Internships. A variety of internship programs exist within the college. Information on these programs can be obtained from the Engineering Internship Program coordinator in the office of the associate dean for Academic Affairs.

Scholarships. Information and applications for academic scholarships for continuing students may be obtained by contacting the college's Student Academic Services or the various department or school offices. Other scholarships may be available through the university Student Financial Assistance Office. For application and more information, access the Web site at www.eas.asu.edu/sas.

ROTC. Students pursuing a commission through either the Air Force or Army ROTC programs are required to take courses in the Department of Aerospace Studies or Department of Military Science. To preclude excessive overloads, these students should plan on at least one additional semester to complete degree requirements. Because of accreditation requirements, aerospace studies (AES) or military science (MIS) courses are not acceptable for degree credit in engineering as social and behavioral science or humanities and fine arts under General Studies. ROTC students must also meet all other degree requirements of this college.

GENERAL INFORMATION

Definition of Terms. The terms used in this college to describe offerings are defined below for purposes of clarity.

Program of Study. This broad term describes the complete array of courses included in the study leading to a degree.

Major. This term describes a specialized group of courses contained within the program of study. Example: program of study—engineering; major—Civil Engineering.

Area of Study, Technical Electives, or Concentration. Each of these terms describes a selection of courses within a major or among one or more majors. The number of technical electives varies from curriculum to curriculum. In several majors, the technical electives must be chosen from preselected groups. For this reason the choice of specific technical electives for an area of study should be made with the advice and counsel of an advisor. Example: major or Mechanical Engineering; area of study: thermosciences.

Literary and critical inquiry **MA** mathematics **CS** computation **SQ** quantitative analysis **HU** humanities and fine arts **SB** social and behavioral sciences **SG** natural sciences—general core **SQ** natural science **GC** cultural diversity in the United States **GG** global awareness **H** historical perspectives

See General Studies page 83

Del E. Webb School of Construction

construction.asu.edu
480 965-3615
SCOB 241

William W. Badger, Director

Professors: Badger Mu gan

Associate Professors: Ar aratnam. Bashford Chasey, Duffy Ernzen, Kash wag , Sawhney, Wa sh Weber W eze

Assistant Professors: F or Knutson

Visiting Eminent Scholar: Schexnayder

PURPOSE

Construction careers are so broadly diversif ed that no single curricul im prepares the student f or universal ntry into all fields As an example heavy constr ct on c ntrac tors usually place more emphasis on tech nica ar d en_ineer ing science skills than do residentia contractors develc pers who usual y prefer a greater depth of knowledge i mai age ment and c onstruct on. To ensure a bala ced unde st nding of the tech n cal, professional, and pl losoph cal stat dards that dist nguish modern day c nstruct rs, ads so y t ups repres nting eading associations of contractors in f bu ders pr vide c un el in curriculun levelop nent Cor str cti n has a con mor core of eng neer n_ sc ence t nagement, and behaviora courses on w ch st ide ts n cy build defn ed concentrat ons to su t ind v dual back rounds, aptitudes and ob ect ves These concentrations c re not bso ute b it enerally n atch n a or divisc ns of the construct n nd is try.

DEGREES

Construction—B.S.

The faculty in the Del E Webb Sch ol of Co istruct n offer the B.S. degree in Construction. Four c ncentrat ons are availab e genera bu ldin_ constru ti n, heavy c nstruc tion, residential construct n, and specialty construction.

Each concentratio is arranged to a ent requisite techni cal sk lls and to develop management ca lership and com petitive qualities in the stu lent. Prescribed are a c mbina tion of General Studies courses, techn c l courses basic to en neering and construct cn, and c urses on a broad ran e of pplied manaement s bjects fundamental to the bus ness of c nstruct cn ntracting

Construction—M.S.

The faculty n the s hoc l also ffer th e M S degr in Construction. Details for this degree are found in the *Grad uate Cat l* .

Professional Accreditation and Affiliations. The Del E. Webb School of Construction is a member of the Associated Schools of Construction, an organization dedicated to the development and advancement of construction education The construction program is accred ted by the American Council for Construction Education

SPECIAL PROGRAMS

The Del E. Webb Schoo of Construct on n aintains a cooperative agreement w th con munity colleges within Ari zona and also with selected out of state col eges and univer s t es to structure courses that are directly transferable into the construction program at ASU

Student Organizations. The school has a chapter of Sigma Lambda Chi a national honor society that rec nizes h gh aca lem c achievement in accepted construction programs. The schoo is also host to the Associated General Contrac tors of America student chapter, the National Association of Home Bu ders student chapter, and the Construct on Women s Al iance.

Scholarships. Apart from those given by the university, a nur ber of sch o arships from the construction industry are awarded to students regist ed in the construction program The scholarsh ps are awarded on the basis of academic achieven ent and participation in act vities of the construc tion pro ram

ADMISSION

For information regard ng requ rements for admission transfer, retent on, qualificat on, and reinstatement, see "Undergraduate Admissic n," page 58; "Admissic n," page 207, and "College De_ree Requirements," page 211. A preprofess or a category is availab e for applicants deficient in regu ar a In ission requirements. Vocat ona and craft ori ented courses taught at the con munity co leges are not a cepted for cred t toward a bache or's degree in Construc tion

BASIC REQUIREMENTS

Students complete the fo owing basic requiren ents before registering for advanced courses: 1) Al first semes ter, first year courses and the univers ty First Year Compo s tion requ ren ent see "U iversity Graduation Requ re ments, page 79) must be comp eted by the time the student has ac un u ated 48 semester hours of program require me nts, and 2) all second semester, first year courses must be comp eted by the tin e the student has completed 64 sen ester hours of pro ram requirements. Transfer students are g ven a one se nester wa ver. Participation in a summer he d internship activ ty is required for a l students between the second and third years of the program.

Any student not making sat factory pro ress is permitted to register for o ly those courses required to c rrect any defic encies

DEGREE REQUIREMENTS

A minimum of 128 semester hours with at least 50 hours at the upper divis on evel is required for graduation in eneral build n construction, heavy construction residen tial construction, and spec alty construction Students in all conc ntrations are required to complete a constr ction core

of science based engineering, construction, and management courses.

GRADUATION REQUIREMENTS

A student must earn a grade of "C" or higher in the mathematics and physics courses listed in the program of study.

In addition to fulfilling school and major requirements, majors must satisfy the General Studies requirements as noted in "General Studies," page 83, and all university graduation requirements as noted in "University Graduation Requirements," page 79. Note that all three General Studies awareness areas are required. Consult your advisor for an approved list of courses.

SCHOOL COURSE REQUIREMENTS

The school requires that the General Studies requirement be satisfied in the following manner:

Humanities and Fine Arts Social and Behavioral Sciences

CON 111	Construction and Culture: A Built Environment *HU G H*	3
ECN 111	Macroeconomic Principles *SB*	3
ECN 112	Microeconomic Principles *SB*	3
HU	SB and awareness area courses as needed	3
HU	SB and awareness area courses as needed upper division	3
Total		15

Literacy and Critical Inquiry

COM 225	Public Speaking *L*	3
CON 496	Construction Contract Administration *L*	3
Total		6

Natural Sciences

PHY 111	General Physics *SQ*	3
PHY 112	General Physics *SQ*	3
PHY 113	General Physics Laboratory *SQ*[1]	1
PHY 114	General Physics Laboratory *SQ*[1]	1
Total		8

Mathematical Studies

MA 270	Calculus with Analytic Geometry I *MA*	4
STP 226	Elements of Statistics *CS*	3
Total		7
General Studies school requirements total[3]		36

[1] Both PHY 111 and 113 must be taken to secure SQ credit.

[2] Both PHY 112 and 114 must be taken to secure SQ credit.

[3] Because of the school's requirement for MAT 270, the total semester hours exceed the General Studies requirement of 35.

Construction Major Requirements Common to All Concentrations (Except as Noted)

ACC 230	Uses of Accounting Information I or ACC 394 ST: Financial Analysis and Accounting for Small Businesses 3 *	3
CEE 340	Hydraulics and Hydrology	3
CON 221	Applied Engineering Mechanics: Statics	3
CON 243	Heavy Construction Equipment, Methods, and Materials	3
CON 244	Working Drawings Analysis	1
CON 251	Microcomputer Applications for Construction	3
CON 252	Building Construction Methods, Materials, and Equipment	3
CON 273	Electrical Construction Fundamentals	3
CON 296	Field Internship	0
CON 310	Estimating of Materials for Construction	3
CON 323	Strength of Materials	3
CON 341	Surveying	3
CON 345	Mechanical Systems	3
CON 371	Construction Management and Safety	3
CON 383	Construction Estimating	3
CON 389	Construction Cost Accounting and Control *CS*	3
CON 424	Structural Design	3
CON 450	Soil Mechanics in Construction	3
CON 453	Construction Labor Management	3
CON 455	Construction Project Management	3
CON 463	Foundations	3
CON 495	Construction Planning and Scheduling *CS*	3
ECE 100	Introduction to Engineering Design *CS*	3
LES 306	Legal, Ethical and Regulatory Issues in Business or LES 306 Business Law 3 ASU West or LES 380 Consumer Perspective of Business Law 3	3
Physical science elective with lab		4
Total common to all concentrations		71

ACC 394 ST. Financial Analysis and Accounting for Small Businesses is recommended.

Advisor approved alternates transfer credits for these courses may vary from the total required semester hours indicated. Such variances do not reduce the minimum of 128 semester hours required for the degree.

The course work for the first two years is the same for all concentrations.

First Semester

CON 101	Construction and Culture: A Built Environment *HU G, H*	3
ECN 111	Macroeconomic Principles *SB*	3
ENG 101	First Year Composition	3
MAT 270	Calculus with Analytic Geometry I *MA*	4
PHY 111	General Physics *SQ*	3
PHY 113	General Physics Laboratory *SQ*	1
Total		17

Second Semester

CON 244	Working Drawings Analysis	1
ECE 110	Introduction to Engineering Design *CS*	3
ECN 112	Microeconomic Principles *SB*	3
ENG 102	First Year Composition	3
PHY 112	General Physics *SQ*	3
PHY 114	General Physics Laboratory *SQ*[2]	1
HU elective with awareness area as needed		3
Total		17

Third Semester

CON 221	Applied Engineering Mechanics: Statics	3
CON 243	Heavy Construction Equipment, Methods, and Materials	3
CON 251	Microcomputer Applications for Construction	3
CON 273	Electrical Construction Fundamentals	3
STP 226	Elements of Statistics *CS*	3
Total		15

L literacy and critical inquiry MA mathematics CS computer statistical quantitative application HU humanities and fine arts SB social and behavioral science SG natural science—general core courses SQ natural science quantitative C cultural diversity in the United States G global H historical See General Studies page 83

Fourth Semester

ACC 230 Uses of Accounting Information I 3
or ACC 304 ST Financial Analysis and Accounting for Small Business 3
COM 295 Public Speaking L 3
CON 252 Building Construction Methods, Materials, and Equipment .. 3
CON 323 Strength of Materials 3
Physical science elective with lab 4

Total 16

Both PHY 111 and 113 must be taken to secure SQ credit
Both PHY 112 and 114 must be taken to secure SQ credit
ACC 304 ST Financial Analysis and Accounting for Small Business is recommended

Concentration in General Building Construction

The general building construction concentration provides a foundation for students who wish to pursue careers as estimators, project managers, project engineers, and eventually, owners of firms engaged in the construction of industrial commercial, and institutional structures. Educational focus is on building systems required for the mass development and production of large scale projects. General building construction is addressed as an integrated process from conception through delivery of completed facilities to users.

Requirements

CON 472 Development Feasibility Reports L 3
CON 483 Advanced Building Estimation 3
PLP 432 Planning and Development Control Law 3
PLP 433Z Planning Ordinances Subdivision Regulations, and Building Codes 3
REA 380 Real Estate Fundamentals 3
Upper division technical elective 3

Total 15

Concentration in Heavy Construction

The heavy construction concentration prepares students for careers related to the public works discipline. Typical projects in which they are involved are highways, railroads, airports, power plants, rapid transit systems, process plants, harbor and waterfront facilities, pipelines, dams, tunnels, bridges, canals, sewerage and water works, and mass earth work.

Requirements

CON 344 Route Surveying 3
CON 486 Heavy Construction Estimating 3
Upper division business elective 6
Upper division technical elective 3

Total 15

Concentration in Residential Construction

The residential construction concentration prepares students for careers in the residential sector of the industry. This concentration covers the specific methods and processes during the planning, production, marketing, and business related activities common to residential construction.

Requirements

CON 377 Residential Construction Production Procedure
CON 477 Residential Construction Business Practices 3
CON 484 Internship 3
MKT 301 Principles of Marketing 3
PLP 432 Planning and Development Control Law 3
or PLP 433Z Planning Ordinances Subdivision Regulations, and Building Codes 3

Total 15

Concentration in Specialty Construction

The specialty construction concentration prepares students for careers with specialty constructors, such as mechanical and electrical construction firms. It emphasizes the construction process at the trade contractor level.

Requirements

CON 468 Mechanical and Electrical Estimating 3
CON 477 Mechanical and Electrical Project Management 3
CON 494 ST Classroom Construction 3
Upper division business electives 6

Total 15

CONSTRUCTION (CON)

CON 101 Construction and Culture. A Built Environment. (3)
fall and spring
Analyzes the cultural context of construction, emphasizing its centrality to the built environment and expansion of the built environment as a process of cultural value systems. Lecture. Speaker.
General Studies HU G H

CON 221 Applied Engineering Mechanics: Statics. (3)
fall and spring
Vectors for resultant moments for resultant systems equivalent balance structural and structural components friction centroids and moments of inertia. Prerequisites: MAT 270, PHY 111, 113

CON 243 Heavy Construction Equipment, Methods, and Materials. (3)
fall and spring
Emphasizes the construction fleet operations maintenance program methods and procedures to construct tunnels roads dams and the excavation of buildings. Lab fee $tr p

CON 244 Working Drawings Analysis (1)
fall and spring
Independent analysis of construction drawings blueprint reading interpreting symbols dimensioning projection and generation organization. Extensive workbook activity. Lecture. Lab

CON 251 Microcomputer Applications for Construction. (3)
fall and spring
Applies the microcomputer as a problem solving tool for the construction industry. Uses spreadsheet formatting management and multimedia software. Prerequisite: ECE 10

CON 252 Building Construction Methods, Materials, and Equipment. (3)
fall and spring
Emphasizes Vertical construction methods materials codes and equipment used in building construction corresponding to the 16 divisions of Masterformat. Lecture. Lab

CON 273 Electrical Construction Fundamentals. (3)
fall and spring
Circuits and machinery. Power transformers and distribution with emphasis on secondary distribution systems. Measurements and instrumentation. Lecture. Field trips. Prerequisite: PHY 112, 114

CON 294 Special Topics. (1–4)
selected semester
Topics may include the following:
• Working Drawing and Specification Analysis

CON 296 Field Internship. (0)
summer
Participation in internship of construction projects to observe and experience the daily activities of internship.

CON 310 Testing of Materials for Construct on. (3)
fa and sp ng
Structura and behav ora c aracter t cs eng neer g propert es measurements and app cat on of construct on mater a s Not open to eng neer ng tudents Lecture ab Prerequ s te CON 323

CON 323 Strength of Materials. (3)
fa and spr g
Ana yzes strength and r g d ty of structura member n res st ng app ed forces Stre s tra n shear moment deflect ons comb ned stres es nnect ons a d moment d tr but on B th U S and S un ts of measurement Prerequ s te CON 221

CON 341 Surveying. (3)
fa and spr ng
Theory and f e d work n co str ct on and and surveys Lecture ab Prerequ s te MAT 170

CON 344 Route Surveying. (3)
spr ng
S mp e, compound and trans t on curves, nc ud ng econna ssance pre m na y and o at on surveys Ca cu at on of earthwork D men s ona contro for constr t on projects Lecture ab. Prerequ s tes CON 243 341

CON 345 Mechanical Systems (3)
fa and sp ng
Des gn parameters and equ pment re ated to heat ng and coo ng sys tems for me han ca construct on Computer a ded ca cu at on Lec ture f e d tr ps Prerequ tes CON 252 PHY 111 113

CON 371 Construction Management and Safety (3)
fa and spri g
Organ zat on and management theory app ed to the construct o pro cess Leadersh p fu ct s Safety procedu e and equ pment OSHA requ rements for construct on Prerequ s te CON 252

CON 377 Res'dential Construct'on Production Procedures. (3)
spr ng
P cess used n res dent a construct n H w a house s bu t des gn perm ts sc edu ng codes tra t ng s te management me han ca e e tr ca Prerequ s te CON 252

CON 383 Construction Estimating. (3)
fa l and spr ng
Draw ngs and spec f cat ons Methods and techn ques used n con struct on est mat ng procedures Introduces computer software used n ndustry Lecture pro ect w rkshops Prerequ s tes. a comb nat on f CON 243 and 251 and 252 or on y nstructor approva

CON 389 Construction Cost Accounting and Control. (3)
fa and spr ng
Nature of c nstru t on cost Deprec at on and tax theory and var ab e equ pment costs Cash f ow theory nvestment mode s prof tab ty and ana ys s Computer app cat ons Fund ng sources and arrange ments Bu der s ns ran e Prerequ s tes ACC 230 or 394 ST F nan c a Ana ys s and Ac ount ng for Sma B s nesses CON 251
Genera Stud s CS

CON 424 Structural Design. (3)
fa
Econom c use of concrete, stee , and wood n bu d ng and eng neered structures Design f beams c mns c crete f mwork and c n nect ons Lectu e f e d tr ps Prerequ te CON 310

CON 450 Soil Mechanics in Construction. (3)
fa and spr ng
So mechan cs as app ed to the onst u t on f e d nclud ng founda t ons ghways reta n ng wa s and s ope stab ty Re at onsh p between so character st cs and geo og c format ons Not open to eng eer ng student Le ture ab Prerequ s te CON 323

CON 453 Construction Labor Management. (3)
fa and spr ng
Labor and management h story un o and open shop organ zat on of bu d ng a d construct on workers app cab e aws and government regu at ons goa s, e onom c power jur sd t ona d sputes, and gr ev ance procedures Lectu e ab Prerequ s tes CON 371 ECN 112

CON 455 Construction Project Management. (3)
fa and sp ng
St dy of methods for oord nat ng peop e equ pment mater a s money and schedu e to comp ete a project on t me and w th n approved co t Lect re a projects Prereq s te CON 371 Pre or corequ s te CON 495

CON 463 Foundat ons. (3)
spr ng
Subsurface c nstruct on theory and pract ce for descr pt on excava t on exp orat on foundat ons pavements, and s opes Eva uat on of spec f at ons and p ans of work Lecture rec tat on f e tr ps Pre eq u s tes CON 424 450

CON 468 Mechanical and Electrical Estimating. (3)
fa
Ana ys s and organ zat on of perform ng a cost est mate f both mechan c and e ectr ca construct on pro e ts Computer usage Prerequ s tes a comb nat on of CON 273 and 345 and 383 or on y nstructor approv

CON 471 Mechanical and Electrical Project Management. (3)
spr ng
Spec a ty contr cts and agreements, schedu ng mater a and ng abor un t ana ys s and ob ost ng for mechan ca and e ectr ca con stru t on Prerequ s te CON 371

CON 472 Deve opment Feas bil ty Reports. (3)
fa and spr ng
ntegrates econom c ocat on theory deve opment cost data market research data and f nanc a ana ys s nto a feas b ty report Com puter or entat on Prerequ s te REA 380
Genera Stud es

CON 477 Residential Construction Business Practices (3)
fa
Top s addressed nc ude deve opment market ng, f nanc ng, ega ssues, and sa es Prerequ s te CON 3 7 or nstructor approva

CON 483 Advanced Building Estimating. (3)
fa and spr ng
Concepts of pr c ng a d markup deve opment of h stor c co t fe yc e cost ng change order and conceptua est mat ng and empha s z ng m crocomputer methods Prerequ s te CON 383

CON 484 Internship. (1–12)
se ected semeste s

CON 486 Heavy Construction Est'mat'ng. (3)
fa
Method a a ys s and cost est mat on for construct on of h ghways br dges tu ne s dams and other eng neer ng works Lecture f e d tr ps Prerequ s tes CON 344 383

CON 494 Special Top cs. (1–4)
fa and spr ng
Top cs may nc ude the fo w ng
- C eanroo Construct on 3
  fa

CON 495 Construction Planning and Scheduling. (3)
fa and sp ng
Var u network methods of project schedu ng, such as AOA AON Pert bar hart ng ne of ba ance and VPM techn ques M crocom puters used f r schedu ng resource a ocat on and t me cost na y s s Lecture ab Prerequ s tes CON 383· STP 226 Pre or corequ s te CON 389
Genera Stud es CS

CON 496 Construction Contract Admin stration. (3)
fa and pr ng
Surveys adm n strat ve procedures of genera and subcontractors Stud es documentat on c a ms arb trat on t gat on, bond ng nsur ance and ndemn f cat on D scusses eth ca pract ces Lecture f e d tr ps Prerequ s tes COM 225 or ECE 30 · sen o stand ng
Genera Stud es· L

CON 533 Strategies of Estimating and Bidding. (3)
fal
Exp ores advanced concepts of the est mat g process such as mod el ng and stat st ca ana ys s to mprove b d accurac es Prerequ s te CON 483 or 486 or nstructor approva

L te acy a d cr t ca nqu y **MA** mathemat s **CS** omputer tat st s qua t tat e app c t on **HU** human t e a d f e a t **SB** a d behav o a c e es **SG** natu a c e ce gene a co cou se **SQ** natu a c ence q t tat ve **C** cu tu a d vers ty n the U t d St tes **G** g oba H h sto ca See Genera tud es page 83

CON 540 Construct on Product'vity. (3)
fa
Product v ty concepts Data co ect on Ana ys s of product v ty data and facto s affect ng product v ty Means for mprov ng product on and study of product v ty mprovement programs Pre or corequ s te CON 495

CON 543 Construction Equipment Engineering. (3)
spr ng
A a yzes heavy construct on equ pment product v ty us ng case tud e App es eng neer ng fundamenta s to the p ann ng se ect on and ut zat on f equ pment Lecture case stud e

CON 545 Construct on Project Management. (3)
spr g
Theory and pra t ce of on truct on pr ject management Ro es of des gner owner gene a contractor and con truct on manager Lec ture f e d tr ps Pre or corequ s te CON 495

CON 547 Strategic Plann ng. (3)
fa
Bus ness p ann ng process of the construct on enterpr se D fferences between pub c y he d and c ose y he d bus nesses and the r exposure

CON 561 International Construction. (3)
spr ng
nvest gat on of the cu tura soc a econom c po t ca and manage ment ssues re ated to onstru t on n fore gn c untr es and remote eg ons

CON 565 Performance-Based Systems. (3)
fa
dent fy ng the mu t cr ter a methodo ogy n the procureme t of fac t es co tractua work Prerequ s te nstructor appr va

CON 567 Advanced Procurement Systems. (3)
spr ng
Deve pment f mu t cr ter a dec on pr curement mode f se ect ng the perform ng ontract r Prerequ s te. nstructor approva

CON 570 Cleanroom Construct'on I. (3)
fa
Des gn ssues for c eanroom fa t es the construct on s v ewpo nt n d ng p ann ng structures. me han ca and to nsta at on Lec ture s te v s ts Prerequ te nstructor approva

CON 571 Cleanroom Construction II. (3)
spr ng
Con truct on ssue for c eanroom fac t es nc ud ng schedu g st est mat ng pro ect manageme t me han ca safety cert f cat on and tool hook up Lecture s te v s ts Prerequ s te CON 570 or nstructor appr va

CON 575 Information Technology in Construction. (3)
spr ng
e of format on techno ogy the construct on enterpr se for mproved ommun cat on process mode ng, and dec on mak g Prerequ s te structor approva

CON 589 Construction Company Financ al Contro . (3)
fa
F nanc a account ng a d cost contro at the company eve n con struct on compan es A count ng systems C n truct on proje t pr f t ca cu at ons F nanc a ana ys s Lecture case stud e

Omnibus Courses. For an exp anat o of ou ses offered but not spec f ca y sted th s ata og ee Omn bus Courses page 56

School of Engineering

480 965-1726

ECG 104

Ronald J. Roedel, Director

PURPOSE

A arge percentage of all engineerin_ de_ree holders are found in leadership positions in a w de variety of industrial settings. Although an education in engineering is generally considered to be one of the best techn cal educat ons, it also provides an opportun ty for the development of many addi tional attributes, including ethical and professional charac teristics. In this era of rapid technological change, an engi neering education serves society well as a truly liberal education. Soc ety 's needs in the decades ahead cal for engineering contributions on a scale not previo isly experi enced The well being of civ lization as we know it may depend upon how effective y this resource is developed

Students studying engineering at ASU are expected to acquire a thorough understanding of the fundamentals of mathematics and the sciences and their app ic ations to the solution of prob ems in the various engineer ng fields The program is designed to develop a balance between science and engineer ng and an understanding of the economic and social consequences of engineering activity. The goals include the prom tion of the _er eral welfare of the engi neering profession.

The courses offered are designed to n eet the needs of the follow ng students:

1. those who wish to pursue a career in engine ring,
2. those who wish to do graduate work in eng neering
3. those who wish to have one or two years of training in mathematics, applied science, and en_ineering in preparation for some other technical career;
4. those who desire preengineering for the purpose of deciding which program to undertake or those who desire to transfer to another college or university; and
5. those who wish to take certain electives in engineer ing while pursuing another program in the univer sity.

ADMISSION

For information regarding requ rements for admission, transfer, retention, disqual fication, and reinstatement, see "Undergraduate Admission," page 58; "Admiss on," page 207; "College Degree Requ rements ' page 211; and "Academic Standards," page 211.

Individuals who are beginning the r in t al college work in the School of Engineering should have completed certain secondary school units in addition to the minimum univer sity admission requirements. Four units are required in

mathematics; a course with trigonometry should be included. The laboratory sciences chosen must include at least one unit in physics and one unit in chemistry. Calculus, biology, and computer programming are also recommended. Students who do not meet the college's subject matter requirements may be required to complete additional university course work that may not apply toward an engineering degree. One or more of the courses CHM 113 General Chemistry, CSE 181 Applied Problem Solving with Visual BASIC, MAT 170 Precalculus, and PHY 115 Basic Physics may be required to satisfy admissions or deficiencies upon admission.

DEGREES

The Bachelor of Science in Engineering B.S.E. degree consists of three parts:

1. university requirements e.g., General Studies, First Year Composition;
2. an engineering core, and
3. a major.

The B.S. degree in Computer Science consists of two parts: 1. university requirements (e.g., General Studies, First Year Composition); and 2. a major.

The courses identified for each of these parts are intended to meet requirements imposed by the university and by the professional accrediting agency, Accreditation Board for Engineering and Technology, Inc. ABET, for programs in engineering and computing science, respectively.

In addition to First Year Composition, the university requires, through the General Studies requirement courses in literacy and critical inquiry, humanities and fine arts, social and behavioral sciences, mathematical studies and natural sciences (see "General Studies," page 53). There are also requirements for historical awareness, global awareness, and cultural diversity in the United States. ABET imposes additional requirements, particularly in mathematics and the basic sciences and in the courses for the major.

The engineering core is an organized body of knowledge that serves as a foundation to engineering and to specialized studies in a particular engineering major.

The courses included in the engineering core are taught in such a manner that they serve as basic background material (1) for all engineering students who will be taking subsequent work in the same and related subject areas; and (2) for those students who may not desire to pursue additional studies in a particular subject area. Thus, subjects within the engineering core are taught with an integrity and quality appropriately relevant to the particular discipline but always with an attitude and concern for both engineering in general and for the particular major.

The majors available are of two types: 1) those associated with a particular department within the School of Engineering, for example, Electrical Engineering and Civil Engineering; and 2) those offered as concentrations in Engineering Special Studies, for example, premedical engineering. With the exception of the Computer Science major, all curricula are extensions beyond the engineering core and cover a wide variety of subject areas within each field. Some of the credits in the major are reserved for the student's use as an area of study. These credits are traditionally referred to as *technical electives*.

Majors and areas of study are offered by the seven departments:

Department of Bioengineering
Department of Chemical and Materials Engineering
Department of Civil and Environmental Engineering
Department of Computer Science and Engineering
Department of Electrical Engineering
Department of Industrial Engineering
Department of Mechanical and Aerospace Engineering

The major in Engineering Special Studies is administered by the Office of the Dean, Engineering. Special Studies makes use of the general structure of the engineering curricula noted above and provides students with an opportunity for study in engineering concentrations not available in the traditional engineering curricula at ASU.

The first two years of study are concerned primarily with general education requirements, English proficiency, and the engineering core. The final two years of study are concerned with the engineering core and the major, with a considerable part of the time being spent on the major.

The semester by semester selection of courses may vary from one field to another, particularly at the upper division level, and is determined by the student in consultation with a faculty advisor. An example of a typical full time freshman year schedule is shown below, depending on a particular student's circumstances, many other examples are possible.

Typical Freshman Year

CHM 113/115 General Chemistry/Lab I *SQ*	4
ECE 100 Introduction to Engineering Design *SQ*	3
ECN 211 Macroeconomic Principles *SB* or ECN 212 Microeconomic Principles *SB*	3
ENG 101 First Year Composition	3
ENG 102 First Year Composition	3
MAT 270 Calculus with Analytic Geometry I *MA*	4
MAT 271 Calculus with Analytic Geometry II *MA*	4
PHY 121 University Physics I Mechanics *SQ*	3
PHY 122 University Physics Laboratory I *SQ*	1
HUM/SB and/or elective course	3
Total	32

Both PHY 121 and 122 must be taken to secure SQ credit.

We prepared students who have no outside commitments can usually complete the program of study leading to an undergraduate degree in engineering in four years, eight semesters at 16 semester hours per semester. Many students however find it advantageous or necessary to devote more than four years to the undergraduate program by pursuing, in any semester, fewer studies than are regularly prescribed. Where omissions or deficiencies exist—e.g., in chemistry, computer programming, English, mathematics, and physics—the student must complete more than the minimum of 128 semester hours. Therefore, in cases of

Literacy and critical inquiry **MA** mathematical **CS** technical **SQ** quantitative application **HU** humanities and fine arts **SB** social and behavioral sciences **SG** natural science **G** global awareness **H** historical awareness **D** cultural diversity in the United States **GE** general education **page 8**

inadequate secondary preparation, poor health, or financial necessity requiring considerable time for outside work, the undergraduate program is extended beyond four years.

DEGREE REQUIREMENTS

The degree programs in engineering at ASU are intended to develop habits of quantitative thought having practical utility for both the practice of engineering and other professional fields. In response to the opportunities provided by changing technology, educational research, and industrial input, possible improvements of various aspects of these programs are routinely considered. It is the intent of the faculty that all students be appropriately prepared in the four areas described below.

1. *Oral and Written English.* Communication skills are an essential component of an engineering education. All engineering students must complete the university First Year Composition requirement (see "University Graduation Requirements," page 79) and the literacy and critical inquiry component (see "Five Core Areas," page 83) of the General Studies requirement, which involves two courses beyond First Year Composition.
2. *Selected nonengineering topics.* This area ensures that the engineering student acquires a satisfactory level of basic knowledge in the humanities and fine arts, social and behavioral sciences, mathematical studies, and the natural sciences. Courses in these subjects give engineers an increased awareness of their social responsibilities, provide an understanding of related factors in the decision making process, and also provide a foundation for the study of engineering. Required courses go toward fulfilling the General Studies requirement. Additional courses in mathematics and the basic sciences are selected to meet ABET requirements.

   Because of accreditation requirements, aerospace studies (AES) and military science (MIS) courses are not acceptable for engineering degree credit in fulfilling the humanities and fine arts and social and behavioral science portions of the General Studies requirement.
3. *Selected engineering topics.* This area involves courses in engineering science and engineering design. The courses further develop the foundation for the study of engineering and provide the base for specialized studies in a particular engineering discipline. The specific courses are included in the engineering core and in the major. While some departmental choices are allowed, all students are required to take ECE 100 Introduction to Engineering Design and ECE 300 Intermediate Engineering Design as part of the engineering core. These courses together with other experiences in the engineering core and in the major, serve to integrate the study of design, the "process of devising a system, component, or process to meet desired needs" (ABET), throughout the engineering curricula.
4. *Specific engineering discipline.* This area provides a depth of understanding of a more definitive body of knowledge that is appropriate for a specific engineering discipline. Courses build upon the background provided by the earlier complete portions of the curriculum and include a major design experience as well as technical electives that may be selected by the student with the assistance of an advisor. The catalog material for the individual engineering majors describe specific departmental requirements.

COURSE REQUIREMENTS

A summary of the degree requirements is as follows:

First Year Composition	6
General Studies (see below)	35
Engineering core	14–18
Major (including area of study or concentration)	48–52
Minimum total	128

The requirements for each of the areas listed here are described on the following pages.

Specific course requirements for the B.S. and B.S.E. degrees follow.

First-Year Composition

Choose among the course combinations below	6
ENC 101 First Year Composition	3
ENG 102 First Year Composition	3
ENG 105 Advanced First Year Composition	3
Elective chosen with an advisor	3
ENG 107 English for Foreign Students	3
ENG 108 English for Foreign Students	3
Total	6

General Studies School Requirements

Humanities and Fine Arts, Social and Behavioral Sciences	
ECN 111 Macroeconomic Principles *SB*	3
or ECN 112 Microeconomic Principles *SB*	
HU and awareness area courses	6 or 9
SB and awareness area courses	6 or 3
Total	15
Literacy and Critical Inquiry	
ECE 303 Intermediate Engineering Design *L*	3
ECE 494 Engineering Communication *L*	3
or approved department L course	3
Total	6
Mathematics, Computer and Quantitative Studies	
ECE 100 Introduction to Engineering Design *CS*	3
MAT 270 Calculus with Analytic Geometry I *MA*	4
MAT 271 Calculus with Analytic Geometry II *MA*	4
MAT 272 Calculus with Analytic Geometry III *MA*	4
MAT 274 Elementary Differential Equations *MA*	3
Department mathematics elective	3
Total	22
Natural Sciences, Basic Sciences	
CHM 114 General Chemistry for Engineers *SQ*	4
or CHM 116 General Chemistry *SQ*	4
PHY 121 University Physics: Mechanics *SQ*	3
PHY 123 University Physics Laboratory I *SQ*	1

PHY 131 U iversity Physics I Electricity a l Ma netism SQ 3
PHY 2 iversity Ph s s Laboratory I SQ[3] 1
Depart er t basic s ence e ect e 3

ta 15
Gene Studies schoo requirements total. 56

[1] En t cering studen ts n ay not use ae ospace studies AES or m lita y science M S courses to fulfil HU or SB requirements C urses in the awareness areas of Global, h storical, and cultural d ers ty in the Unit d States n ust also be represented in the pro gram of st dy. One ourse n ust be upper div sion.

Both PHY 21 and 122 m st be taken to ecure SQ cred t

[3] Both PHY 131 ar d 2 n ust be taken t secu e SQ credit

Engineering Core Requirement

In dd t on in ECE 100 and 300, which also fulfill a por tion of the university General Stud es requirement, a mini mum of five of the following eight courses are required Courses selected are subject to departmental approval. See department requirements

ECE 2 1 Electrical Net orks I 4
ECE 2 (Engineer n Mechanics I St tics. 3
ECE 21 Engineering Mecha ics II: Dynamics 3
ECE 214 Engineering Me hanics. 4
ECE 313 Introduction to Def ormable S lids 3
ECE 314 Electronic Devices and Instrumentation 4
ECE 340 Thermody amics. 3
or CHE 342 Applied Chemical Therm odynamics 4
or MSE 43 Thermodynamics of Materials 3
ECE 351 Structure and Propert es of Materials 3
or ECE 351 Civil E gineering Materials 3
or ECE 352 Propert es of Electronic Materials 4
Choose one microcon puter microprocessor cou se below ..... 3 or 4
BME 470 Micr computer App ications n Bi engineer ng 4
CHE 461 Process Contro CS 4)
CSE 225 Assembly Language Programming and Microprocessors Motorola) 4
or EEE 225 Assembly anguage Programming and M c oprocessors Motorola 4
CSE 226 Assembly Language Programming and Microprocessors Inte (4
r EEE 226 Assembly Language Prog amming and M croprocessors Inte 4
IEE 463 Computer A ded Manufacturing and Contr CS 3

GRADUATION REQUIREMENTS

To qual fy for graduation from the School of Engineer ing, a student must have a minimum cumulative GPA of 2.00 in addition to having a GPA of at least 2.00 for the courses in the major field

PROFESSIONAL ACCREDITATION

The undergraduate programs in Aerospace Engineering, Bioengineering, Chemical Engineering, Civil Eng neering, Computer Systems Engineering, Electrical Engineering, Industrial Engineering, Materials Science and Engineering, and Mechanical Engineering are accredited by the Engi neering Accreditation Commission of ABET Baltimore, Maryland, 410 347 7700. The B.S. program in Computer Science is accredited by the Computer Science Accredit t on Commission of ABET.

ANALYSIS AND SYSTEMS (ASE)

ASE 100 College Adjustment and Surviva . (2)
fa and pr ng
Exp ores career goa and major Emphas zes rgan zat on nd deve opment of study sk s nc ud ng t me management st ess man agement and use of the brary

ASE 194 Special Topics. (1–4)
fa
Top cs may n de the fo ow ng
• MEP Academ c Succe

ASE 399 Cooperative Work Exper ence. (1)
fa spr ng s mmer
Work per ds w th ndustr a f rms o government agenc es a ternated w th fu t me co rse w rk N t open to tudent fro othe o eges May be repeated f r c ed t Prerequ s tes 45 hours comp eted major w th 2 50 GPA dean app ova

ASE 485 Engineering Statistics. (3)
fa spr ng summer
Des gn ng stat st ca stud es for so ut on to eng neer ng prob ems Methods nc ude regress on des gn and ana ys of exper ments a d other stat st ca top cs Prerequ s te ECE 380
Genera Stud es CS

ASE 490 Project in Design and Development. (2 3)
fa spr ng summer
Ind v d a pro ect n creat ve de gn and synthes s May be repeated f r cred t Prerequ s te sen or stand g

ASE 496 Professional Seminar. (0)
fa and spr ng
Top cs of nterest to students n the e g neer ng spec a and nterd sc p ary stud es

ASE 500 Research Methods: Eng neering Statistics. (3)
fa spr ng summer
Des gn ng stat st ca stud es for so ut ons to eng neer ng prob em Methods c ude regress on, des gn and ana ys s of exper ents nd ther stat st ca top cs P ereq s te ECE 380

ASE 582 Linear Algebra in Engineering. (3)
fa
Deve opment nd so ut on of ystems of near a gebra c eq at ons App cat ons from mechan ca structura and e ectr ca f e ds of eng eer ng Prerequ s te MAT 42 r t equ va ent

ASE 586 Partia D fferentia Equations n Engineer ng. (3)
spr ng
Deve opment and so ut on of part a d fferent a equat ons n eng neer ng App cat ons n so d me han c v brat ons and heat tran fer Pre requ s tes MAT 242 274

Omnibus Courses. For an exp anat on of course offered but ot spec f ca y ted n th s cata og see mn bu Course page 56

ENGINEERING CORE (ECE)

ECE 100 Introduction to Engineering Design (3)
fa and spr ng
ntroduces eng neer ng de gn team g t e p fess n of eng neer ng computer mode s n eng nee ng commun cat o sk s ua ty and customer sat fact o Prereq s tes g schoo omput ng and phys cs and a gebra courses or the r equ va ents
Gene a Stud es CS

ECE 194 Special Topics (1–4)
fa and spr ng
Top may nc ude the fo w ng
• ntroduct on to Eng neer ng Des gn
• troduct on to Eng neer ng Des gn

L teracy and c t ca nqu y MA mat e at CS mputer stat st s qua t tat ve at s HU huma t d f e rt SB o a and behav r e e SG natura e c ge era re o e SQ natura c e e q ant tat ve C u tura d e t t e ted St te G g oba H st See Ge er Stud e page 8

ECE 200 E ements of Engineering Design (3)
fa and p g
Advanced ver on of ECE 1 0 f tude ts wh t a fe to A U afte omp et o of t e stated prereq te ed t a owed fo on y ECE 10 or 200 Le ture ab Prerequ s te f eng nee ma s ENG 101 or 105 MAT ⌐70 P Y 121 122 Prerequ s te for Construct on majors ENG 101 or 105 MAT 2⁻ PHY 111 11 Pre r r qu s te for eng neer ng ma or CHM 113 or 114 116

ECE 201 Electrical Networks . (4)
ta spr ng summer
ntroduce e ectr a netwo ks Co ı oner t mode tran ent and teady state a ys s Lectu e ab Prereq s te ECE 10 o 194 ST ntrodu t o to Eng neer ng De g a d nt du t t Eng n e ng D s gn r 0 Pre or requ tes MAT 274 PHY 131 132

ECE 210 Engineer ng Mechanics I: Stat cs. (3)
fa sp ng summer
F e ystems re u tants equ br um d tr buted forces area moments f u d tat s nte na tres es fr ct n nergy r ter on f equ br um and stab ty Le t re e tat on Pre equ tes ECE 10 or 4 tr d t on t ng nee ng De gn and ST trodu t on t Eng neer ng Des g o MAT 2 1 or 291 PHY 121 122

ECE 212 Engineer ng Mechanics I: Dynamics. (3)
fa . spr ng. summer
K nem t cs and k net c of part es tran at g a d otat g coord nate sy tem r g d b dy k nemat cs dynam c of ystems of part c s and r g d b d es nd energy and n me tum pr n p es Lecture rec tat on Prerequ tes ECE 210 MAT 2⁻4

ECE 214 Engineer ng Mechanics. (4)
fa spr ng un mer
orce sy tems re u tants moment and equ br um K nemat and k net c f pa t es sy tem of part c es and r g d bod es Energy and momentum pr nc p e Lecture e tat Prereq s tes ECE 10 or 194 ST ntr duct n to Eng nee ng De gn and S tr du t on t Eng neer ng Des gn or 2 0 MAT 2 4 PHY 121 122

ECE 294 Spec a Top cs (1–4)
se cted semesters
Top may nc ude the f ow ng
• E ement. of Eng neer ng Des gn

ECE 300 Intermediate Eng neering Design. (3)
fa spr ng n me
Eng neer ng de gn proce con ent at ng on crea ng t e ab ty to prepa e we wr tten techn a c mn u ato a d to def e prob ems and ge erate a d eva uate dea Team sk an ed Prerequ s tes ECE 100 or 194 ST Introdu t on to E g eer ng Des g and ST nt odu t on to Enq n er ng De gn or 20 ENG 2 r 5 r 8 at e st two other e g neer ng c re cou se
Genera St d es L

ECE 313 Introduction to Deformable So ıds (3)
fa spr ng summer
Equ br um tra n d pa e ent e at o an st e s st a tempera t re re t ons App at o s to force tran m s on and def rmat ons n a a tor ona and bend ng of bar omb ned oad ngs Lecture rec tat on Prerequ s te ECE 210 or 214 MAT 274

ECE 334 Electronic Devices and Instrumentation. 4)
fa spr g un n e
App es e ctr c network the ry to sem cond ctor c rcu t D odes t an t s amp f er p mps d ta og g tes and e e t n c nstr ts Lecture ab Prereq s te ECE 1

ECE 340 Thermodynamics (3)
fa s r ng summer
Work eat and e ergy tran for at o s a d e at on h ps between prope t e aw ncept a d mode f ana y common t a app cat s of ther dy a cs n e g eer ng Le ture re tat o Prerequ tes HM 114 o 11 ECE 210 or 2 4 PHY 131 132 Pre r corequ te MAT 274

ECE 350 Structure and Properties of Materia s (3)
fa sp ng s mmer
Bas c co e t of mater a tru ture d ts e t o to propert e App cat on to e g eer ng pr b e Pre equ te CHM 1 4 or 116 PHY 121 1 2

ECE 351 Civil Engineer ng Mater a s. (3)
fa and spr ng
t t re and b hav r of c v eng neer ng mate a s. Laboratory nvest at ons and test cr ter a Lecture ab Pre equ s te ECE 313

ECE 352 Properties of Electronic Materials (4)
fa pr ng summer
h d nger s wave equat n, p tent a barr e p ob e s bonds of ry ta the b d theory f o ds em conductor uper onductor d ect c nd magnet c propert es Prerequ s tes CHM 114 o 1 6 MAT 2⁻4 PHY 241

ECE 380 Probab lity and Stat stics for Engineering Problem So v- ing. (3)
fa and spr ng
App at on or e ted c ur e w th comp ter ba ed exper en e u ng t t t ca oftware for formu at ng and so v ng eng neer ng prob ems 2 hour ect re, 2 ho rs ab P e equ s te MAT 2⁻1
Genera Stud es CS

ECE 384 Numerical Methods for Eng'neers. (4)
fa and pr g
Nu er ca methods and computat ona too s for e ected prob ems n e g eer ng Prerequ s tes CE 1 0 194 ST ntroduct n to Eng neer g De gn and ST ntrod t on to E g eer ng Des gn o 200 MAT 274, t east two other e g eer ng c re c urse Pre or corequ s te MAT 27

ECE 394 Specia Topics. (1–4)
fa and sp g
op c may n ude the f ow ng
• C n erva on Pr nc p es 4
• Eng neer ng Systems 4
• ntrod ct on t Man fa tu g Eng neer ng 3
• P opert e that Matter 3

ECE 400 Eng neering Communications (3)
fa spr ng su mer
P an g a d prepar ng eng nee ng pub cat on and ora presenta t ons based on d e ted brary re earch re ated to u rent e g neer ng top cs Prerequ s te ENG 102 or 105 or 1 8 c mp et on of Ge era Stud e L requ rement or E E 3 0 sen or tand ng n a e g eer ng n a or
Ge era Stud es L

Omnibus Courses For an exp nat on of o rse offered but not pec f ca y ted n th s cat og s e m bu Cour e page 56

SOCIETY, VALUES, AND TECHNOLOGY (STE)

STE 208 Patterns n Nature. (4)
fa and p ng
Pro ect r ented ence ourse w th compute tra n ng t deve op c t ca t nk ng and techn a k s f r stude t r ented K 1 s ce es s n Lecture b s sted a PHS 208 Cred t s a wed f r on y PHS 208 r TE 2 8 rerequ s te a co ege eve cou se n sc e e or n t t r approva
Ge era Stud s SQ

Omn bus Courses. F r n e p anat n f courses offered but not sp f ca y sted n th s ata og see Omn b s Courses page 56

Department of Bioengineering

www.eas.asu.edu ~bme
480 965-3028
ECG 334

Eric J. Guilbeau, Chair

Professors: Gu beau, Towe

Associate Professors: Garc a He, asem d s Massia, Pizz con Sweeney, Yamaguch

Assistant Professors: Muthuswamy Pan tch Vernon

Senior Research Professional: Brandon

The facu ty in the Department of Bioengineerin_e offer the B.S E. degree in Bioengineerin_e. The m_jor builds on a broad base of know ledge within the basic and mathematical sciences and the engineering core. The major offers gradu ates excellent car er opportunities

Faculty within the department also p rticipate in the En_ineering Specia Studies program in premedical engi ne ring, which is described separately in "Programs in Engineering Special Studies, page 27?

BIOENGINEERING—B.S.E.

Bioengineering synonyms: bio medical engineering, medical engineering is the discipl ne of engineering that applies principles and n ethods fron engineering, the physi cal sciences, the life sciences, and the medica sciences to understand define, and solve prob ems in medicine, physi ology and bio o_y. The m ssion of the bioengineerin_ pro gram at ASU is to educate students to use en ir eering and scientific principles and n eth ds to develop nstrumenta tion, materials, dia_nostic and therapeutic devices, artificial organs, or other equipment and technologies needed in med icine and bio ogy and to d scover new fun lamental princi ples regardin_ the funct oning and structure of living sys tems The overall goa of the progr im is to produce h _l quality graduates with a broad based education in engineer ing and the life and natura sciences who are well prepare l for further graduate study in bioengineering, a career in the medical device or biotechnology industries, a career in bio medical research, or entry into a medical or other hea th profession school

The program's mission is achieved by having its faculty and graduate teachers fulfill the following objectives: to provide students w th a strong foundation in mathematics, the physical and life sciences, and basic engineering; and to give students a balance of theoretical understanding and ability in order to app y modern techniques, skills, and tools for problem solving at the interface of engineerin_ with the biological and medical scien es Students demonstrate an ability to make measurements on and interpret data from living systems, addressing the problems associated with the interact on between livin_ and nonliv in_ materials and sys tems. Students are able to design systems, devices, compo nents processes, and experiments with an understand ng of man ufacturi g processes to meet real world needs for solu tions to problems in the biomed cal device ir dustries, medi cine, and the life sciences. Students are able to commun i cate effectively as bioengi neers in ora , written, computer based, and graphical forms. Faculty seek to instill students with a sense of con n itment to professio alism and ethical responsibility as bioeng neers. St dents are given opportu nities to interact with and gain real w rld experience w th local and nat onal medical dev ice a d technology industries, health care or anizations, educational institutions, and con stituent popu ation s. Faculty seek to develop within students an understanding of and positive approach toward continued ifelong learning of new technol gies an l relevant issues in the discipline of b oengineering

Graduate degree programs in Bioengineering are offered at ASU at the master s and doctora levels. For more infor mat on, consult the *Gra l t te Catal* ç

DEGREE REQUIREMENTS

A m nimum f 128 semester hours s necessary for the B S E. degree ir Bioengineering A minimum of 50 upper division semester hours is requ red. Students must attain a GPA of at least 2 00 for the courses in the major field.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requ rements, students must sat sfy all universit y graduation requirements See "Univers ty Graduation Requirements," page 79.

COURSE REQUIREMENTS

The course work, in semester hours, for the undergradu ate degree can be c ass fied into the follow ing categories:

First-Year Composition

Choose am ng th e c urse comb nations bel w 6
ENG 10 First Year C n pos t on 3
ENG 102 First Year Compos t on 3
———c
ENG 1 5 Advanced F rst Year Composit on 3
E ective hosen w ith an advis r 3
———c
ENG 1 7 En lish f r Fo eign Students 3
ENC 1 5 En lish f F eign Stu lents 3

Total 6

General Studies School Requirements

Hu anities and Fine Art S i t t IB it al Scien e
ECN 111 Macroec nomic Pr c ples *SB* 3
or ECN 1? M c economi c Pri ciples *SB* 3
HU SB and awareness area courses 12

Total 15

Liter ics and Critical Inquir
BME 413 Bion ed cal Instrumentati n *L* 3
BME 423 Biomedical Instrumentation Laborator *L* 1

L teracy and cr t a qu ry **MA** athemat **CS** c puter stat st cs quant tat ve app cat on **HU** huma t es and f ne art **SB** oc a and behav ora sc en es **SG** natura ence—genera c re ur es **SQ** natura sc en e—quant tat ve **C** u tura d vers ty n t e n ted States **G** g oba H h tor ca See enera Stud es page 83

ECE 300 Intermediate Engineering Design L

Total

Natural Sciences Basic Sciences

CHM 115 General Chemistry SQ 4
CHM 116 General Chemistry SQ 4
PHY 111 University Physics I Mechanics SQ 3
PHY 123 University Physics Laboratory I SQ 1
PHY 133 University Physics II Electricity and Magnetism SQ 3
PHY 332 University Physics Laboratory II SQ 1

Total 16

Mathematical Studies

ECE 111 Introduction to Engineering Design CS 3
ECE 384 Numerical Methods for Engineering 4
MAT 211 Calculus with Analytic Geometry I MA 4
MAT 212 Calculus with Analytic Geometry II MA 4
MAT 272 Calculus with Analytic Geometry III MA 4
MAT 274 Elementary Differential Equations MA 3

Total 22
General Studies school requirements total 16

Engineering Core

ECE 220 Electrical Networks I 4
ECE 230 Engineering Mechanics I Statics 3
ECE 334 Electronic Devices and Instrumentation 4
ECE 340 Thermodynamics 3
ECE 350 Structure and Properties of Materials 3

Total 17

Major

BIO 188 General Biology II SQ 4
BME 211 Introduction to Biomechanics L 3
BME 215 Biomaterials 3
BME 331 Biomedical Engineering Transport Fluid 3
BME 334 Bioengineering Heat and Mass Transfer 3
BME 416 Biomechanics 3
BME 417 Biomedical Engineering Capstone Design 3
BME 435 Physiology for Engineers 4
BME 437 Microcomputer Applications in Biomedical 4
BME 439 Biomedical Engineering Capstone Design II 3
ECE 389 Probability and Statistics for Engineering Problem Solving CS 3
Technical electives 9

Minimum total 45

[1] Both PHY 121 and 122 must be taken to secure SQ credit
[2] Both PHY 131 and 132 must be taken to secure SQ credit

The major BME courses require a grade of "C" or higher to advance in the program and to receive a baccalaureate degree.

Bioengineering Areas of Study

Technical electives should in general be selected from one of the following emphasis areas. Students can elect to emphasize biochemical engineering, biomaterials engineering, biomechanical engineering, biomedical imaging engineering, biosystems engineering, molecular and cellular bioengineering or premedical engineering in their studies. A student may also, with prior approval of the department, select a general area of study or combination of courses that support a career in bioengineering not covered by the following areas.

Biochemical Engineering. This area is designed to strengthen the student's knowledge of chemistry and transport phenomena and is particularly well suited for students interested in biotechnology. Students should choose technical electives from the following:

BCH 461 Principles of Biochemistry 3
or BCH 461H General Biochemistry 3
BCH 462 General Biochemistry 3
CHE 453 Biochemical Engineering 3
CHE 456 Bioreaction Engineering 3
CHE 457 Bioseparation Processes 3
CHM 331 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory 1
CHM 336 General Organic Chemistry Laboratory 1
MIC 470 Immunology Lecture and Laboratory Foundations 3

Bioelectrical Engineering. This area is designed to strengthen the student's knowledge of electrical systems, electronics, and signal processing. Students considering a career in bioelectric phenomena, biocontrol systems, medical instrumentation, neural engineering or electrophysiology should consider this area of study. Students should choose technical electives from the following:

BME 350 Signals and Systems for Bioengineers 3
or EEE 350 Signals and Systems 3
BME 419 Biocontrol Systems 3
EEE 320 Electrical Networks II 3
EEE 425 Digital Systems and Circuits 3
or EEE 435 Analog Integrated Circuits 3

Biomaterials Engineering. This area integrates the student's knowledge of materials science and engineering with biomaterials science and engineering concepts for the design of materials intended to be used for the development of medical and diagnostic devices. It emphasizes structure property relationships of engineering materials (metals, polymers, ceramics, and composites) and biological materials, biomaterial host response phenomena, technical and regulatory aspects of biomaterials testing and evaluation. Students interested in careers in the biomaterials, medical device or biotechnology industries should consider this area of study. Students must take the following two courses:

MSE 350 Introduction to Materials Processing and Synthesis 3
MSE 355 Introduction to Materials Science and Engineering 3

Students should choose additional technical electives from the following:

BME 494 STP Polymeric Drug Delivery 3
MSE 451 Corrosion and Corrosion Control 3
MSE 441 Analysis of Material Failures 3
MSE 450 Polymers and Composites 3
MSE 451 Introduction to Ceramics 3

Biomechanical Engineering. This area is designed to strengthen the student's knowledge of mechanics and control theory. Students interested in careers related to biomechanical analyses, the design of orthotic prosthetic devices and orthopaedic implants, forensic biomechanics, and rehabilitation engineering should consider this area of study. While students may choose any combination of the following technical electives, it is recommended that courses be

selected from one of three subareas in movement biomechanics, rehabilitation engineering, or orthopaedic biomechanics. The movement biomechanics area is designed to strengthen the student's knowledge of dynamics and control theory. Students interested in analyzing pathological human movement disorders, sports techniques, and neuromuscular control should select courses from this area. Rehabilitation engineering emphasizes the design of highly functional products for people with disabilities. Biomechanical, electrical, and mechanical design procedures are used to develop new assistive devices, orthoses, and prostheses. The student primarily interested in the material properties of bones, cartilage, soft tissues, and the design of implants for tissue repair and replacement should select courses from the orthopaedic biomechanics area.

Recommended subarea selections of courses are as follows:

Movement Biomechanics

BME 350	Signals and Systems for Bioengineers or EEE 303 Signals and Systems	3
BME 419	Biocontrol Systems	3
ECE 212	Engineering Mechanics I Dynamics	3
EPE 334	Functional Anatomy and Kinesiology or EPE 444 Electromyographic Kinesiology	3

Rehabilitation Engineering

ECE 212	Engineering Mechanics II Dynamics	3
EPE 334	Functional Anatomy and Kinesiology	3
IEE 437	Human Factors Engineering or DSC 344 Human Factors in Design	3
IND 354	Principles of Product Design	3
MAE 341	Mechanism Analysis and Design	3

Orthopaedic Biomechanics

ECE 212	Engineering Mechanics II: Dynamics	3
ECE 313	Introduction to Deformable Solids	3
EPE 412	Biomechanics of the Skeletal System	3
MAE 404	Finite Elements in Engineering	3

Biomedical Imaging Engineering. This area is designed to strengthen the student's knowledge of radiation interactions, health physics, medical diagnostic imaging (MRI, PET, X-ray, CT), radiation protection, and nuclear instrumentation. Students considering careers in medical engineering or health physics should consider this area of study. Students should choose technical electives from the following or other departmental approved electives:

BME 350	Signals and Systems for Bioengineers or EEE 303 Signals and Systems	3
BME 494	ST: Scanning Probe Microscopy	3
EEE 460	Nuclear Concepts for the 21st Century	3
PHY 366	Introductory Modern Physics	3

Biosystems Engineering. This area is designed to strengthen the background of students interested in physiological systems modeling and analysis and design and evaluation of artificial organs and medical devices. Analyzing physiological systems and designing artificial organs require knowledge in integrating electrical, mechanical, transport, and thermofluid systems. Students considering careers in medical device industries, clinical engineering, or artificial organs should consider this area of study.

Students should choose technical electives from the following:

BME 350	Signals and Systems for Bioengineers or BME 449 Biocontrol Systems	3
BME 411	Biomedical Engineering I	3
BME 412	Biomedical Engineering II	3
BME 415	Biomedical Transport Processes	3
CHE 466	Bioreaction Engineering	3

Molecular and Cellular Bioengineering. This area is designed to strengthen and integrate the student's knowledge of molecular and cellular biology, biochemistry, and biomaterials science and engineering for the design of biomolecular and cellular based hybrid medical and diagnostic devices. It is particularly suited for students interested in pursuing graduate studies in molecular and cellular bioengineering and health related biotechnologies.

Students are encouraged to choose the following courses:

BIO 205	Cell Biology	3
BME 494	ST: Biotechnology Laboratory Techniques	3
CHM 333	General Organic Chemistry	3

Students should choose additional or alternative technical electives from the following:

BCH 366	Principles of Biochemistry or BCH 461 General Biochemistry	3
BIO 334	General Genetics or MBB 350 Applied Genetics or PLB 350 Applied Genetics	4
BIO 342	Genetic Engineering and Society or MBB 343 Genetic Engineering and Society	4
BME 494	ST: Cell Biotechnology	3
BME 494	ST: Introduction to Molecular Cellular and Tissue Engineering	3
CHM 355	General Organic Chemistry Laboratory	1
CHE 475	Biochemical Engineering CHE 466 Bioreactor Engineering CHE 477 Bioseparation processes	3

Premedical Engineering. This area is designed to meet the needs of students desiring entry into a medical, dental, or veterinary school. The course sequence provides an excellent background for advanced study leading to a career in research in the medical or life sciences. Technical electives must include the following:

CHM 331	General Organic Chemistry	3
CHM 332	General Organic Chemistry	3
CHM 333	General Organic Chemistry Laboratory	1
CHM 336	General Organic Chemistry Laboratory	

Additional technical electives should be chosen from any of the course offerings listed for the other bioengineering areas of study listed. Note that, to fulfill medical school admission requirements, BIO 187 General Biology is required in addition to the degree requirements and cannot generally be used as a technical elective.

Bioengineering Program of Study
Typical Four Year Sequence

First Year

First Semester

CHM 113 General Chemistry *SQ*	4
ECE 1 Introduction to Engineering Design *CS*	3
ENG 1 First Year Composition	3
MAT 270 Calculus with Analytic Geometry I *MA*	4
Total	14

Second Semester

CHM 116 General Chemistry *SQ*	4
ENG 102 First Year Composition	3
MAT 271 Calculus with Analytic Geometry II *MA*	4
PHY 121 University Physics I: Mechanics *SQ*	3
PHY 122 University Physics Laboratory I *SQ*	
Total	15

Second Year

First Semester

BIO 188 General Biology II *SQ*	4
BME 201 Introduction to Bioengineering *L*	3
ECE 2 Engineering Mechanics I: Statics	3
MAT 272 Calculus with Analytic Geometry III *MA*	4
PHY 131 University Physics II: Electricity and Magnetism *SQ*	3
PHY 132 University Physics Laboratory II *SQ*	
Total	17

Second Semester

ECE 211 Electrical Networks I	4
ECE 315 Structure and Properties of Materials	3
ECN 111 Macroeconomic Principles *SB* or ECN 112 Microeconomic Principles *SB*	3
MAT 274 Elementary Differential Equations *MA*	3
HUSB and awareness area courses	3
Total	16

Third Year

First Semester

BME 331 Biomedical Engineering Transport. Fluids	3
BME 415 Physiology for Engineers	4
ECE 3 Intermediate Engineering Design *L*	3
ECE 340 Thermodynamics	3
ECE 384 Numerical Methods for Engineers	4
Total	17

Second Semester

BME 315 Biomaterials	3
BME 334 Bioengineering Heat and Mass Transfer	3
ECE 354 Electronic Devices and Instrumentation	4
ECE 380 Probability and Statistics for Engineering Problem Solving *CS*	3
HUSB and awareness area courses[3]	3
Total	16

Fourth Year

First Semester

BME 417 Biomedical Instrumentation *L*	3
BME 416 Biomechanics	3
BME 417 Biomedical Engineering Capstone Design I	3
BME 422 Biomedical Instrumentation Laboratory *L*	
HUSB and awareness area course[3]	3
Technical electives	3
Total	16

Second Semester

BME 470 Computer Applications in Bioengineering	4
BME 419 Biomedical Engineering Capstone Design II	3
HUSB and awareness area courses	3
Technical electives	6
Total	16
Total degree requirements	128

[1] Both PHY 121 and 122 must be taken to secure SQ credit.

[2] Both PHY 131 and 132 must be taken to secure SQ credit.

[3] Engineering students may not use aerospace studies AES or military science MS courses to fulfill HUSB requirement

BIOENGINEERING (BME)

BME 201 Introduction to Bioengineering (3)
fall and spring
Impact of bioengineering on society. Development and awareness of the contributions of bioengineering to overall medical and biological problems. Prerequisite: ENG 101 102 or 105 108
General Studies

BME 202 Global Awareness Within Biomedical Engineering Design. 3
second semesters
Introduction to ethical, legal, social, economic and technical issues arising from the design and implementation of bioengineering technology. Prerequisite: ECE 100 ECN 111 or 112 ENG 102 or 105
General Studies LH

BME 318 Biomaterials. (3)
spring
Materials properties of natural and artificial biomaterials. Tissue and blood compatibility. Uses of materials to repair or replace body parts. Prerequisite: ECE 350

BME 331 Biomedical Engineering Transport: Fluids. (3)
fall
Transport phenomena with emphasis on biomedical engineering fluid systems. Prerequisites: MAT 274 PHY 131

BME 334 Bioengineering Heat and Mass Transfer. (3)
spring
Applies the principles of heat and mass transfer phenomena to solutions of problems in medicine and medical device design. Prerequisite: ECE 340 Prerequisite with a grade of C or higher BME 331

BME 350 Signals and Systems for Bioengineers. (3)
spring
Applies principles of calculus and ordinary differential equations to modeling and analysis of response signals and signal transfer in biosystem. Prerequisites: ECE 201 MAT 272 274

BME 411 Biomedical Engineering I. (3)
once a year
Reviews diagnostic and prosthetic methods using engineering methodology. Introduces transport metabolic and autoregulatory processes in the human body. Prerequisite with a grade of C or higher BME 334

BME 412 Biomedical Engineering II. (3)
once a year
Reviews electrophysiology and nerve pacing applications. Introduces biomechanics and joint replacement technology cardiovascular and pulmonary fluid mechanics and the application of mathematical modeling. Prerequisite in instructor approval

BME 413 Biomedical Instrumentation. (3)
fall
Principles of medical instrumentation. Studies of medical diagnostic instrument and techniques for the measurement of physiological variables involving systems. Prerequisite: ECE 300 334 Prerequisite with a grade of C higher BME 435 Corequisite BME 423
General Studies L for credit also earned in BME 423

BME 415 Biomedical Transport Processes. (3)
once a year
Pr nc p es of momentum, heat and mass tran port w th app cat on to med a and b o og ca systems and med a dev ce des g Prereq u s tes MAT 274 PHY 131

BME 416 Biomechan cs. (3)
fa
Mechan ca propert es of bone musc e and soft t ssue Stat a d dynam c ana ys s of human moveme t tasks such as ocomot on Pre requ s te w th a grade of C or h gher BME 318

BME 417 Biomedical Eng'neering Capstone Design I. (3)
fa
Techn ca regu ato y econom c ega soc a a d eth ca aspects of med ca dev ce systems eng neer ng des gn Lecture f e d tr ps Pre requ s te ECE 300 Prerequ s te w th a gr de of C or h gher BME 318, 334.

BME 419 Biocontrol Systems. (3)
fa
App es near and non 'near contro systems techn ques to ana ys s of neuromus u oske eta card ovascu ar therma , and mass t ansfer systems of the body Prerequ s tes ECE 201 MAT 274

BME 423 Biomedical Instrumentation Laboratory. (1)
fa
Laboratory exper ence w th p ob ems oncepts, and te hn ques of b omed ca nstrumentat on n static and dynam c env ronments Lab Prerequ s tes ECE 300 334 Prereq s te w th a grade of C or h gher BME 435 Coreq s te BME 413
Genera Stud es L f cred t a so earned n BME 413

BME 435 Physiology for Engineers. (4)
fa
Phys o ogy of the nervous m scu ar, card ovascu ar endocr ne rena , and resp ratory systems Emphas zes use of quant tat ve et o s n unde stand ng phys o og ca sy tems Lecture ab Prerequ s tes a comb nat on of B O 188 and CHM 116 and PHY 131 or on y n tructor approva

BME 470 Microcomputer Applications in Bioengineering. (4)
spr ng
Uses m crocomputers for rea t me data co ect on ana y s and con tro of exper ments nvo v ng actua and s mu ated phys o og a sys tems ecture ab Prerequ s te ECE 100 334 Prerequ s te w th a grade of C or h gher. BME 435

BME 490 Biomedical Engineer ng Capstone Des'gn II. (1 5)
spr ng
nd v dua pro ects n med ca systems or med ca dev ce des gn and deve opment ecture ab Prerequ s te w th a grade of C or h gher BME 417

BME 494 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the f ow ng
- B opo ymer c Drug De very 3
- B otechno ogy Laboratory Techn ques 3
- Ce B ote hno ogy 3
- ntrodu t on to Mo ecu ar Ce u ar and T s ue Eng neer g 3
- Scann ng Probe M cr c py 3

BME 496 Professional Sem'nar. (1 3)
fa and spr ng
Profess ona a d eth ca a pe ts w th a d scu s on of respo s b t es Lecture, f e d tr ps Prerequ te nst ctor approva

BME 511 Biomedical Engineering I. (3)
once a year
D agnost and prosthet c method us ng eng neer ng n ethodo ogy Transport, metabo c and autoregu atory pr e ses n the body

BME 512 Biomedical Engineering II. (3)
once a yea
E ectrophys o ogy and nerve pac ng app c t ons ntrod ces b me chan cs and jo nt mb rep acement te hno ogy ard ovascu ar and pu monary f u d me han cs and mathemat a m de ng

BME 513 Biomedical Instrumentation (3)
fa
Pr nc p es of med ca strumentat on Stud es of med ca d agnost c nstruments a d techn que for the meas rement of phys o og c var ab es n v ng system

BME 514 Advanced Biomed cal Instrumentation. (3)
se ected semesters
Pr nc p e of app ed b ophys a measurements us ng b oe ect c and rad o og ca approach Prereq s tes ECE 334 MAT 274 or ts equ v a ent

BME 515 Biomedical Transport Processes. (3)
se ected sen esters
Pr nc p es of momentum heat and mas tran port w th app cat ons to med a a d b o og ca systems a d med ca dev ce des gn Prereq u s te nstr tor approva

BME 516 Top cs in Biomechanics. (3)
fa
Mechan ca propert es of bone m sc e and soft t ssue Stat c and dynam c ana ys s of human movement tasks n ud g n depth pro ect Prerequ s te nstructor approva

BME 518 Introduction to Biomater als. (3)
spr ng
Top cs nc ude str t re property re at onsh ps for synthet c and natu ra b omater a s b oc mpat b ty and uses of mater a s to rep ace body parts Prerequ s te ECE 350 or ts equ va ent or nstructor approva

BME 519 Topics in Biocontro Systems. (3)
fa
L near and non near co tro systems ana ys s of neuromuscu oske e ta card ovascu ar therma and mass transfer systems of the body nc ud ng n depth project Prerequ s tes both ECE 201 and MAT 274 or on y nstructo approva

BME 520 B oelectric Phenomena. (3)
se ected semesters
Study of the or g n propagat o and nteract on of b oe ectr c ty n v ng th ng vo ume ond ctor prob em mathemat ca ana ys s of b o e ectr c nteract ons a d uses n med ca d agnost s

BME 521 Neuromuscular Control Systems (3)
spr ng
Overv ew of sensor motor bra n str ctures App cat on of non near adapt ve opt ma and superv sory contro theory to eye head hand coor nat on and ocomot o

BME 522 Biosensor Design and Appl cation. (3)
once a year
Theory and pr c p es f b o e sor de gn and app cat o n med c ne a d b o ogy Pr nc p e f mea urements w th b sens r Prerequ te nstructor appr va

BME 523 Physiological Instrumentat on Lab. (1)
fa
abo at y exper ence w th prob em co cepts and techn ques of b omed ca n trumentat on tat and dynam env ronme ts Lab Prereq s tes BME 435 ECE 334 Pre or o equ s te BME 5 3

BME 524 Fundamenta s of Applied Neural Control. (3)
once a year
Fu damenta c ncept f e ectr a t mu at on and record ng n the nerv us system w th the goa f funct ona contro restorat n Pre or corequ te BME 435 or str ctor approva

BME 525 Surg cal Techn ques. (2)
spr ng
Pr nc p es of surg ca te n q es standard operat ve procedures fed era regu at gu de nes a d state f the a t method Lect re, ab

BME 532 Prosthetic and Rehabilitation Engineering. (3)
once a yea
Ana y s a d c t ca as essment of de gn and ntr trateg es for tate of the art med ca dev es sed n rehab tat on eng neer ng P e or corequ s te BME 416 or 516 or EPE 61

BME 533 Transport Processes I. (3)
fa
Un f ed treatme t of momentum heat and ma s transfer from mo ec u ar theory and co t nuum po nts of v ew nt nuum equat ns of m cr scop c and ma ro cop systems and mu t component and

L te a y and cr t a q y MA themat c CS comp ter tat t s q a t tat e app t HU h m n te a d ne a t SB ca a d behav ora e e SG nat ra e e qen a o e ur e SQ atura en e q t tat e C t ra d ve y n t e Un ted State G g ba H h t r e e a St d e age

mu t hase ystems r s ted as CHE 533 Cred t s a owed for on y BME 533 or CHE 5 3

BME 534 Transport Processes II (3)
spr g
C nt at o of BME 53 or CHE 533 em has z ng mas transfer ross sted as C E 5 4 Cred t s a wed f on y BME 534 or CHE 534 Prerequ s te BM 533 r HE 53

BME 543 Thermodynam cs of Chemical Systems. (3)
fa
C ass ca and stat st a thermodyna s f non de phy co hem ca sy tems an processes pred ct n of opt m m operat ng c nd t ons Cross ted as CHE 543 Cred t s a wed for on y BME 543 or CHE 543

BME 544 Chem ca Reactor Engineering. (3)
spr ng
Rea t on rate t ermodyn m and tra sp rt r c p es app ed to the de gn a d operat on of chem ca reactor s sted as CHE 544 red t s a we f on y BME 544 or CHE 544 P erequ s te BME 543 r HE 543

BME 551 Movement Biomechan cs. (3)
spr ng
Me han cs pp ed t the na ys s and mode ng of phy o og ca movem nt Computat ona m d f musc es tendons o nts and t e ske eta system w th app cat n to port and ehab tat n Pre requ te BME 416 o 516 or nstruct r appr va

BME 566 Med cal Imaging Instrumentation. (3)
se ected semesters
De gn and a a ys s of m g ng y tems and nuc ear dev ce f r med a d agn s s the apy and research Lab ratory exper ments us ng d agnost c rad gy f uoro copy t as nd and CAT cann ng Le ture ab Prerequ s te n tructor app ova

BME 568 Med cal Imag ng. (3)
e ected semesters
CT SPE T T and MR 3 d mens ona *n v v* meas rements n trume t des gn phys o og a mode ng n a pr t co s re on tru t on a go thm and quant t t on sue Pre equ s te n tructor approva

BME 593 Applied Project. (1 12)
se cted semester

Omnibus Courses. For an xp anat n f courses offered b t ot spec f ca y ted th ata og see Omn bu Course page 56

Department of Chemical and Materials Engineering

www.eas.asu.edu ~cme
480 965-3313
ECG 202

Subhash Mahajan, Chair

Regents' Professor: Mayer

Professors: Adams Dey Krause Mahajan Newman P craux Raupp S eradzk

Associate Professors: A ford Beaudo n Beckman Burrows R vera S'erks Van Sch fgaarde

Assistant Professors: A en Chaw a D l er Razatos

The faculty n the Department of Chen ical and Materia s Engineering offer the B S E degree n Chemi al En_n cer ing and n Materia s Science and Engineering Each of these majors builds on a broad base of knowledge w thin the basic and mather atica sciences and the engineering co e. E ch offers excellent career opportunities

Chemical engineers design and operate proces es th t may include cl emical change They combine the science of chemistry with the discipline of engineering in order t solve complex problems in a wide variety of industries. Challenging job opportunities exist not only in the chemica and petroleum industries, but also in the plastics, electron ics, computer, metals, space, food, drug, and health care ndustries In these industries, chemica engineers practice in a wide variety of occupat ons including environmental contro , surface treatments, energy and mater als transfor mation, bion ed cal appl cat ons, fermentation protein recovery, extractive meta urgy, and separat ons. In the env ronmental area, chemical engineers develop methods to reduce the pollution created in manufacturing processes, devise techn ques to recover usable materials fron wastes, des gn waste storage and treatment facilities, and design po lution control strategies.

Materials sc ence and engineering uses fundamer tal knowledge n chemistry and phys cs to correlate relat on ships between the structure and proces ing of n ter als and their properties. Students educated in this discipline lecide how to opt mize existing materials or how to develop new advanced materials and processing techniques. Students who major n materials science and engineering will find employment opportunities in a variety of in lustries and research facilities, which include aerospace, e ectronics, energy conversion, manufacturing, medical devices, semi conductors, and transportation.

CHEMICAL ENGINEERING—B.S.E.

Chemical engineers are generally concerned with transfer within and between liquid, gas, and solid phases and the chem ca changes that may also occur The engineers design and operate processes that accommodate such changes, including the chemical activation of materials. ypica ly this involves complex n ulticomponent system s wherein the interactions between species have to be considered and ana lyzed The new cha enge in chemical engineering is to apply the princ ples of fluid dynamics, mass transfer solu tion thermodynamics, reaction kinet cs, and sep ration tech r iques to technological endeavors such as pollution control within manufacturing and the environment, integrated cir cuit design, solid state surface treatments, and materials processing

Consequently, in add t on to the chemical and petroleum industries, chemical engineers find challenging opportuni ties in the plastics, solid state, electronics, computer, metals, space, food, drug, and health care ndustries, where they practice in a wide variety of occupations, such as environ mental control, surface treatments, energy and materials transform ations b omedical applications, ferment ition, pro tein recovery, extractive metallurgy, and separations. While a large percentage of the industrial positions are filled by graduates with bachelor's degrees, there are lucr t ve and creative opportunities in research and deve opment for those who acquire postgraduate education.

Subspecializations have developed within the profession However, the same broad body of know edge is generally expected of a chemical engineers for maximum flex bility in industrial positions. The preparation for chem cal engi neering is accomplished by a blend of cla sroom instruction and laboratory experience

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the B.S.E. degree in Chemical Engineering A minin um of 50 upper division semester hours is required Students n ust attain a GPA of at east 2 0(for the courses in the major field

GRADUATION REQUIREMENTS

In addition to fulfi l ng school and m ajor requ rements, majors must satisfy all university graduat on requiret ients. See "University Graduat on Requirements," page 79.

COURSE REQUIREMENTS

The course work for the undergraduate degree can be classified into the fo owing categories (in semester hou s ·

First-Year Composition

Choose am ng the course combinations below 6

ENG 10 F r t Year C mp ition 3
ENG 102 F rst Year Comp sition 3

—— or ——

ENG 1 5 Advan ed First Year C mposito 3
Elective chosen w th an advisor 3

—— or ——

ENG 7 Engli h for Foreign Studer ts 3
ENG 108 Engli h for Foreign Students 3

Total 6

General Studies School Requirements

Huma t ies and Fine A ts S cia and Beh v ral S ien s

ECN 111 Macroeconon c Pri ciples *SB* 3
or ECN 112 Mi oeconom c Principle *SB* 3
HU SB and awareness area urs s[1] 12

Total 15

Liter cy and Cr t cal Inqui y

CHE 352 Tra sport Laboratories *L* 3
ECE 300 Intermediate Engineering Design *L* 3

Total 6

N tura S ien es Bas S ien es

CHM 113 Gene al Chemistry *SQ* 4
CHM 116 General Chemistry *SQ* 4
CHM 331 General Orga n c Chemistry 3
CHM 335 General O anic Chemistry Laboratory 1
PHY 121 Univers ty Physics I: Mechanic *SQ*[2] 3
PHY 122 Univers ty Phys cs Laboratory I *SQ*[2]

Total 6

M thematic a Studies

ECE 1 0 Int oduct on to Engineering Desig *CS* 3
ECE 384 Numerica Methods for Engi eers 4
MAT 27 Calculus w th Analytic Ge ometry I *MA* 4
MAT 271 Calculus w th Analyt c Geometry I *MA* 4
MAT 272 Calculu w th Analyt c Geometry I I *MA* 4
MAT 274 Elem r tary D fferent a Equations *MA* 3

Total 22
Ge e a Studies sch requirements t tal 30

Engineering Core

CHE 342 Applied Chemical Therm d am cs 4
CHE 461 Pr cess Contr l *CS* 4
FCE 304 ST C nservat on P incip es 4
FCF 3 4 S E ince in_ Systems 4
FCF 394 S P operties that Matter 3

Total 19

Major

CHE 311 ntr du tion t Chem a P o essing 3
CHE 331 Tra sport Phenomena I: Flu ds 3
CHE 332 Transport Phenomena I Ene gy T ansfer 3
CHE 333 Tr nsport Phenomena III: Mass Trat sfer 3
CHE 432 Pr ciples f Chen ical En_ neering Des g n 3
CHE 442 Chemical Re ictor Des n 3
CHE 451 Cl emical Engineer ng Lab ratory 2
CHE 462 Process Desig 3
CHM 332 G e al Or_an Cher istry 3
FCF 3S Pr bab l ty a id Statistic for Eng neer ng P blem S lvin *CS* 3
Tech n al elect e 15

Total 44

[1] Engineering st dents may n ot use aerospace tud es AES r military s ien e MIS cou ses to fulfi HU or SB requirements.
[2] B oth PHY 121 and 122 must be taken to ecu e SQ cred t

Students should consult with their department academic advisors to ensure that all requirements are met.

The technical elective courses must be selected from upper div s on courses with an advisor's approval and must inc ude two three semester hour chemistry courses; a three semester hour natural sci er ce or materials course; and a three semester l our chemical engineering course.

To fulfill ac reditation requirements and to prepare ade quate y for the adv nced chemistry courses, Chemical Engi neerin majors are required to take the CHM 113 and 116 ntroductory chemistry sequence (CHM 117 and 118 are acceptable substitutes . Other freshman cl emistry courses are n t a ept ble and transfer students who have taken nother cl emistry course may be required to enroll in CHM 113 and 116.

Chemical Engineering Areas of Study

Stu ents who wish to specialize n ay develop an area of interest through the use of technica electives and selective substitutions for required courses. Substitutions must be approved by the advisor and the Department Standards Committee and must be consistent with ABET accreditation criteria No substitution of CHE 462 is a lowed. The follow ing are possible elective areas with sug ested courses. A student n ay choose ele tives with n the general department guide nes and does not have to select one of the areas listed.

L te y a d c t a nqury **MA** mat em t **CS** mp ter tat c qua t tat e app at on **HU** huma t es and f ne arts **SB** o a and behav ora sc en es **SG** natu c e ce—genera re our e **SQ** at ra en e q a t tat e **C** u tu a d er ty n t e U ted State **G** g oba H h to ca S G ne a St d e page

Biochemical. Students wishing to prepare for a career in biotechnology, fermentation, food processing, pharmaceuticals, and other areas within biochemical engineering should select from the following:

Chemistry Electives

BCH 361 Principles of Biochemistry 3
or BCH 461 General Biochemistry (3)
BCH 462 General Biochemistry 3

Technical Electives

CHE 475 Biochemical Engineering 3
CHE 476 Bioreaction Engineering 3
CHE 477 Bioseparation Processes 3
CHE 494 ST: Biotechnology Techniques 3

Biomedical. Students who are interested in biomedical engineering but wish to maintain a strong, broad chemical engineering base should select from the following:

Chemistry Electives

BCH 361 Principles of Biochemistry 3
or BCH 461 General Biochemistry (3)
BCH 462 General Biochemistry 3

Technical Electives

BME 318 Biomaterials 3
BME 435 Physiology for Engineers 4

Environmental. Students interested in environmental engineering are encouraged to pursue a B.S.E. degree in Chemical Engineering with this area of study. Students interested in the management of hazardous wastes and air and water pollution should select from the following:

Chemistry Electives

BCH 361 Principles of Biochemistry 3
or BCH 461 General Biochemistry (3)
CHM 302 Environmental Chemistry 3
CHM 481 Geochemistry 3
CHM 494 ST: Chemistry of Global Climate Change 3

Technical Electives

CEE 561 Physical-Chemical Treatment of Water and Waste 3
CEE 563 Environmental Chemistry Laboratory 3
CHE 474 Chemical Engineering Design for the Environment 3
CHE 478 Industrial Water Quality Engineering 3
CHE 479 Air Quality Control 3

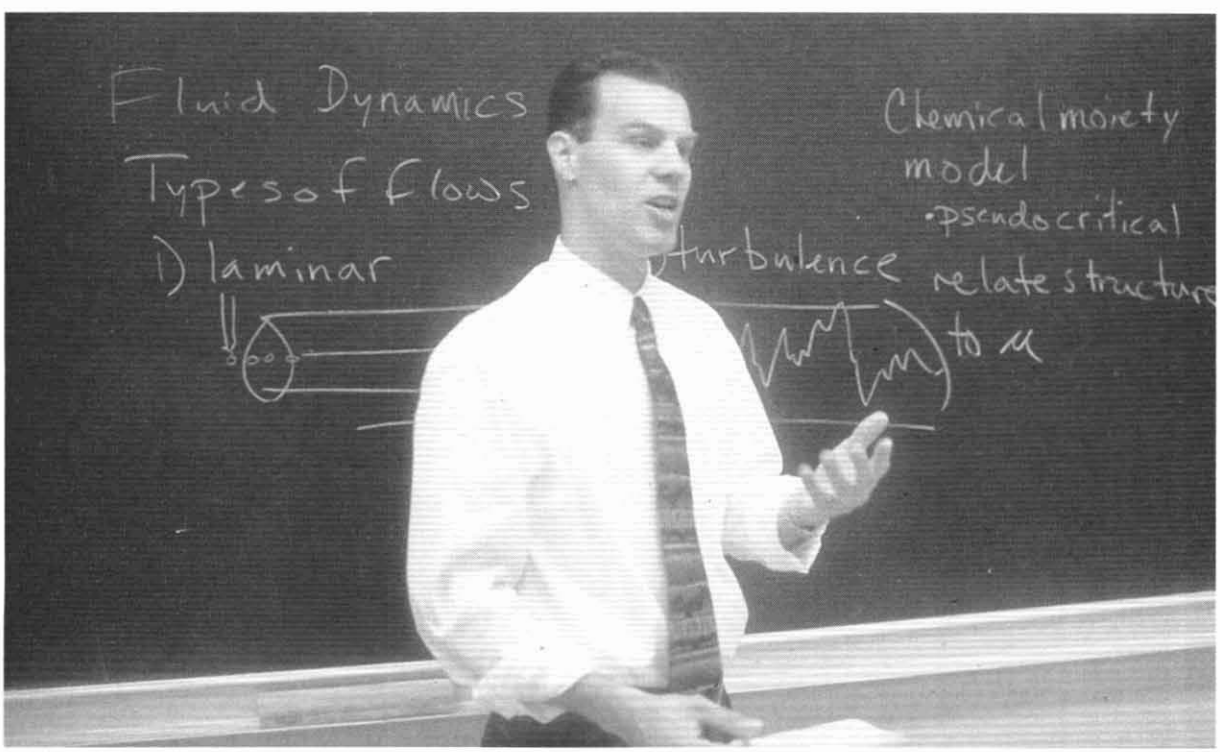
Materials. Students interested in the development and production of new materials such as alloys, ceramics, composites, polymers, semiconductors, and superconductors should select from the following:

Chemistry Electives

CHM 345 Physical Chemistry I 3
CHM 346 Physical Chemistry II 3
CHM 453 Inorganic Chemistry 3
CHM 471 Solid-State Chemistry 3

Technical Electives

BME 318 Biomaterials 3
CHE 458 Semiconductor Material Processing 3
ECE 352 Properties of Electronic Materials 4
MSE 353 Introduction to Materials Processing and Synthesis 3
MSE 354 Experiments in Materials Synthesis and Processing I 2
MSE 431 Corrosion and Corrosion Control 3
MSE 470 Polymers and Composites 3



Dr. Steve Beaudoin addresses his chemical and materials engineering class. Beaudoin has been identified by his students, a parent organization, and his colleagues as a talented faculty member and gifted researcher.

Premedical. Students planning to attend medical school should select courses from those listed under the biomedical area. In addition, BIO 187, 188, and CHM 336 must be taken to satisfy medical school requirements but are not counted toward the Chemical Engineering bachelor's degree.

Process Engineering. The engineering core and required chemical engineering courses serve as a suitable background for students intending to enter the traditional petrochemical and chemical process industries. Students can build on this background by selecting courses with the approval of their advisor. Examples of these courses are as follows:

CHE 474	Chemical Engineering Design for the Environment	3
CHE 478	Industrial Water Quality Engineering	3
CHE 479	Air Quality Control	3
CHE 494	ST: Advanced Process Control	3
CHE 528	Process Optimization Techniques	3
CHE 556	Separation Processes	3
CHE 563	Chemical Engineering Design	3
MAE 436	Combustion	1–4

Semiconductor Processing. Students interested in the development and manufacturing of semiconductor and other electronic devices should select from the following.

Chemistry Electives

CHM 345	Physical Chemistry I	3
CHM 346	Physical Chemistry II	3
CHM 453	Inorganic Chemistry	3
CHM 471	Solid State Chemistry	3

Technical Electives

CHE 458	Semiconductor Material Processing	3
CHE 494	Special Topics	1–4
ECE 355	Properties of Electronic Materials	4
EEE 435	Microelectronics	3
EEE 436	Fundamentals of Solid State Devices	3
EEE 439	Semiconductor Facilities and Cleanroom Practices	3
MSE 353	Introduction to Materials Processing and Synthesis	3
MSE 354	Experiments in Materials Synthesis and Processing I	2

Chemical Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 113	General Chemistry *SQ*	4
ECE 100	Introduction to Engineering Design *CS*	3
ENG 101	First Year Composition	3
MAT 270	Calculus with Analytic Geometry I *MA*	4
Total		14

Second Semester

CHM 116	General Chemistry *SQ*	4
ENG 102	First Year Composition	3
MAT 271	Calculus with Analytic Geometry II	4
PHY 121	University Physics I: Mechanics *SQ**	3
PHY 122	University Physics Laboratory I *SQ*	1
Total		15

Second Year

First Semester

CHE 211	Introduction to Chemical Processing	3
CHM 331	General Organic Chemistry	3
CHM 335	General Organic Chemistry Laboratory	1
ECE 394	ST: Conservation Principles	4
ECN 111	Macroeconomic Principles *SB*	3
	or ECN 112 Microeconomic Principles *SB*	3
MAT 274	Elementary Differential Equations *MA*	3
Total		17

Second Semester

CHE 333	Transport Phenomena I: Fluids	3
CHM 332	General Organic Chemistry	3
ECE 394	ST: Properties of Matter	3
MAT 272	Calculus with Analytic Geometry II *MA*	4
HU SB and awareness area course		3
Total		16

Third Year

First Semester

CHE 337	Transport Phenomena II: Energy Transfer	3
CHE 342	Applied Chemical Thermodynamics	4
ECE 310	Intermediate Engineering Design *L*	3
ECE 383	Probability and Statistics for Engineering Problem Solving	3
ECE 384	Numerical Methods for Engineers	4
Total		17

Second Semester

CHE 333	Transport Phenomena III: Mass Transfer	3
CHE 352	Transport Laboratories *L*	3
CHE 432	Principles of Chemical Engineering Design	3
ECE 394	ST: Engineering Systems	4
HU SB and awareness area course		3
Total		16

Fourth Year

First Semester

CHE 442	Chemical Reactor Design	3
CHE 451	Chemical Engineering Laboratory	2
CHE 466	Process Control *CS*	4
HU SB and awareness area course		3
Technical electives		6
Total		18

Second Semester

CHE 462	Process Design	3
HU SB and awareness area course		3
Technical electives		9
Total		15
Total degree requirements		128

* Both PHY 121 and 122 must be taken to secure SQ credit.

MATERIALS SCIENCE AND ENGINEERING—B.S.E.

Materials engineers create innovations that result in new and improved materials that help drive the cutting edge of new technologies in many industries. These include the auto, aerospace, electronics, semiconductor, materials production, and health professions. The space shuttle, lightweight cars, and today's fastest computers have all been

L literary and inquiry MA mathematics CS computer statistics quantitative applications HU humanities and fine arts SB social and behavioral sciences SG natural sciences general education SQ natural sciences quantitative C cultural diversity in the United States G global H historical See General Studies page 83

developed using the latest materials technologies. In advancing today's techno ogies m ater als en_ nee s fulfill a wide ran_e of job responsibilities that si_nificantly impact other engineer ng disciplines and include

1. selecting the best material for a given application or developin_ innovative n aterials and processin_ techniques for new applications,
2. characterizing and analyzit g fai ed products in order to redesign more reliable and robust engineerin_ components, and
3. in pactin° technological advances in larger sca e projects throu_h working in a team env ronn ent with other engineers from the chemical, electrical, mechanical, aer ospace and other en_ineerit g disci plines.

The Mater als Science and Engineering degree program at ASU has outstanding faculty who l ave national reputa t ons in the areas of both structural and electronic materia s. The faculty brit g significant professional expe tise to class room teaching, which is c n plemented by enlightenin_ experimental work in the pro_ram's contemporary, well equipped laboratory facil ties. This atmosphere pron otes quality undergraduate research projects and sen or design projects that frequently result in patents and technical publi cations. Exan ples of recent patent applications include an improved method for producing artificial Teflon arteries and an improved tecl nique for testing steel in air bag containers. Such preparation and experiences ;ive the programs's grad uates an edge in seeking employment at the best con panies or admission to the nation's leadin_ _raduate schools. The program's educational experience is also enhanced by numerous scholarships available to students rangin_ from enterin_ freshman to final year seniors.

The Materia s Science and Engineering degree program is accredited by the national organization of Accreditation Board for En_ineering and Technology, Inc As such, it has an identifiable program mission, object ves, and outcomes, which reflect, encompass, and embody the unique educa tional development that a student experiences as he or she progresses throu_h the program to graduation The mission and ob ectives are descr bed below

The mission of the Materials Science and En_ineerin_ degree program is to educate students in the application of basic principles of science toward the design, ut zat on, and improvement of mater als n engineering components and systems for the betterment of soc ety. To accomp sh this mission, the program's graduates fulfi the following objective: (1 Graduates will have the strong educational foundation in n aterials science and engineering that pro motes success in the broad ran_e of career opportunities available in graduate school, industry, and government; and (2) graduates will have the personal skills and values that promote their success in the rapidly changing, culturally diverse workplace that reflects the needs of contemporary society.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the B.S.E. degree in Materials Science and Engineer ng. A min imum of 50 upper division semester hours is required Stu dents must attain a GPA of at least 2.00 for the courses in the major fie d

Graduation Requirements. In add t on to fulfill n° school and major requirements, ma ors n ust satisfy all university graduation requ rements See University Graduation Requirements," page 79.

Course Requirements. The undergrad ate curriculun requires that students take a ser es of interdisciplinary courses of fundamental importance t> an understand ng of all engineering materials Fol owit g these are addit onal courses that may be taken as technical electives to develop an area of study The courses for the undergra luate degree can be classified nto the following categories in semester hours):

First-Year Composition

Ch o se ar ong the c our c comb ations be s	6
ENG 1C1 Fi st Yea C mpos tion 3	
ENG 102 Fir t Yea C n pos tion 3	
ENG 105 Advanced Fi st Yea Compos t > 3	
Elective chosen with an advisor 3	
ENG 107 En lish fo r Fore _n Students 3	
ENG 108 En_ sh for Fore n Stude ts 3	
Total	6

General Studies School Requirements

Hun ar ities an l Fine A ts S cial an l Beh vio a S en es

ECN 111 Macroec n mic Pr ciples *SB*	3
or ECN 112 M cro on mic Princ p es *SB* 3	
HL, SB, and awareness area courses	12
Total	15

L tera a d Crit cal In qui y

ECE 300 I termediate Engi eer g Design *L*	3
MSE 482 Mater ls Engineer n_ Desi_n	3
Total	6

Natu a S i nce Basic S ies

CHM 113 G neral Chemistry *SQ*	4
CHM 116 Genera Chemistry *SQ*	4
PHY 121 University Phy ics Mechanics *SQ*	3
PHY 122 University Phys cs Laboratory *SQ*	1
PHY 131 Unive sity Phys s II Electr c ty and Magnet sm *SQ*[2]	3
PHY 132 University Phy ics aboratory I *SQ*[2]	
Total	16

Mather ati al Studies

ECE 100 Introduction to En_ neerin Design *CS*	3
MAT 242 Elementar Linear A _ebra	3
MAT 270 Calculus with Analytic Ceometry I *MA*	4
MAT 271 Calculus with Analytic Geometry *MA*	4
MAT 272 Calculus with Ana ytic Ge m try III *MA*	4
MAT 274 Elementary D fferential Eq at ons *MA*	3
Total	20
Genera Studies schoo req i eme ts tota	57

Engineering Core

ECE 201 Elect cal Netw ks I	4
ECE 210 Engineer ng Mecl an cs I- Static	3
ECE 315 I ntroduction to Def rmable Solids	

ECE 355 Structure and Properties of Materials	3
MSE 433 Thermodynamics of Materials	3
Total	16

Major

ECE 350 Probability and Statistics for Engineering Problem Solving CS	3
MSE 194 ST: Challenges in Material Engineering	1
MSE 353 Introduction to Materials Processing and Synthesis	3
MSE 354 Experiments in Materials Synthesis and Processing	2
MSE 355 Introduction to Materials Science and Engineering	3
MSE 420 Physical Metallurgy	3
MSE 421 Physical Metallurgy Laboratory	1
MSE 441 Mechanical Properties of Solids	3
MSE 450 X-ray and Electron Diffraction	3
MSE 470 Polymers and Composites	3
MSE 471 Introduction to Ceramics	3
MSE 490 Capstone Design Project	3
Select two of the following four courses[3]	6
CHM 325 Analytical Chemistry	3
CHM 351 General Organic Chemistry	3
CHM 341 Elementary Physical Chemistry	3
PHY 261 Introductory Modern Physics	3
Technical electives	2
Total	49

[1] Both PHY 125 and 225 must be taken to secure SQ credit.
Both PHY 131 and 132 must be taken to secure SQ credit

[3] To take CHM 341 Elementary Physical Chemistry CHM 353 Organic Chemistry must be taken as the prerequisite

Materials Science and Engineering Areas of Study

Technical electives may be selected from one or more of the following areas. A student may, with prior approval of the department, select a general area or a set of courses that would support a career objective not covered by the following categories.

Biomaterials. Students interested in the materials used in the body and other living systems to improve or replace body components should choose from the following technical electives:

BME 318 Biomaterials	3
BME 411 Biomedical Engineering I	3
BME 412 Biomedical Engineering II	3
BME 415 Biomedical Instrumentation Lab	3
BME 416 Biomechanics	3

Ceramic Materials. Students who want to develop an understanding of the chemistry and processing that control the structure and properties of ceramics and their application should select from these technical electives.

CHM 331 General Organic Chemistry	3
CHM 332 General Organic Chemistry	3
CHM 471 Solid State Chemistry	3
EEE 435 Microelectronics	3
EEE 436 Fundamentals of Solid State Devices	3
EEE 439 Semiconductor Facilities and Cleanroom Practices	3

Energy Systems. Students interested in the materials used in energy conversion systems such as solar energy or nuclear energy should choose from the following technical electives:

MAE 44 Principles of Design	3
MAE 442 Mechanical Systems Design	3
MSE 43 Corrosion and Corrosion Control	3
MSE 441 Analysis of Material Failures	3

Integrated Circuit Materials. Students interested in the materials used in the semiconductor industry and in how they are processed to achieve the desired properties should choose from the following technical electives:

CHE 458 Semiconductor Material Processing	3
EEE 435 Microelectronics	3
EEE 436 Fundamentals of Solid State Devices	3
EEE 439 Semiconductor Facilities and Cleanroom Practices	3

Manufacturing and Materials Processing. Students interested in the manufacturing and processing of materials for a broad base of applications should choose from the following technical electives:

CHE 458 Semiconductor Material Processing	3
IEE 336 Manufacturing Processes	3
IEE 336 Manufacturing Processes Laboratory	1
MAE 422 Mechanics of Materials	4
MAE 442 Principles of Design	3
MAE 442 Mechanical Systems Design	3
MSE 431 Corrosion and Corrosion Control	3
MSE 441 Analysis of Material Failures	3

Mechanical Metallurgy. Students interested in understanding the design, processing, and manufacturing of metals for structural applications, such as autos, airplanes, and buildings, should choose from the following technical electives:

MAE 415 Vibration Analysis	4
MAE 422 Mechanics of Materials	4
MAE 441 Principles of Design	3
MAE 442 Mechanical Systems Design	3
MSE 431 Corrosion and Corrosion Control	3
MSE 441 Analysis of Materials Failures	3

Metallic Materials Systems. Students interested in building an understanding of the basis for the design and processing of metals and alloys should choose from the following technical electives:

MAE 351 Manufacturing Processes	3
MSE 431 Corrosion and Corrosion Control	3
MSE 441 Analysis of Material Failures	3

Polymers and Composites. Students who desire to build an understanding of the chemical and processing basis for the properties of polymers and their applications, including composite systems, should select from the following technical electives:

CHM 331 General Organic Chemistry	3
CHM 332 General Organic Chemistry	3
CHM 471 Solid State Chemistry	3
MSE 441 Analysis of Material Failures	3

L literary and artistic inquiry MA mathematics CS computer statistics quantitative application HU humanities and fine arts SB social and behavioral sciences SG transcendence general course SQ natural science quantitative CC cultural diversity the United States G global H historical Gen Gen Studies page 83

Materials Science and Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 113	General Chemistry *SQ*	4
ECE 10	Introduction to Engineering Design *CS*	3
ENG 101	First Year Composition	3
MAT 27	Calculus with Analytic Geometry I *MA*	4
MSE 194	ST Challenges in Materials Engineering	1
Total		15

Second Semester

CHM 116	General Chemistry *SQ*	4
ENG 102	First Year Composition	3
MAT 271	Calculus with Analytic Geometry II *MA*	4
PHY 121	University Physics I: Mechanics *SQ*	3
PHY 122	University Physics Laboratory I *SQ*[1]	1
Total		15

Second Year

First Semester

ECE 210	Engineering Mechanics I: Statics	3
ECE 350	Structure and Properties of Materials	3
MAT 242	Elementary Linear Algebra	2
MAT 272	Calculus with Analytic Geometry III *MA*	4
PHY 131	University Physics II: Electricity and Magnetism *SQ*[2]	3
PHY 132	University Physics Laboratory II *SQ*	1
Total		16

Second Semester

ECE 201	Electrical Networks I	4
ECE 313	Introduction to Deformable Solids	3
ECE 380	Probability and Statistics for Engineering Problem Solving *CS*	3
MAT 274	Elementary Differential Equations *MA*	3
Technical elective		3
Total		16

Third Year

First Semester

ECE 300	Intermediate Engineering Design *L*	3
ECN 111	Macroeconomic Principles *SB*	3
MSE 353	Introduction to Materials Processing and Synthesis	3
MSE 355	Introduction to Materials Science and Engineering	3
Advanced science course[3]		3
Total		15

Second Semester

MSE 354	Experiments in Materials Synthesis and Processing	2
MSE 402	Physical Metallurgy	3
MSE 421	Physical Metallurgy Laboratory	1
MSE 430	Thermodynamics of Materials	3
MSE 450	X-ray and Electron Diffraction	3
HU SB and awareness area courses[4]		6
Total		18

Fourth Year

First Semester

MSE 440	Mechanical Properties of Solids	3
MSE 470	Polymers and Composites	3
MSE 471	Introduction to Ceramics	3
MSE 482	Materials Engineering Design	3
Technical electives		3
HU SB and awareness area course[4]		3
Total		18

Second Semester

MSE 490	Capstone Design Project	3
Advanced science course[3]		3
HU SB and awareness area course[4]		3
Technical elective		6
Total		15
Total degree requirements		128

[1] Both PHY 121 and 122 must be taken to secure SQ credit.

[2] Both PHY 131 and 132 must be taken to secure SQ credit.

[3] To take CHM 341 Elementary Physical Chemistry CHM 331 Organic Chemistry must be taken as the prerequisite.

[4] Engineering students may not use aerospace studies AES or military science MIS courses to fulfill HU and SB requirements.

GRADUATE STUDY

The faculty in the Department of Chemical and Materials Engineering also offer graduate programs leading to the M.S., M.S.E. and Ph.D. degrees. These programs provide a blend of classroom instruction and research. Many various topical and relevant research projects are available for thesis topics. Students interested in these programs should contact the department for up to date descriptive literature.

CHEMICAL ENGINEERING (CHE)

CHE 311 Introduction to Chemical Processing (3)
fall
Applies chemical engineering analysis and problem solving to chemical processes materials and energy balances methods and skills. Prerequisites CHM 116; MAT 27

CHE 331 Transport Phenomena I: Fluids (3)
spring
Transport phenomena with emphasis on fluid systems. Prerequisites CHE 311, ECE 394 ST Conservation Principles; MAT 274

CHE 332 Transport Phenomena II: Energy Transfer. (3)
fall
Continuation of transport principles with emphasis on energy transport in stationary and fluid systems. Prerequisite CHE 331

CHE 333 Transport Phenomena III: Mass Transfer. (3)
spring
Applies transport phenomena to mass transfer. Design of mass transfer equipment including staged processes. Prerequisite CHE 332

CHE 342 Applied Chemical Thermodynamics. (4)
fall
Applies conservation and accounting principles with non-ideal property estimation techniques to model phase and chemical equilibrium processes. Lecture recitation. Prerequisites CHE 311, ECE 394 ST Conservation Principles, ECE 394 ST Properties that Matter. Prerequisite or corequisite MAT 272

CHE 352 Transport Laboratories. (3)
spring
Demonstrates transport phenomena principles with experiments in fluid flow, heat and mass transfer. Prerequisites CHE 332, ECE 300. Prerequisite or corequisite CHE 333

General Studies L

CHE 432 Principles of Chemical Engineering Design (3)
fall
Multicomponent distillation engineering economics equipment sizing and costs plant operation economics, and simulation and optimization techniques. Prerequisite CHE 332, 342

CHE 442 Chemical Reactor Design. (3)
spr ng
App es k net s to chem ca reactor des gn Prerequ s te CHE 342 Pre or corequ s te CHE 333

CHE 451 Chemical Engineering Laboratory. (2)
fa
Operat on cont , and des gn of exper menta and ndustr a pr cess equ pment, ndependent esearch pro ects 6 hours ab Prerequ s tes CHE 333 352 ECE 384

CHE 458 Semiconductor Material Processing. (3)
se ected semesters
Introduces the proces ng and character zat on of e ectron c mater a s for sem conductor app at ons Prerequ s tes CHE 333 342

CHE 461 Process Contro . (4)
fa
Process dynam cs, n trumentat on and feedback app ed to auto mat c pr cess cont o ecture ab Prerequ te ECE 394 ST Eng neer ng Systems
Genera Stud es CS

CHE 462 Process Design. (3)
spr ng
App es econom c pr nc p es to opt m ze equ pment se ect on and des gn development and des gn of pr cess sy tems Prerequ s tes CHE 432 442

CHE 474 Chem cal Engineering Design for the Environment. (3)
fa
Conf ct of proces ng mater a s and preserv ng the natura resource Teaches students to understand and va ue the env ronment and attempt to c ntro ou mpact Prerequ s tes CHE 333 342

CHE 475 B ochemical Engineering. (3)
se ected semesters
App es chem a eng neer g methods mass transfer thermodynam cs and transport phenomena to ndustr a b otechno ogy Prerequ s te nstructor approva

CHE 476 Bioreaction Engineering. (3)
se ected semesters
Pr nc p es of ana ys s nd des gn of rea t rs for proce s ng w th e s and other b o g ca y a t ve mater a s app cat ons of react on eng neer ng n b otech o ogy. Prerequ s te· nst tor approva

CHE 477 Bioseparation Processes. (3)
se ected semesters
Pr nc p es of separat on of b o og ca y act ve hem ca s, the app ca t on sca e up, and des gn of separat on pr ces es n b otechno ogy. Prerequ s te nstruct r approva

CHE 478 Industrial Water Quality Engineering. (3)
fa
Chem ca treatment process ng qua ty cr ter a and ontro system des gn and water po utants Prerequ tes CHE 331 sen or stand ng.

CHE 479 Air Quality Control. (3)
fa
A r po utant contro effect and or g ns Chem ca and phys ca pro cesses nc ud ng combust on, contro equ pme t des gn d spers on, and samp ng Prerequ s tes CHE 331 en or stand ng

CHE 490 Chemical Engineering Projects. (1–5)
fa spr ng summ r
Ind v dua projects 'n hem a eng neer g operat ons and des gn Prerequ s te: stru t r approva

CHE 494 Special Top cs. (1–4)
fa and spr ng
Top cs may nc ude the fo owing
- Advanced Process Contro 3
- B otechno ogy Techn ques 3

CHE 496 Professional Seminar. (1–3)
fa and spr ng
Profess ona and eth ca aspect w th a d scu s on of respons b t es Lecture f e d tr ps Prerequ s te nstructor approva

CHE 501 Introduction to Transport Phenomena. (3)
fa and spr ng
Transport phenomena, w th empha s on f u d systems Prerequ s te trans t on student w th nstructor approva

CHE 502 Introduction to Energy Transport. (3)
fa and spr ng
Cont nuat on of transport pr nc p e w th emphas s on energy t ans port n tat onary nd f u d systems Prerequ s te trans t o student w th nstru tor pprova

CHE 503 Introduct on to Mass Transport. (3)
fa and pr ng
App es trans o t phenomena to mass transfer Des g of mass t a s fer equ pme t nc ud ng staged proce se Prerequ s te tra s t on tudent w t n tructor appro a

CHE 504 Introduction to Chemical Thermodynam'cs. (3)
fa and pr ng
Energy re at ons nd equ br um conve s on based on chem ca potent a and p ase equ br a. Prerequ s te t a s t student w th nstructor approva

CHE 505 Introduction to Chem ca Reactor Design. (3)
fa and pr ng
App es k net c to chem ca reactor des gn Prerequ s te trans t on student w th nstructor approva

CHE 527 Advanced Applied Mathematical Analysis in Chemical Engineering. (3)
fa
Formu at on and s ut on of omp ex mathemat ca re at n h ps resu t ng from the de cr pt n f phys a prob ems n mass energy and momentum tran fer and chem ca k net cs

CHE 528 Process Opt'mizat'on Techniques. (3)
sp g
Meth d for opt m z ng eng neer ng processes Exper menta de gn and ana ys s near and non near regress on methods c ass ca search nd dynam c programm ng a gor thms

CHE 533 Transport Processes I. (3)
fa
Un f ed treatment of momentum heat and mas tran fer from mo ec u ar the y and nt nuum p nts f v ew Cont nu m equat ons of m roscop c and macro cop c systems and mu t component and mu t phase ystems Cro sted as BME 533 Cred t s a owed for on y BME 533 r C E 533

CHE 534 Transport Processes II. (3)
spr ng
Cont n at on of BME 533 or CHE 533 emphas z ng mass transfer Cross ted as BME 534 Cred t s a owed for on y BME 534 or CHE 534 Prerequ s te BME 533 or CHE 533

CHE 536 Convective Mass Transfer. (3)
se ected semesters
Turbu ent f w for mu t ompone t ystems nc ud g chem ca reac t ons w th app cat o s separat o s an a r pol t on Prerequ s te HE 533 or MAE 571

CHE 543 Thermodynamics of Chemical Systems. (3)
fa
C as ca a d tat st a t ermody am cs of no dea phys cochem ca ystems and pro e ses pred ct on of opt mum operat ng cond t ons Cr s sted as BME 543 Cred t a owed for on y BME 54 or CHE 543

CHE 544 Chemical Reactor Engineer ng. (3)
spr ng
React on rates thermodynam s a d transport pr nc p es app ed t the des g and perat on f chem ca eactors Cross sted as BME 544 Cred t s a owed for y BME 544 or HE 544 Prerequ s te BME 543 or CHE 543

CHE 548 Topics 'n Catalysis. (3)
se ected semesters
Eng neer ng cata y emphas z ng adsorpt on k net s haracter za t on d ffus ona con derat ons and reactor des g Other top cs nc ude mechan sms s rf ce ana yses and e ectr n c structure

L tera y and r t ca nqu ry **MA** mathemat c **CS** omputer stat t c q a t tat ve a at o **HU** uma te a d f e art **SB** oc a nd beha o a enc s **SG** natura s en e genera co e o r e **SQ** natu ence q ant t t ve **C** t ra d ver ty n the ted States **G** g b H h o ca Se Ge a Stud es page 83

CHE 552 Industrial Water Quality Engineering. (3)
selected semesters
Water pollutants, quality criteria and control, chemical treatment processing, and system design. Case studies. Prerequisite: CHE 331 (or its equivalent).

CHE 553 Air Quality Control. (3)
selected semesters
Air pollutant origins, effects, and control. Physical and chemical processes, including dispersion, combustion, sampling, control equipment design, and special topics. Prerequisite: CHE 331 (or its equivalent).

CHE 554 New Energy Technology. (3)
selected semesters
Gasification, liquefaction pyrolysis, and combustion processes for coal, wastes, and other raw materials. In-situ processes for coal, oil, shale, and geothermal energy. Environmental quality issues.

CHE 556 Separation Processes. (3)
selected semesters
Topics in binary multicomponent separation, rate governed and equilibration processes, mass transfer criteria, energy requirements, separating agents and devices, and staged operations.

CHE 558 Electronic Materials. (3)
selected semesters
Processing and characterization of electronic materials for semiconductor-type uses. Thermodynamics and transport phenomena, phase equilibria and structure, mass transfer, and diffusion and thermal properties.

CHE 561 Advanced Process Control. (3)
spring
Dynamic process representation, linear optimal control, optimal state reconstruction, and parameter and state estimation techniques for continuous and discrete time systems.

Fireworks mark the end of the Lantern Walk, a traditional Homecoming activity.

CHE 563 Chemical Engineering Design. (3)
selected semesters
Computational methods: the design of chemical plants and processes.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

MATERIALS SCIENCE AND ENGINEERING (MSE)

MSE 194 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Challenges in Materials Engineering. (1)

MSE 353 Introduction to Materials Processing and Synthesis. (3)
fall
Principles of materials structure and properties with emphasis on applications in bulk and thin film materials processing and synthesis. Prerequisites: CHM 116 and PHY 131 (or their equivalents).

MSE 354 Experiments in Materials Synthesis and Processing. (2)
spring
Small groups of students complete three experiments selected from a list. Each is supervised by a selected faculty member. Lab. Prerequisite: MSE 353 (or its equivalent).

MSE 355 Introduction to Materials Science and Engineering. (3)
fall
Elements of the structure of metals and alloys, measurement of mechanical properties, and optical metallography. Lecture, lab, field trips. Prerequisite: CHM 114 or 116.

MSE 420 Physical Metallurgy. (3)
spring
Crystal structure and defects. Phase diagrams, metallography, solidification and casting, deformation, and annealing. Prerequisite: ECE 350.

MSE 421 Physical Metallurgy Laboratory. (1)
spring
Focuses on analysis of microstructure of metals and alloys and includes correlation with mechanical properties to some extent. Lab. Pre- or corequisite: MSE 420.

MSE 430 Thermodynamics of Materials. (3)
spring
Principles of statistical mechanics, statistical thermodynamics of single crystals, solutions, phase equilibrium, free energy of reactions, free electron theory, and thermodynamics of defects. Prerequisite: ECE 350.

MSE 431 Corrosion and Corrosion Control. (3)
spring in odd years
Introduces corrosion mechanisms and methods of preventing corrosion. Topics include: electrochemistry, polarization, corrosion rates, oxidation, coatings, and cathodic protection. Prerequisite: ECE 350.

MSE 440 Mechanical Properties of Solids. (3)
fall
Effects of environmental and microstructural variables of mechanical properties, including plastic deformation, fatigue, creep, brittle fracture, and internal friction. Prerequisite: ECE 350.

MSE 441 Analysis of Material Failures. (3)
spring in even years
Identifies types of failures. Analytical techniques. Fractography, SEM, nondestructive inspection, and metallography. Mechanical and electronic components. Prerequisite: ECE 350.

MSE 450 X-Ray and Electron Diffraction. (3)
spring
Fundamentals of x-ray diffraction, transmission electron microscopy, and scanning electron microscopy. Techniques for studying surfaces, internal microstructures, and fluorescence. Lecture, demonstrations. Prerequisite: ECE 350.

MSE 470 Polymers and Composites. (3)
fall
Relationship between chemistry, structure, and properties of engineering polymers. Design, properties, and behavior of fiber composite systems. Cross-listed as MAE 455. Credit is allowed for only MAE 455 or MSE 470. Prerequisites: ECE 313, 350.

MSE 471 Introduction to Ceramics. (3)
fa
Pr n p es of structure and property re at ons n ceram c mater a s Process ng te hn ques App cat on n me han ca e ectron c and superconduct ng systems Prerequ te ECE 350

MSE 482 Materials Eng neering Design (3)
fa
Pr nc p es of the des gn pr cess Fea b ty and pt m zat n Manu fa tur ng pr ce ses mater a s e e t on fa ure ana ys s and econom cs Prerequ s tes ECE 313 35

MSE 490 Capstone Design Project (1–3)
fa and spr ng
For ma groups f ndamenta or app ed aspects of e g neer ng mater a s emphas zes exper menta prob ems and des gn Prerequ te MSE 430 440 450

MSE 510 X Ray and Electron Diffraction. (3)
spr ng
Fundamenta s of x ray d ffract on transm ss on e ectron m croscopy and cann ng e ectron m croscopy. Techn ques f r study ng surfaces nterna m cro tructure and f uorescence Lecture demon trat o s Prerequ s te trans t on student w th nstructor app va

MSE 511 Corros on and Corrosion Control. (3)
spr g n odd years
ntrodu es corros on mecha sms a d methods of prevent ng corro s on Top cs n ude e ectrochem try po ar zat o corros on rates ox dat on coat ngs and athod c pr tect on Prerequ s te trans t n student w th nstructor approva

MSE 512 Analys s of Material Failures. (3)
spr ng n even years
dent f e type of fa ures A a yt a techn ques Fra tography SEM nonde tru t ve nspect n a d meta ograp y Mechan ca and e ec tron c comp nents Prerequ te trans t on student w th nstructor appr va

MSE 513 Polymers and Composites. (3)
fa
Re at on h p betwee che stry structure and propert s of eng neer ng po ymers Des gn propert es and behav or of f ber compo te sy tem

MSE 514 Physical Metallurgy (3)
spr ng
Crysta structure and defects Pha e agrams meta ography so d f cat on and cast ng and deformat o a d annea ng Prerequ s te· tran s t on student w t nstruct r approva

MSE 515 Thermodynam cs of Materials. (3)
spr ng
Pr nc p es of stat st ca mechan cs, stat st ca thermodynam cs of s n g e y ta s so ut ons pha e equ br um free ene gy of rea t ons free e ect n t e ry and thermodynam c of defects Prerequ s te trans t on student w t n tructor approva

MSE 516 Mechanical Properties of Solids. (3)
fa
Effects of env ronmenta and m cr truct na var ab es of mechan a p opert es nc ud ng p ast deformat on fat g e creep, br tt e frac ture, a d nter a f ct on Prerequ s te trans t o student w th nst uc tor appr va

MSE 517 Introduction to Ceramics. (3)
fa l
Pr c p es of structu e property e at ns n e am mater a s Pr ce ng tec n que App cat s n me han ca e ectron c a d super conduct ng systems P e equ te trans t on student w th nstructor approva

MSE 519 Physical Metallurgy Laboratory. (1)
spr ng
Ana yzes m c structure f meta s and a oys and c udes some cor re at on w th mecha ca propert es Lab Pre or corequ s te MSE 514

MSE 520 Theory of Crystalline Solids (3)
e ected semesters
An s trop c propert es of crysta s tenso treatment of e ast c mag net c, e ect c and therma propert es and crysta ography of Martens t c tran fo mat ons

MSE 521 Defects in Crystalline Solids. (3)
spr ng
trodu e the ge metry nteract on and equ br um between d s o a t ons and po nt defects D scusse re at ons between defe ts and propert es Prerequ te ECE 350 or nstructor approva

MSE 530 Materials Thermodynamics and Kinetics. (3)
spr ng
Thermodynam cs of a oy ystems d ffus n n ds k net cs f pre c p tat on and phase transformat on n s ds Prerequ s tes ECE 340 350

MSE 540 Fracture, Fatigue, and Creep. (3)
spr ng n odd yea s
Re at ons p betwee m crostructure and fra ture fat gue and reep propert es of mater a s Env ronn enta effects and recent deve op ment Current t eor e and exper menta resu ts Prereq s te MSE 440 or ts equ va ent

MSE 550 Advanced Materia s Character zation. (3
fa
Ana yt a strumentat o for chara ter zat on f mater a SEM S MS Auge ana yt ca EM and othe advanced research tech n'ques

MSE 556 Electron Microscopy Laboratory (3)
fa
Lab support for MSE 558 C oss sted a SEM 556 Cred t a owed for on y MSE 556 or SEM 556 Pre or corequ s te MSE 558 or SEM 558

MSE 557 Electron Microscopy Laboratory. (3)
spr ng
Lab pport for MSE 559 Cross sted as SEM 55" C ed t a owed for n y MSE 557 or SEM 557 Pre o corequ s te MSE 559 or SEM 559

MSE 558 Electron Microscopy I. (3)
fa
M croana y s of the structure and on p t on of mater a s s ng mages, d ffract on x ays and energy oss pectr scopy Requ res know dge of e ementary rysta ography rec proca att ce stere graph c project o s and comp ex var ab e Cross sted as SEM 558 Cred t s a owed fo on y MSE 558 r SEM 558 Prerequ s te nstru tor approva

MSE 559 Electron M croscopy II. (3)
spr ng
M croa a ys s of the stru ture and compos t on of mater a s us ng mages d ffra t on x rays and energy spectroscopy Requ re know edge of e ementary crysta ography rec proca att ce stereo gr ph c pr ect ons and comp e var b e ross sted as EM 5 9 C ed t s a owed for on y MSE 559 or SEM 559 Pre equ s t stru t approva .

MSE 560 Strengthening Mechanisms (3)
se e ted semesters
Deformat on of crysta e mate a s Propert e of d s ocat o heo r e of stra n harden ng so d o ut on prec p tat on and transforma t on strengt en ng Prerequ s te E E 350 or ts eq va ent

MSE 561 Phase Transformation in So ids. (3)
spr ng n even years
Heterogeneous and homogeneous prec p tat on react o s shear d s p ac ve rea t ons and order d sorder transformat on

MSE 562 Ion Imp antation. (3)
sele ted semesters
nc udes efect product on and annea ng Genera zed treatment nc ud ng on mp ant t on neutron r d at on damage an the nte a t on of ther nc dent beams P erequ s te M E 45

MSE 570 Po ymer Structure and Properties. (3)
spr ng n even years
Re at on h ps between str ct re and propert es of synthet c po ymers. c ud ng g ass t ans t n mo ec ar re axat ons crysta ne tate v coe a t c ty morpho og ca c aracter zat n and pro e s g

L tera y a d t q ry **MA** at e at **CS** p te tat t u ntt tv p at **HU** an te a f e art **SB** a d be ra c e **SG** at ra en e qe era co e cou e **SQ** nat a en ua t t tve **C** u t ra d ve ty n the ted St te **G** H t a See e a St d e page 8

MSE 571 Ceram cs. (3)
se ected semeste s
nc udes ceram process ng cast g m ng f r ng te ng rysta defects and mechan a e ectr n c and phy ca propert es Prereq u s tes MSE 521 561

MSE 573 Magnetic Materials. (3)
se ected semester
Emphas zes ferromagnet c and ferr mag et p en m a D ma ns magnet c an sotrophy and magnetostr ct o Study of commer a magnet mater a s Prerequ s te MSE 52 or t equ va ent

MSE 598 Spec al Topics. (1–4)
on e a year
Top s may nclude the fo ow ng
• Growth and Proces ng of Sem conducto Dev ce 3

Omn'bus Courses. For an exp anat on of our e offered but not spec f a y sted n th s cata og ee Omn bus Course page 56

Department of Civil and Environmental Engineering

www.eas.asu.edu ~civil
480 965-3589
ECG 252

Sandra L. Houston, Chair

Professors: Fox, S Houston W Houston Mam ouk Mays, Rajan, S ngha W tczak

Associate Professors: Abbaszadegan, Faf t s, H nks Johnson, Mobasher Westerhoff

Assistant Professors: A en D ner Ka oush, Mucc no, Owusu Antwi Pecc a Zhu

The civil engineering profession ncludes analy s, plan ning, des gn, construction, and maintenance of many types of fac t es for government, commerce, industry, an l the public domain These fac t es include high rise office tow ers, factories schools, airports t nnels and subway sys tems dams, canals, an l v ater purificat on and env r onmer tal protecti n facilities such as solid w aste and w astew ater treatment systems Ci l eng r eers are cor cern ed w ith the mpact of their projects on the public and the env r on ment, and they attempt to coord r ate the needs of so iety w ith techn ca an l eco r omic feasibility

Career Opportunities in the Field. University graduates w ith the B.S.E degree in Civil Engineering readily find employment Civil engineers work in many different types of companies, from large corporations to small, private c on sulting firms, or in governmental agencies A c vil engineer ing background is an excellent foundatio n for obs in man agement and public service Civil engineering is one of the best engineering professions fro m the v iewp nt of interna tional travel opportunities or for eventually establishing one's own consulting business.

Uniqueness of the Program at ASU. The Department of Civil and Environmental Engineering offers a challenging program of study designed to provide the student with the resources and background to p rs ue a career in a w de range of specialty areas. Some of these areas are structural, geo tech r a , environmental and w ater resources, transportation an l mater als engineering Th e C vil En_ neering program s fully ac redited by ABET. With the program students w ill be prep ared for the F ndamen ta s of En_ neering exam ination and professional reg stration

The Department of Civil and Environmental Engineering at ASU strongly believes in the deve opment of program matic objectives an l outcomes, and a continuous quality improvement program The four top level learn ng obje tiv s for the pro_ram deal with the ab ty of our graduates to

1. be technically competent,
2. be effective members of society,
3. communicate effectively, and
4. ana yze and design civ eng neer ng systems with due considerat ons to cost, environmental and con str uction factors

Civil Engineering Areas of Study

Areas of study in the civil engineering curriculum are described below

Environmental Engineering. This area of study includes the quality of air, water, and land resources; transport use, and disposal of haz ardous wastes, water and wastew ater treatment, and water reuse

Geotechnical Geoenvironmental Engineering. This area of study includes the analysis and design of f undation sys tems, seepage control, earthdams and water resource struc tures, earthwork operations, fluid flow through po ous me ia response of foundations and embankments to earth quakes, and solutions to environmental problems.

Structures Materials Engineering. This area of study con siders the plan ning analysis and design of steel and con crete bridges buildings, dams, special offshore and space structures Portland cement concrete; c mposite materials; and structural retrof t of existing bridges

Transportation Materials Engineering. This area of study includes 1 transportation design and operation and 2 pavements and materials. Transportation design and operation cover geometric design of highways, traffic operations, and h way c apac ty an l safety Pavements and materials f cus on pavement analysis and design, pavement main te nance and rehab tation pavement eva uation and management characte ization of h ghway mater a s, and durability of highway structures

Water Resources Engineering. This area of study s con cerned with surface and groundw ater flow, planning and management of water supply, and water d stribut on system modeling.

The undergra duate prog am provides an exce ent back ground for entry to graduate study n engineering.

UNDERGRADUATE OPPORTUNITIES IN CIVIL AND ENVIRONMENTAL ENGINEERING

Students majoring in Civil Engineering have three choices:

1. the major without a concentration;
2. the major with a concentration in construction engineering, and
3. the major with a concentration in environmental engineering

Civil Engineering. The B.S.E. degree in Civil Engineering offers students a wide background on various areas of study within civil engineering. The degree provides basic principles of environmental, geotechnical geoenvironmental, structural materials, transportation materials, and water resources engineering. Students have the option to select among a certain number of design and technical elective courses in their junior and senior years.

Civil Engineering with Construction Engineering Concentration. The B.S.E. degree in Civil Engineering with a construction engineering concentration offers students basic principles of civil engineering with the option to concentrate on construction engineering. The degree provides education based on the traditional engineering principles, construction materials and practice, quality control, and civil engineering project management.

Civil Engineering with Environmental Engineering Concentration. The B.S.E. degree in Civil Engineering with an environmental engineering concentration offers students basic principles of civil engineering with the option to concentrate on environmental engineering. The degree provides a multidisciplinary education based on the traditional engineering principles, chemistry, biology, and hydrogeology.

CIVIL ENGINEERING—B.S.E.

The B.S.E. degree in Civil Engineering requires a minimum of 128 semester hours of course work. A minimum of 50 upper division semester hours is required. The minimum requirements are for a student who has successfully completed at least a year (each) of high school chemistry, physics, and computer programming along with precalculus, algebra, and trigonometry.

The B.S.E. degree program consists of the following categories:

First Year Composition	6
General Studies school requirements	55
Engineering core	18–19
Civil Engineering core	27
Design courses	6
Technical courses	15–16
Total	128

For information concerning First Year Composition, General Studies school requirements, and engineering core courses, see "School of Engineering," page 218. The Civil Engineering core and the design and the technical course requirements are shown below. The four-year sequences presented afterwards show the specific course requirements for the Civil Engineering degree without a concentration, Civil Engineering with the construction engineering concentration, and the Civil Engineering degree with the environmental engineering concentration.

Civil Engineering Core

CEE 296	Civil Engineering Systems	4
CEE 321	Structural Analysis and Design	4
CEE 341	Fluid Mechanics for Civil Engineers	4
CEE 351	Geotechnical Engineering	4
CEE 361	Introduction to Environmental Engineering	4
CEE 372	Transportation Engineering	4
ECE 380	Probability and Statistics for Engineering Problem Solving CS	3
Total		27

Design Courses for the Degree Without a Concentration

Six semester hours from the following list are required

CEE 423	Structural Design	3
CEE 444	Water Resources Engineering	3
CEE 452	Foundations	3
CEE 466	Sanitary Systems Design	3
CEE 475	Highway Geometric Design	3

Technical Courses for the Degree Without a Concentration

From 15 to 16 semester hours are required. The design elective courses that have not been selected to satisfy the design electives requirement may be used as technical electives.

A maximum of seven hours may be selected from outside civil engineering, with an advisor's approval. Construction courses taken as technical electives may be selected from the following list: CON 341, 383, 495, and 496. Students must select technical and design electives from at least three different CEE areas of study.

Environmental Engineering

CEE 462	Unit Operations in Environmental Engineering	3
CEE 466	Sanitary Systems Design	3
CEE 467	Environmental Microbiology	4
CHM 231	Elementary Organic Chemistry IQ	3

Geotechnical/Geoenvironmental Engineering

CEE 452	Foundations	3

Structures Materials Engineering

CEE 322	Steel Structures	3
CEE 423	Concrete Structures	3
CEE 424	Structural Design	3
CEE 432	Matrix and Computer Applications in Structural Engineering	3

Transportation/Materials Engineering

CEE 412	Pavement Analysis and Design	3
CEE 475	Highway Geometric Design	3
CEE 481	Civil Engineering Project Management	3
CEE 483	Highway Materials, Construction and Quality	3

Water Resources Engineering

CEE 440	Engineering Hydrology	3
CEE 441	Water Resources Engineering	3

Design Courses for the Degree with the Construction Engineering Concentration

CEE 3.? Steel Stru t r es
CEE 45? F undati n s .

Total 6

Technical Courses for the Degree with the Construction Engineering Concentration

CEE 32> C c rete St c r es 3
CEE 481 Civ l E g ee in Proje t Ma a n t 3
CEE 48> H h va M ter ls Co tr ct n and Quality 3
CON 34 Surve in 3
CON 496 Co st ct n Contr ct Adm nistrat n

T ta 15

Design Courses for the Degree with the Environmental Engineering Concentration

CEE 44 W ter R sour s Engin e n ... >
CEE 466 Sa tary Sy ten s De n ..... >

To ta 6

Technical Courses for the Degree with the Environmental Engineering Concentration

BIO 32(Fu l ment s of Ec lo y 3
or BCH >61 Pr nciples f B c l e str y >
CHM >? Env ir nmenta Chem try >
or CHM 34 Elem ntary Ph s cal Ch str 3
PLP 44? Env ronmenta P nn n 3
or PLP 4 > Environmenta Impact A se sment 3
CEE 36? Unit Operati ns n Env ro e ta Eng er ng 3
CEE 44(Er ineerin Hydr o y >
CEE 46 Env r nmenta Microb o y 4
Technical e ctive[1]

Total 16

[1] This c urse is s l ted fro the st f tech ca course for the degree w thout a cer trat o

Civil Engineering Program of Study
A Four-Year Sequence

First Year

First Semester

CHM 4 General Chem try f> Eng neer *SQ* 4
or CHM 6 Genera Ch m try *SQ* 4
ECE (Introd ct y to Eng r er n De n *CS* ...3
ENG 1 1 F r t Year Comp siti n .3
MAT ?7 Calculus with Ana yt c Ge m try I *MA* 4

tal 14

Second Semester

CEE ?96 Civ l Engineer ng Syste 4
ECN 111 Ma r c n mic Princip e *SB* 3
or ECN 1 ? M cr econ mi Prin ip s *SB*
ENG ? F st Year Comp s ti n 3
MAT 271 Ca cu us with Ana yt c G metr II *MA* . 4
PHY 121 U iversity Phy ics I Me han s *SQ* 3
PHY 1 Universit P sic L b ratory I *SO* 1

Total 5

Second Year

First Semester

ECE 2 Engineer ng Mech n s I Stat c 3
MAT 2 Cal ul s with Ana yt c Ge m try II *MA* 4
MAT 4 Ele e tary Differ nt a Equation *MA* 3
PHY 3 Univ rsity Physics I F e t city and Ma n t sm *SQ* 3
PHY 13 Univ rsity Phys s Lab rat II *SO*[2] 1
HU SB and wareness are c urse 3

tal 17

Second Semester

ECE ?? Engineer ng Mechan s I Dyn mic 3
ECE 3?? I tr du t to Def rm able Solids 3
ECE ?4 Thermodyna ics 3
or ECE ? Electr ca N tw rks I 4
ECE >? Pr ba ity and Stat stics f> En ee ng Pr ble Solvin *CS* 3
Basic ien e ele tive> 3

Tota 15 16

Third Year

First Semester

CEE >21 Str ctura Analys nd De n 4
CEE 341 Fl id Mechanics for Civil En eers .. 4
ECE 3( ) termediate Eng neer ng Design *L* 3
E E 351 Civil Engineer g Mater a s 3
ECE >64 Numer ical Meth ds for Eng ne s 4

T tal 15

Second Semester

CEE 351 Ge te hn a Eng ee g 4
CEE >61 Introduct on to Env ro e ta En e ng 4
CEE >7 Tra sp rtation Eng n eri 4
HU SB and wareness area c u se 3

Total 15

Fourth Year

First Semester

Des n electives 3
H SB and wareness are t ui e 3
T chni al ele tives 9

Total 15

Second Semester

CEE 48(I te rated Civ l Eng neer g Des gn *L* 3
Des g ec ive 3
HU SB and w r e s are c u se[3] 3
Technica electives 6–7

To ta 15 6
Mi imum to 25

[2] Both PHY 131 and 132 must be take t sec re SQ credit.

[3] Engineering students may not use ae space studies AES o n tary science MIS cour es t f th HU or SB requirements Students should consider the fo ow n list of electives to e han e communi at n and mana ement k COM t , 11), >2 CON 1 1 PLP 10), 2

Construction Engineering Concentration
Program of Study
A Four-Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry *SQ* 4
ECE 1 Introduction to Engineering Design *CS* 3
ENG Freshman Composition 3
MAT 271 Calculus with Analytic Geometry I *MA* 4

Total 14

Second Semester

CEE 296 Civil Engineering Systems 4
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* 3
ENG 102 First Year Composition 3
MAT 272 Calculus with Analytic Geometry II *MA* 4
PHY 131 University Physics II Mechanics *SQ* 3
PHY 132 University Physics Laboratory II *SQ* 1

Total 18

Second Year

First Semester

ECE 211 Engineering Mechanics Statics 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II Electricity and Magnetism *SQ*[2] 3
PHY 132 University Physics Laboratory II *SQ*[2] 1
HU SB and awareness area course 3

Total 17

Second Semester

ECE 211 Electrical Networks I 4
ECE 212 Engineering Mechanics II Dynamics 3
ECE 315 Introduction to Deformable Solids 3
ECE 388 Probability and Statistics for Engineering Problem Solving *CS* 3
Basic science elective 3

Total 16

Third Year

First Semester

CEE 321 Structural Analysis and Design I 4
CEE 341 Fluid Mechanics for Civil Engineers 4
ECE 311 Intermediate Engineering Design *L* 3
ECE 351 Civil Engineering Materials 3
ECE 384 Numerical Methods for Engineers 4

Total 18

Second Semester

CEE 351 Geotechnical Engineering 4
CEE 361 Introduction to Environmental Engineering 4
CEE 372 Transportation Engineering 4
HU SB and awareness area course[3] 3

Total 15

Fourth Year

First Semester

CEE 472 Steel Structures 3
CEE 452 Foundations 3
CEE 481 Civil Engineering Project Management 3
CON 241 Surveying 3
HU SB and awareness area course 3

Total 15

Second Semester

CEE 332 Concrete Structures
CEE 348 Highway Materials Construction and Quality ....
CEE 456 Integrated Civil Engineering Design *L* 3
CON 496 Construction Contract Administration *L* 3
HU SB and awareness area course[3] 3

Total 15
Graduation requirement total 128

Both PHY 131 and 132 must be taken to secure SQ credit
Both PHY 131 and 132 must be taken to secure SQ credit
Engineering students may use double-space studies AES or military science courses to fulfill HU or SB requirements
Students should consider the following list of electives to enhance communication and management skills COM 100 1
32 CON 496 PUP 101, 2

Environmental Engineering Concentration
Program of Study
A Four Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry *SQ* 4
ECE 100 Introduction to Engineering Design *CS* 3
ENG 101 First Year Composition 3
MAT 271 Calculus with Analytic Geometry I *MA* 4

Total 4

Second Semester

CEE 296 Civil Engineering Systems 4
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* 3
ENG 102 First Year Composition 3
MAT 272 Calculus with Analytic Geometry II *MA* 4
PHY 131 University Physics II: Mechanics *SQ* 3
PHY 132 University Physics Laboratory II *SQ*[1] 1

Total 18

Second Year

First Semester

ECE 210 Engineering Mechanics I Statics 3
MAT 272 Calculus with Analytic Geometry II *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II Electricity and Magnetism *SQ* 3
PHY 132 University Physics Laboratory II *SQ*[1] 1
HU SB and awareness area course[3] 3

Total 17

Second Semester

CHM 231 Elementary Organic Chemistry *SQ*
ECE 212 Engineering Mechanics II Dynamics 3
ECE 315 Introduction to Deformable Solids 3
ECE 334 Thermodynamics 3

Literary and artistic study **MA** mathematics **CS** computer statistics quantitative applications **HU** humanities and fine arts **SB** social and behavioral sciences **SG** natural science general curriculum **SQ** natural science—quantitative **C** cultural diversity the United States **G** global **H** history **C** General Studies page 8

ECE 380 Probabil t and Statistics for Engineering Prob em So v ng *CS* 3

T ta 15

Third Year

First Semester

CEE 321 Struct ral Analysis and Desi n. 4
CEE 341 Fluid Mecha i s for C vil En neers. 4
ECE 300 Intermed ate Eng neering Design *L* 3
ECE 351 Civil Engineeri Materia s 3
ECE 384 Nun erical Methods for Eng neers 4

T tal 18

Second Semester

CEE 351 Geotechnical Engineering 4
CEE 361 Intr duct on to Envir nmenta Engineer ne . .4
CEE 372 Transp rtati n E gineer ne 4
BIO 120 Fundamentals of Eco o y 3
or BCH 361 Principles of Bi chemistry 3
or CHM 302 Environmenta Ch mistry 3
or CHM 341 E em ntary Ph s cal Ch en ist y 3
or PUP 444 Environ enta P ann ng 3
or PUP 475 Environmenta Impact A sessm nt 3
HU SB and aw renes s area course[3] 3

T ta 18

Fourth Year

First Semester

CEE 362 Unit Operation n Environ menta E g neer n g 3
CEE 444 Eng neering H drology. 3
CEE 466 Sanitary Systems Design 3
CEE 446 Env ronn enta Microbio ogy. 4
HU SB and awarenes area co r e[3] 3

Tota 6

Second Semester

CEE 444 W ater Resour es Eng neer ng 3
CEE 486 Integrated C v l Eng eering Des gn *L* 3
HU SB and awareness area course[3] 3
Technical elective[4] 3

Total 15
Graduat on requiren ent total. 128

Both PHY 121 an l 122 n ust be taken to ecure SQ credit

- B th PHY 131 and 32 must be taken tc secure SQ cred t.

Engineering studer ts may not se aerospace studies AES or military science MIS c urse to fu fi l HU r SB requi ements Students shou d c nsider the f llow ng st of elect ves t enhance on munication and management skills· COM 10 , f 320, CON 101, PUP 100, _0

4 This course is selected from the list of te hnic al c urses f r the degree w ithout a oncent ration.

GRADUATION REQUIREMENTS

Each Sequence of mathematics, engineering core, civil engineering core, and the combined design and technical courses must be completed with an average grade of "C" or higher. CEE courses, except CEE 296, may not be taken before the engineering core courses are completed Design and technical courses may not be taken before the civil engineering core courses are completed.

A n av n un of two graduate cour es may be taken for undergraduate credit by students whose cumulative GPA is 3 00 or higher with the approval of the instructor, advisor, department chair, and the dean of the college

In addition to fulfilling schoo and major requirements, majors must satisfy all university graduation requirements See "University Graduation Requ ren ents " page 79.

Concurrent Studies in Architecture and Civil Engineering

Qualified lower division students interested in combining undergraduate studies in architecture and civil engineering may prepare for upper division and graduate courses in both programs by taking courses shown for opt on B under the Architectural Studies major See "Architectural Studies B.S.D.," page 130

GRADUATE STUDY

The Department of Civil and Environmental Engineering also offers graduate programs leading to the M S M.S.E., and Ph.D. degrees. These programs provide a blend of classroom instruction and research. Many topics and relevant research projects are available for thesis programs. Students interested in these programs should contact the department for up to date literature.

CIVIL AND ENVIRONMENTAL ENGINEERING (CEE)

CEE Note 1. Students enro ed n EE 580 590 592 599 792 and 799 are requ red to attend graduate student sem nars at t e t me hown n the *Sch du e of C asse*

CEE Note 2. Each semeste every graduate student enro d for more than e ght semester ho rs to enro for at e st o e semester hour of CEE 592 599 92 799

CEE 296 Civil Engineer ng Systems. (4)
fa a d pr ng
ntroduce c v eng neer ng Prob em s v ng econ m s descr pt o of c v eng neer ng systems des gn concepts eth cs profess o a respons b t e and computer g aph s Lecture computer abs f e d tr ps Pre or coreq u s te ECE 100

CEE 321 Structura Analys s and Des gn. (4)
fa a d pr ng
Stat ca y determ nate and ndeterm nate structures trusses beams nd frames by c ass a and matr x met ods ntrodu es tructura des gn ecture rec tat on Prereq u s tes ECE 212 313 Pre or coreq u s tes ECE 380 384

CEE 322 Steel Structures. (3)
fa
Behav or of structura components and sy tems Des g of stee mem bers and connect ons Load and re tance fa tor es gn method Le ture rec tat on Prereq u s te EE 321

CEE 323 Concrete Structures. (3)
spr ng
Behav r of oncrete structures and the des gn of re nforced and pre stres ed concrete members, nc ud ng foot ngs Part a de gn of on rete bu d ng system ecture rec tat on P erequ te CEE 321

CEE 340 Hydraulics and Hydrology. (3)
fa and spr ng
App es hydrau c eng neer ng pr nc p es to f ow of qu ds n p pe sys tems and open hanne s hydrostat cs character t cs of pumps and turb nes ntroduces hydro ogy Not open to eng neer ng students Lec ture ab Prerequ te CON 221

CEE 341 Fluid Mechanics for Civil Engineers. (4)
fa and spr ng
Fu damenta pr nc p e and methods of f u d mechan cs form ng the ana yt ca bas for water re ources eng neer ng C ndu t and open channe f ow 3 ho rs ecture 1 hour ab Prerequ s tes. ECE 212 313 Pre o coreq u s tes ECE 380 384

CEE 351 Geotechnical Engineering. (4)
fa and sp ng
ndex propert e and eng eer ng chara ter st s of C mpa t on permeab ty and seepage compres b ty and sett ement and hea stre gth Lecture ab Prerequ tes E E 212 313 P e or corequ s tes ECE 380 384

CEE 361 Introduction to Environmental Engineer ng. (4)
fa and spr ng
Concepts of a r and water o ut on e v ronmenta regu at o r k es ment chem try water qua ty mode ng water and wa tewater treatment system des gns ecture ab Prereq s tes E E 212 3 Pre r co equ s tes ECE 380 384

CEE 362 Unit Operations n Environmenta Engineering. (3)
spr ng
De gn and perat on of un t pro es es f r water and wa tewater treatment Prerequ s te CEE 361

CEE 372 Transportation Eng neering. (4)
fa a d spr ng
H g way ra , water and a tran p rtat n Operat ona ar ter t s and traff c co tro dev ces of each tran p rt m de mpact o urban form Prereq tes E E 212 313 P e corequ te ECE 8 384.

CEE 412 Pavement Analysis and Des'gn. (3)
fa
Des g of f ex b e and r g pave e ts for h ghways a d a ports Sur face ba e and subgrade cou ses Cost ana ys and paveme t se e t on Prerequ te CEE 35 ECE 351

CEE 423 Structural Design 3)
fa
Ana ys s and des gn f re for ed concrete stee masonry a d t mbe structure Lecture ab Prereq s te CEE 323 Pre or corequ te C E 322

CEE 432 Matrix and Computer App ications in Structura Engineering. (3)
spr ng
M tr x and computer app cat on to st uct ra eng neer g a d st u tura mec an c St ff es a d f ex b ty met ods f n te e e ents nd d fferences Prerequ s te CEE 321

CEE 440 Engineering Hydro ogy 3)
fa
De cr pt ve ydro ogy hyd o g yc e. mode s and sy te Ra n runoff mode s Hydr g des gn Con epts propert es and ba c e uat ons of gr ndwater f ow Prerequ s te CEE 341

CEE 441 Water Resources Engineering. (3)
spr ng
App es the pr n p es of hydrau s and hydro ogy t the e g neer ng of wate resource pro ects de g a d operat on f water r ur es sy tems water qua ty Prerequ te CEE 341.

CEE 452 Foundations. (3)
fa
App es so mechan to foundat n sy tems bea ng apa ty at era earth p ess re, and s pe tab ty Prerequ s te CEE 51

CEE 466 Sanitary Systems Design. (3)
fa
apa ty p ann ng and de gn of wate s pply domest c nd torm dra nage and so d waste sy tems Pre equ te CEE 361

CEE 467 Environmental Microbiology. 4)
fa
Overv ew of the m rob o ogy of natura and huma pa ted env ron ment m cr b a detect n eth do og es waterborne d sea e out breaks r sk as e ment and regu at on Lecture b Prerequ te CEE 361 or M C 220

CEE 471 Intelligent Transportation Systems 3)
se ected semesters
App es advanced techno ogy to the veh e a d the roadway t o ve traff conge t o safety and a r qua ty prob em Prerequ s te EE 372 or st tor approva

CEE 475 Highway Geometric Design. (3)
spr ng
Des g of the v s b e e ement of the r adway Fu dament des gn cont o s w th app cat on to rura ads at grade ntersect n fre ways and nterchange e ture re tat o Prerequ te CEE 2

CEE 481 Civi Engineering Project Management. (3)
once a yea
C v eng nee ng pro ect management and adm n trat on p a n g and edu ng ost est mat ng an b dd ng strateg es f nanc a man agement qua ty co tro and safety and omputer app cat ons Lec ture f e d tr p P erequ tes CEE 321, 351 372

CEE 483 Highway Materials, Construction, and Quality. 3)
on e a yea
Propert e f h ghway m ter a s n ud ng ggregates aspha t con crete and port and cement concrete, con truct on pract ce mater a de very p acement and con pact on qua ty co tro Le ture f e d tr p Prerequ s tes CEE 21 351 372 ECE 5 38

CEE 486 Integrated C v l Eng'neering Design. (3)
fa a d pr ng
Requ res con p et n f a c v eng eer ng des gn n a s m ated prac t ng eng neer ng env ronment L m ted t undergraduates n the f na semeste ecture team earn ng Prerequ s te CEE 321, 341, 351 361 3 2
Gene a Stud es

CEE 512 Pavement Performance and Management. (3)
se e ted semesters
Paveme t management systems, n ud ng data co ect n eva uat on pt n zat on econom c ana y s and computer app at on for h gh way and a rport des g Prerequ s te str ct r app ova

CEE 514 B tum nous Mater'a s and Mixture. (3)
se ected sen e ter
Types f b tum n us mater a s used pavement m xtures Chem ca comp s t on, phy ca propert e de rab e aggregate ha acter st cs pt m m pha t contents superpave aspha t b nder m xt e d gn. Lecture ab P erequ s te EC 35

CEE 515 Propert es of Concrete. (3)
se e ted semester
Mate a s s ence of c ncrete Ceme t c em stry me han sms of hyd at n nte re at onsh p among m cro and macro pr pert e of ceme t ased ater a s Mechan ca propert e fa ure theo es fra ture mecha s of o ete mater Cement ba ed c mpo te mater a s and the d rab ty aspects Lecture ab rerequ s te ECE 50 or 351

CEE 521 Stress Analysis. (3)
fa
Advan ed top s the ana yt a determ nat on of tres and tra n Prerequ te CEE 321

CEE 524 Advanced Steel Structures. (3)
fa
Stre gt p ert es of stee and t e r effect on tructura be av E a t c de gn f tee str ct e P ast c ana ys s and de gn of bea s fra e and bents P ast def e t ons P ast c des gn req re ment Mu t story bu d ng Prereq te CEE 3 2

CEE 526 Finite Element Methods 'n Civi Engineering. (3)
fa
F n te e en ent formu at o for s ut ons f structur geote hn ca and hydrau c prob ems Prerequ s te CEE 432

CEE 527 Advanced Concrete Structures. (3)
se ect d seme ters
U t mate trength de g Comb ned shear and tor on Serv ceab ty P ast c ana y . Spe a sy tem Prerequ s te C 323

CEE 530 Prestressed Concrete. (3)
se ected semesters
Mate a and methods f pre tres ng A a ys s and des gn for f ex ure hear and tor on Pre tre o e due to fr ct on creep shr nk age and an horage set Stat a y ndeterm nate tructure Des gn of f at s ab br dge and compos te e ms Prerequ te CEE 323

CEE 533 Structural Optimization. (3)
se e ted sem ters
ne r and n n near programm P em formu at on onstra ned and n o stra ned pt m zat o Se s t v ty a a ys s Approx mate te h ques FEM ba ed opt ma des gn of mec an ca and ae space

L teracy r t a q y **MA** m themat **CS** om ter tat st cs q a t tat e app at n **HU** hu a t e f e t **SB** a a d behav o a e e **SG** natu a sc ce g era re o es **SQ** nat ra e e q ant t e **C** u t ra ver ty t e ted St t s **G** g ba H h t See Ge e St page 83

stru t res Cross sted as MAE 521. ed t s a owed f on y CEE 533 or MAE 521 Prerequ s te n truct approva

CEE 536 Structural Dynam cs. (3)
se ected semester
Struct re and tructura member ub e ted to dyn m c oad ngs esponse spectra theory app cat ns to br dges nd power p ant nve t gat on f the respo ses f m t egree of freedom tructures and matr x and nu er a methods f a a ys Le tu e rec tat on Prerequ s tes CEE 21 structor appr va

CEE 537 Topics in Structural Eng neering (1–3)
se ected semeste s
Advanced top c ud g on ear st u tura ana ys s exper menta stres ana ys s advanced f n te e ements p ast c ty and v s oe est c ty comp s te an damage mecha cs Prerequ s te n tru tor app ova

CEE 540 Groundwater Hydrology (3)
fa
Phy a prope t e of aqu fers we pump ng ubsurf ce f w mode ng unsaturated f ow n mer ca methods and subs den e and g u dwate po ut n Prereq s te CEE 44 or nstructor approva

CEE 541 Surface Water Hydro ogy. (3)
sp ng
Hydro og c cy a d mechan sm n ud ng pr c p tat on evapora t on a d transp at on ydrograp a a y f od r ut ng t t st ca methods n hydro gy and hydr g c de gn Prerequ te CEE 440 or nstru t r approva

CEE 543 Water Resources Systems. (3)
se ected semeste s
T eory a d app at on f quant tat ve p an ng methodo g e for the de gn and operat on of water re urce ystem C as pro ect ng a computer ca e tud e Prerequ te nstructor pprova.

CEE 546 Free Surface Hydraulics. (3)
se ected se ieste s
Der vat o of 1 d me s ona quat on u ed n open chann f ow ana y omputat n for un form and nonun form f ows unsteady f ow and f ood rout ng Mathemat and phy ca m de s Prerequ s te EE 341

CEE 547 Principles of River Engineer ng. (3)
se ected ˛ emesters
es of r vers tudy of water ed and hanne processes Sed ment our e y e d and ntro ydr og an ys s Case stud es P e eq u s te C E 341 o n tructor approv

CEE 548 Sedimentation Engineer ng. (3)
e ected sen ster˛
ntroduces the tran p rtat n f gran r sed mentary mate a by mov ng f u d Degradat on, agg egat on and ca cour n a uv a channe s Mathemat a and p ys ca m de s Prerequ te CEE 547 or nstruct approva

CEE 550 Soi Behavior. (3)
se ected sen e ters
Phys c c em ca aspects of s behav or stab zat on of s and eng neer ng propert es of so s Pre qu s t EE 51

CEE 551 Advanced Geotechn ca Testing. (3)
e ected s meste s
Odometer tr ax a stat c and cyc c ba k pres ure s turated a d u aturated amp es p re pre sure me surements sed oop omputer c ntro ed te t ng n s t te t ng a d sa p g Le ture ab Pre equ s te EE 351

CEE 552 Geological Engineer ng (3)
se ected ˛en esters
Geo og a ve t gat ons f r eng neer g purp ses case h stor es ge g c truct re weather ng remote en ng geophys cs and a r p oto nterpretat on for eng neer ng s te at s Lecture f e d tr ps Prerequ te CEE 351

CEE 553 Advanced Soil Mechanics. 3
se ected semeste s
App e theor es of e a t c ty an p a t c ty to so s theor e f conso dat on fa re theor es and re ponse to tat c and dyna c oad g Prerequ s t CEE 351

CEE 554 Shear Strength and Slope Stabil'ty. (3)
se ected semesters
Shear stren th of aturated and unsatu ated o trength deforma t on re at onsh ps, t me dependent strength parameter effe ts of amp ng and advan ed ope stab ty Prere u te CEE 351

CEE 555 Advanced Foundations. (3
se ected semesters
Deep foundat ons b aced excavat ns an red bu kheads re forced eart and u derp nn ng Prerequ s te E 351

CEE 557 Hazardous Waste. Site Assessment and Mit gation Measures. (3)
se e ted semesters
Techn q es fo hazard u waste s te as es ment and m t at on ase h stor e pre ented by nstructo and gue t speakers P erequ s te graduate stand ng nstructor a prova

CEE 559 Earthquake Engineer ng. (3)
se ected semesters
Character t c of earthquake mot o s e ect n of es gn earth quakes te esponse ana yses e m c s ope stab ty and quefac t on Prereq s te. CEE 351

CEE 560 Soil and Groundwater Remediation. (3)
fa
Prese t tech que fo remed at n f contam nated s s and grou dwaters w th bas c eng ne r g pr c p es Prereq s te nstruc tor approva

CEE 561 Physical-Chemical Treatment of Water and Waste. (3)
fa
Theory and des gn f phys ca and hem ca pr cesses fo t e treat ent of water and wastewate s Prerequ te 36

CEE 562 Env'ronmental B ochemistry and Waste Treatment. (3)
spr ng
Theory and des gn of b o og c waste treatment sy tems o ut on and env ronme ta ass m at on of wa tes P erequ s te EE 362

CEE 563 Env'ronmenta Chemistry Laboratory. (3)
fa
Ana yzes water domest c and ndustr a wa te aboratory proce dures for po ut on eva uat on and th contro of w ter a d waste treat me t pr esses Lecture ab P e equ s te CEE 361

CEE 565 Model ng and Assessment of Aquatic Systems. (3)
se ected semesters
Deve pment f pred t ve mode s of water qua ty methods t a ess e v ronme ta mpact app cat o s to water qua ty ma agement P erequ te CEE 361 or nstructor approva

CEE 566 Industrial Hazardous Waste Treatment. (3)
se ected semesters
Emphas ze treatment of ca ndustr a hazardou waste prob ems nc ud ng so vent recovery a d meta ecture project Prerequ s te EE 561 563

CEE 573 Traffic Engineering. (3
se ected semester
Dr ver veh e and roadway aracter t cs aw d ord nances traff c ontro dev ces traff eng neer ng stud es, a d Tran p rtat on System Management me su Prerequ te CEE 372

CEE 574 Highway Capac ty. (3)
se ected semesters
H ghway apac ty for a funct o a a es of h ghways raff c gna zat on nc ud ng traff c stud es warrants cyc e ngt t m g phas ng and o d at on Prerequ s te CEE 372

CEE 575 Traff c F ow Theory and Safety Analys s. (3)
se ected semesters
Traff c f ow theory d str but ons que ng de y mode s and car fo ow g H ghway afety ac d nt records systems ac dent ana ys s dent fy ng prob em ocat ns and acc dent cou terme sures Prereq u s te EE 573 or 574

CEE 577 Urban Transportation Plann ng. (3)
se ected semesters
App es and use pa ameter traff generat theory traff c d t b t on a d ass g ment mode trans t an ys a d econom c fact rs to the so ut on of the urba tran portat on prob em Prerequ s te CEE 3˜2

CEE 580 Practicum. (1 12)
se ected semeste s
See CEE N te 1

CEE 590 Reading and Conference (1–12)
se ected sem sters
See CEE Note 1

CEE 591 Sem nar. (1–12)
se e ted s m sters
Top cs ay c ude the fo w ng
• Tra sportat Sy tem P o em na

CEE 592 Research. (1 12)
se ected seme ters
See CEE Note 1, 2

CEE 598 Specia Topics (1–4)
se e ted emesters
Top cs may nc ude the f ow ng
• nte gent Transportat on Systems

CEE 599 Thesis (1 12)
se ected semesters
See CEE Note 1 2

CEE 792 Research. (1–15)
e ected emesters
See CEE Note 1 2

CEE 799 Dissertation. (1–15)
se ected semesters
See CEE Note 1 2

Omnibus Courses. For an exp anat on of c urse offered but not pec f a y ted n th s ata og see Omn bu Cour es page 5

Department of Computer Science and Engineering

cse.asu.edu
480 965-3190
GWC 206

Charles J. Colbourn, Chair

Professors: Ashcroft Co bourn Co ofe o Far n, Go shan , Kambhampat Lee Lew s N e son, Panchanathan Tsa J. Urban, S. Urban Yau

Associate Professors: Bara Bhattacharya Dasgupta, D etr ch, Fa tz Gupta H ey L u M er O Grady, Phean s Sen, Xue

Assistant Professors: Bazz , Cam Candan Chat a Gannod Konjevod R cha, Ryu, Sar ough an Wagner

Lecturers: Chen, DeL bero Nakamura Navab

Computers have a si_nil cant impict on our daily lives, and this impact s kely to bc even greater in the future as computer profess onals continu> to devel >p more pow erful, sn aller faster, ar d less expensive computins systems. Computer science and con puter en_ineerin_ dea with the study, design, development, construction, and application of n odern computing n a hin>ry. Other important topics nclude computin_ techniques and appropriate languages for general inform ation processing, for scient fi> con puta tion> for the recognition, storage, retrieval, and process n> c f data of all k nds; and for the automati control and s mu ation of processes

Th curricul offered by the Department of Computer Scier ce an l En_ neer ng prepare the student to be a partici pant n th s rapidly changit o area of technology by preser t t_ n lepth treatment of the fundan entals of computer scier ce and comp ter engineering The depart ent offers t vo under_raduate de rees, a B.S. de_ree n Computer Sci ence ar d a B S E degree in Con puter Systems En>ineering Th> following are share l ob ectives of the legree pr>gr ms:

1. Graduates wi understand current trends in nforma tion techno o_y and be able to apply their under stan l n_ in the listributed mana ement of nform a tion.
2. Graduates can apply the inderlying principles of computer science, including n athemat cal and phys ical sciences and engineering principles.
3. Gr duates w ll knc w and be able to apply syster developr ent processes, usin_ modern tools, fro > the con po ent level to the system l vel
4. Gradu ates a so will have the ski s required to cor > municate effectively in both techn cal and nontech n cal sett n_s, to w >rk effectively in teams and in > ri u t cultural environment, to work eth cal y a id pr fession lly, and continue to earn independent y and grow intellect ally

Th e Computer Systems Engineering proeran has the spe c fic objective that its graduates will have the technical expert se r ecessary t > analyze equirements and to design and imp emer t effective solutions to prob ems that r qu re the i te_ration of hardware and software The Computer Sc ence program has the specihc object ve that t _raduat >s w ll have the technic l expert se necessary to analyze requir>ments, design, and implement effective so utions us ng con puter science for a broad r nge of problems. Th e department strives to maintain a modern earnin_ env r n n ent th it f sters excellence, c >operat cn, and scho rship for facu ty students, and staff

ADMISSION REQUIREMENTS

The idn ssion standards for the undergraduate Cor >puter Sc ence and Computer Systems En_ neerin_ degree pr gran s are changit > for sprit 2)(2

The Preprofessional Program. Each st dent adi itted to the Depart ment of Computer Sc ence and En>ineering is de ienated a preprofessional student n either Con puter Sc ence or Con puter Systems Engineerin_. The studer t fo lows the first and second year sequence of cours s list l in the curr cu um out in> for his or her particular majo Inc uded n th first and second year schedule a e 13 emphasis courses.

CSE 1>	D ital Des_n Funda ner tals	3
CSE 2	Concepts of Comp ter Sc ence . . .	3
CSE 21	Object Oriented Design an l Data Stru tu e	>

L teracy nd cr t a nqu y **MA** mat e tc **CS** o p te tat t qua t tat v app cat **HU** uma t es a d f e a t **SB** a n be a a en es **SG** nat ra enc genera c re o e **SQ** at a e u nt tat ve **C** u tura d ve ty th n t d State G g ba **H** h st r a See e era Stud es pag 8

CSE 2[illegible] Assembly Languages Programming and Microprocessors Motorola 4
or CSE 230 Assembly Language Programming and Microprocessors Intel 4
CSE 240 Introduction to Programming and Data Structures 3
Choose a course from the course combinations below 6
ENG 101 First Year Composition 3
ENG 105 First Year Composition 3
—or—
ENG 105 Advanced First Year Composition
HUSB elective chosen with an advisor 3
—or—
ENG 107 English for Foreign Students 3
ENG 108 English for Foreign Students 3
MAT 243 Discrete Mathematical Structures 3
MAT 270 Calculus with Analytic Geometry I 4
MAT 271 Calculus with Analytic Geometry II 4
MAT 272 Calculus with Analytic Geometry III . . 4
PHY 121 University Physics I Mechanics 3
PHY 122 University Physics I Laboratory I 1
PHY 131 University Physics II Electricity and Magnetism . . . 3
PHY 132 University Physics II Laboratory I 1

The Professional Program. Admission to the professional program is competitive and granted to those applicants demonstrating the highest promise for professional success in Computer Science and Engineering. The admissions committee considers overall transfer and ASU GPA numbers as well as the transfer and ASU GPA numbers in Computer Science and Engineering emphasis courses. All students seeking professional status must have completed or be in the process of completing all the emphasis courses and then follow the application procedure as described on the Computer Science and Engineering Web site. Completion of the specified courses does not guarantee admission to professional status. Only students who qualify for professional status in the College of Engineering and Applied Sciences and have been admitted to ASU are eligible to apply for the professional programs. Candidates are strongly encouraged to visit the Computer Science and Engineering Advising Center in GWC 302 before beginning the application process. All application materials can be found on the Web at cse.asu.edu.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is required for the B.S. degree in Computer Science and the B.S.E. degree in Computer Systems Engineering. A minimum of 50 upper division semester hours is required. In addition to the requirement for a cumulative GPA of 2.00 or higher, all computer science and computer systems engineering students must obtain a minimum grade of "C" in all CSE courses used for degree credit.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 79.

DEGREES

Computer Science—B.S.

The faculty in the Department of Computer Science and Engineering offer a B.S. degree that prepares the student for a career in computer science. A student pursuing a B.S. degree must complete the First Year Composition requirement, the General Studies requirement, department degree requirements, the computer science core courses, a senior level breadth requirement in the major, technical electives, and unrestricted electives. For more information, visit the department in GWC 206, call 480 965-3190, send e-mail to cse.graduate.office@asu.edu or access the department's Web site at cse.asu.edu.

Software Engineering Concentration. Students pursuing the B.S. degree in Computer Science may choose to concentrate their studies on software engineering. The B.S. Degree in Computer Science with a concentration in software engineering provides recognition that the student has acquired in depth knowledge and hands-on experience in software development and related subjects. This concentration requires the student to complete CSE 445, 460, 461, and 462 with a grade of "C" or higher in each.

The following table specifies departmental requirements for the B.S. degree in Computer Science.

First Year Composition

Choose among the course combinations below 6
ENG 101 First Year Composition 3
ENG 105 First Year Composition 3

ENG [illegible] Advanced First Year Composition 3
HUSB elective chosen with an advisor

ENG [illegible] English for Foreign Students
ENG 108 English for Foreign Students 3

Total 6

General Studies Department Requirements

Humanities and Arts Social and Behavioral Sciences
HUSB electives 18

Literature and Humanities
Elective 3
ECE 484 Engineering Communications 3
or approved CSE course

[illegible] 6

Natural Sciences
PHY 121 University Physics I Mechanics SQ 4
PHY 122 University Physics Laboratory I SQ 1
PHY 131 University Physics II Electricity and Magnetism SQ 3
PHY 132 University Physics Laboratory II SQ . . . 1
Science elective 4

Total 12

Mathematical Studies
ECE 350 Probability and Statistics for Engineering Problem Solving CS 3
MAT 243 Discrete Mathematical Structures 3
MAT 270 Calculus with Analytic Geometry I MA 4
MAT 271 Calculus with Analytic Geometry II MA 4
MAT 272 Calculus with Analytic Geometry III MA 4
MAT 342 Linear Algebra 3

Total 21
General Studies department requirement total 39

Computer Science Core

CSE 120 Digital Design Fundamentals 3

CSE 2 Concepts of Computer Science *CS* 3
CSE 210 Object Oriented Design and Data Structures *CS* 3
CSE 225 Assembly Language Programming and Microprocessors Motorola 4
or CSE 226 Assembly Language Programming and Microprocessors Intel 4
CSE 240 Introduction to Programming Languages 3
CSE 310 Data Structures and Algorithms 3
CSE 330 Computer Organization and Architecture 3
CSE 340 Principles of Programming Languages . 3
CSE 355 Introduction to Theoretical Computer Science 3
CSE 360 Introduction to Software Engineering 3
CSE 430 Operating Systems 3

Total computer science core 34

400 level CSE computer science breadth requirement 18
Technical electives[4] 6
Unrestricted electives 31

Total 31
Total degree requirements 128

Both PHY 121 and 122 must be taken to secure SQ credit

Both PHY 131 and 132 must be taken to secure SQ credit

[3] Each student must complete a four credit laboratory science course that meets major requirements in the discipline of the course selected that satisfies the SQ portion of the General Studies requirement. See an advisor for the approved listing.

[4] Each student must complete six hours of courses chosen from the computer science technical elective list and approved by the student's advisor. See an advisor for the approved listing.

Computer Science
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CSE 200 Concepts of Computer Science *CS* . . . 3
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
HU SB and awareness area course[1] 3
Unrestricted elective 3

Total 16

Second Semester

CSE 120 Digital Design Fundamentals 3
CSE 210 Object Oriented Design and Data Structures *CS* 3
ENG 102 First Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* . . . 4
Unrestricted elective 4

Total 17

Second Year

First Semester

CSE 240 Introduction to Programming Languages 3
MAT 243 Discrete Mathematical Structures 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
PHY 121 University Physics I: Mechanics *SQ* 3
PHY 122 University Physics Laboratory *SQ*[2] 1
HU SB and awareness area course 3

Total 17

Second Semester

CSE 225 Assembly Language Programming and Microprocessors Motorola 4
or CSE 226 Assembly Language Programming and Microprocessors Intel 4
MAT 342 Linear Algebra 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1
HU SB and awareness area course 3
Elective 3

Total 17

Third Year

First Semester

CSE 311 Data Structures and Algorithms 3
CSE 331 Computer Organization and Architecture 3
CSE 360 Introduction to Software Engineering 3
HU SB and awareness area course 3
Laboratory science *SQ*[4] 4

Total 16

Second Semester

CSE 340 Principles of Programming Languages 3
CSE 355 Introduction to Theoretical Computer Science 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
HU SB and awareness area course 3
Technical elective 3

Total 15

Fourth Year

First Semester

CSE 430 Operating Systems 3
ECE 433 Engineering Communications *L* 3
300 level approved CSE Course 3
400 level CSE computer science breadth electives 9

Total 15

Second Semester

400 level CSE computer science breadth electives 9
HU SB and awareness area course 3
Technical elective 3

Total 15

Engineering students may not use aerospace studies AES or military science MIS courses to fulfill HU and SB requirements

[1] Both PHY 121 and 122 must be taken to secure SQ credit

[2] Both PHY 131 and 132 must be taken to secure SQ credit

[3] Each student must complete a four credit laboratory science course that meets major requirements in the discipline of the course selected that satisfies the SQ portion of the General Studies requirement. See an advisor for the approved listing.

Computer Systems Engineering—B.S.E.

The Department of Computer Science and Engineering offers a B.S.E degree that prepares the student for a career in computer systems engineering This degree program pro-

L literacy and critical inquiry **MA** mathematical quantitative applications **HU** humanities and fine arts **SB** social and behavioral sciences **SQ** natural sciences quantitative **C** cultural diversity in the United States **G** global **H** historical See General Studies page 83

vides training in both engineering and computer science. Qualified students in this program may apply to participate in an industrial internship program offered through the Embedded Systems and Internetworking Consortium. Students who participate in this internship program receive academic credit (CSE 484) that applies to the technical elective requirement of the B.S.E. degree in Computer Systems Engineering. The following table specifies departmental requirements for the B.S.E. degree in Computer Systems Engineering.

First-Year Composition

Choose a combination below 6
ENG 101 First Year Composition 3
ENG 105 Advanced First Year Composition 3
HUM SBS elective chosen with advisor
ENG 107 English for Foreign Students 3
ENG 108 English for Foreign Students 3

Total 6

General Studies Department Requirements

Humanities and Fine Arts Social Sciences
ECN 111 Macroeconomic Principles SB 3
or ECN 112 Microeconomic Principles SB 3
HUM and SBS electives 12

Total 15

Literacy and Communication
CSE 425 Microcomputer System Hardware I 3
or CSE 438 Systems Programming I 3
ECE 306 Intermediate Engineering Design L 3

Total 6

Natural Sciences and Basic Science
CHM 114 General Chemistry for Engineers SQ 4
or CHM 116 General Chemistry SQ 4
PHY 121 University Physics I: Mechanics SQ 3
PHY 122 University Physics Laboratory I SQ 1
PHY 131 University Physics II: Electricity and Magnetism SQ 3
PHY 132 University Physics Laboratory II SQ 1
PHY 361 Introductory Modern Physics 3

Total 15

Mathematical Studies
MAT 243 Discrete Mathematical Structures 3
MAT 270 Calculus with Analytic Geometry I MA 4
MAT 271 Calculus with Analytic Geometry II MA 4
MAT 272 Calculus with Analytic Geometry III MA 4
MAT 274 Elementary Differential Equations MA 3
MAT 342 Linear Algebra 3

Total 21
General Studies department requirements total 57

Engineering Core

CSE 230 Concepts of Computer Science CS 3
CSE 325 Assembly Language Programming and Microprocessors Motorola 4
ECE 100 Introduction to Engineering Design CS 3
ECE 201 Electrical Networks I 4
ECE 210 Engineering Mechanics I: Statics 3
ECE 334 Electronic Devices and Instrumentation 4

Total 21

Computer Science Core

CSE 120 Digital Design Fundamentals 3
CSE 211 Object Oriented Design and Data Structures CS 3
CSE 240 Introduction to Programming Languages 3
CSE 310 Data Structures and Algorithms 3
CSE 333 Computer Organization and Architecture 3
CSE 424 Principles of Programming Languages 3
CSE 555 Introduction to Theoretical Computer Science 3
CSE 616 Introduction to Software Engineering 3
CSE 411 Microprocessor System Design II 4
CSE 414 Microprocessor System Design II 4
CSE 443 Operating Systems 3
ECE 386 Probability and Statistics for Engineering Problem Solving CS 3
Technical electives 6

Total 44
Degree requirements total 128

Both PHY 121 and 122 must be taken to secure SQ credit.
Both PHY 131 and 132 must be taken to secure SQ credit.
3 Each student must complete six hours of courses chosen from the computer science technical elective list and approved by the student's advisor. See an advisor for the approved list.

Computer Systems Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CSE 230 Concepts of Computer Science CS 3
ECE 100 Introduction to Engineering Design CS 3
CSE 120 Digital Design Fundamentals 3
ECN 111 Macroeconomic Principles SB 3
or ECN 112 Microeconomic Principles 3
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I MA 4

Total 16

Second Semester

CHM 114 General Chemistry for Engineers SQ 4
CSE 211 Data Design Fundamentals 3
or ECE 110 Introduction to Electrical Design CS 3
CSE 210 Object Oriented Design and Data Structures CS 3
ENG 102 First Year Composition 3
MAT 271 Calculus with Analytic Geometry II MA 4

Total 17

Second Year

First Semester

CSE 325 Assembly Language Programming and Microprocessors Motorola 4
MAT 243 Discrete Mathematical Structures 3
MAT 272 Calculus with Analytic Geometry III MA 4
PHY 121 University Physics I: Mechanics SQ 3
PHY 122 University Physics Laboratory I SQ 1

Total 15

Second Semester

CSE 240 Introduction to Programming Languages 3
ECE 210 Engineering Mechanics I: Statics 3
MAT 274 Elementary Differential Equations MA 3

PHY 151 University Physics II Electricity and Magnetism SQ 3
PHY 152 University Physics Laboratory II SQ[2] 1
HU SB and awareness area course[3] 3

Total 16

Third Year

First Semester

CSE 310 Data Structures and Algorithms 3
CSE 330 Computer Organization and Architecture 3
CSE 360 Introduction to Software Engineering 3
ECE 380 Intermediate Engineering Design I 3
MAT 342 Linear Algebra 3

Total 15

Second Semester

CSE 340 Principles of Programming Languages 3
CSE 355 Introduction to Theoretical Computer Science 3
CSE 421 Microprocessor System Design I 4
ECE 388 Probability and Statistics for Engineering Problem Solving CS 3
HU SB and awareness area course[3] 3

Total 16

Fourth Year

First Semester

CSE 422 Microprocessor System Design II 4
CSE 430 Operating Systems 3
ECE 401 Electrical Networks I 4
PHY 361 Introductory Modern Physics 3
HU SB and Awareness area course[3] 3

Total 17

Second Semester

CSE 429 Microcomputer System Hardware L 3
or CSE 438 Systems Programming L
ECE 354 Electronic Devices and Instrumentation 4
HU SB and awareness area course[3] 3
Technical electives 6

Total 16

[1] Both PHY 121 and 122 must be taken to secure SQ credit.

[2] Both PHY 131 and 132 must be taken to secure SQ credit

[3] Engineering students may not use aerospace studies AES or military science MIS courses to fulfill HU and SB requirements

COMPUTER SCIENCE AND ENGINEERING (CSE)

CSE 100 Principles of Programming with C++. (3)
fall, spring, summer
Principles of problem solving using C++ algorithm design structured programming fundamental algorithms and techniques and computer systems concepts Social and ethical responsibility Lecture lab Prerequisite MAT 170
General Studies CS

CSE 110 Principles of Programming with Java. (3)
fall, spring, summer
Concepts of problem solving using Java algorithm design structured programming fundamental algorithms and techniques and computer systems concepts Social and ethical responsibility Lecture, lab Prerequisite MAT 17

CSE 120 Digital Design Fundamentals. (3)
fall, spring, summer
Number systems conversion methods binary and complement arithmetic Boolean algebra circuit minimization ROMs PLAs flip flops synchronous sequential circuits lecture lab Cross listed as EEE 120 Credit shared with only SE 120 or EEE 120 Prerequisite computer literacy

CSE 180 Computer Literacy. (3)
fall, spring, summer
Introduces personal computer operations and their place in society Problem solving approaches using databases spreadsheets, and word processing May be taken for credit on either Windows or Macintosh but not both Lecture demonstration Prerequisite nonmajor
General Studies CS

CSE 181 Applied Problem Solving with Visual BASIC. (3)
fall, spring, summer
Introduces systematic definition of problems, solution formulation and method validation Requires computer solution using Visual BASIC for projects Lecture lab Prerequisites MAT 111, nonmajor
General Studies CS

CSE 185 Internet and the World Wide Web. (3)
fall and spring
Fundamental Internet concepts World Wide Web browsing publishing, searching advanced Internet productivity tools
CSE 200 Concepts of Computer Science. (3)
fall, spring, summer
Overview of algorithms languages computing systems theory Problem solving by programming with a high level language Java or other Lecture lab Prerequisite CSE 100 or 110 or one year of high school programming with Java or C++ or PASCAL
General Studies CS

CSE 210 Object-Oriented Design and Data Structures. (3)
fall, spring, summer
Object oriented design static and dynamic data structures strings stacks queues binary trees recursion searching and sorting Professional responsibility Prerequisite. CSE 200
General Studies CS

CSE 225 Assembly Language Programming and Microprocessors (Motorola). (4)
fall, spring, summer
Assembly language programming including input output programming and exceptions interrupt handling Register level computer organization, I/O interfaces assemblers and linkers Motorola based assignments Lecture lab Cross listed as EEE 225 Credit shared only CSE 225 or EEE 225 Prerequisites CSE 100 or 110 or 200 CSE 120 or EEE 120

CSE 226 Assembly Language Programming and Microprocessors (Intel). (4)
fall and spring
CPU memory peripheral devices interfaces and programming System buses interrupts serial and parallel I/O DMA coprocessors interrupt based assignments Lecture lab Cross listed as EEE 226 Credit shared only CSE 226 or EEE 226 Prerequisites. CSE 100 or 110 or 200 · CSE 120 or EEE 120

CSE 240 Introduction to Programming Languages. (3)
fall, spring, summer
Introduces the procedural C++ applicative LISP and declarative Prolog programming languages Lecture lab Prerequisite CSE 210

CSE 310 Data Structures and Algorithms (3)
fall, spring, summer
Advanced data structures and algorithms, including stacks queues trees B B+ AVL and graphs Searching for graphs, hashing external sorting Lecture lab Prerequisites. CSE 210 MAT 243

CSE 330 Computer Organization and Architecture (3)
fall and spring
Instruction set architecture processor performance and design data path control hardwired microprogrammed pipelining input output Memory organization with cache virtual memory Prerequisite· CSE 225 or 226 or EEE 225 or 226

CSE 340 Principles of Programming Languages. (3)
fall and spring
Introduces language design and implementation Parameter machine dependent and declarative features type theory specification rec g

Literary and Critical Inquiry **MA** mathematics **CS** computer tatistics and quantitative applications **HU** human ties and fine arts **SB** and behavioral sciences **SG** natural sciences and engineering **SQ** natural sciences quantitative **G** b **H** st r See Ge a Studies page 83

n t o trans at on run t me ma agement. P erequ s tes CSE 225 or 226 r EEE 225 or 226 CSE 240 310

CSE 355 Introduction to Theoretical Computer Science. (3)
fa and sp ng
ntroduce f ma ang age the ry and aut mata T r ng mac ne dec dab ty und c dab ty recur ve fu ct o theory. and comp e ty t eory Pre equ s te SE 310

CSE 360 Introduction to Software Engineering. (3)
fa , spr ng ummer
Software fe cyc e mode pro ect management team deve opment e v ronment and methodo g e software a h te t res qua ty assuran e and standards ega eth a s ues Prerequ s te CSE 10 240

CSE 408 Mult med a Information Systems. (3)
fa
Des gn use and app cat ons of mu t med a ystem ntroduces a q s t on compress on torage etr eva a d pre entat n f data fr m d fferent med a su h a mages text vo ce and a phanumer c Prerequ s te CSE 310

CSE 412 Database Management. (3)
fa and sp ng
ntroduce DBMS c cepts Data m de s and angua e Re at ona databa e t eory Database ecur ty ntegr ty and o u re cy Prereq s te SE 310

CSE 420 Computer Arch tecture I. (3)
once a yea
Co p ter arch te ture Performa ce vers s o t tr deoffs n truct on set des n Ba c proce or mp eme tat n and p pe n ng Prerequ s te CSE 33

CSE 421 Microprocessor System Design I. (4)
fa and spr ng
Assemb y anguage programm g a d og a hardware de gn of sy tem u ng 8 b t m croproces ors and m croc ntro ers Fundamenta c ncepts of d g ta sy tem de gn Re a ty and so a . ega mp ca t on . e ture ab Prerequ te E 225 o EEE 225

CSE 422 M croprocessor System Design II. (4)
fa and spr ng
Des gn of m croco puter sy tem us g contemporary og c and m cro omp ter system c mpone t Req es a sem y ang age programm ng Prereq te CSE 42

CSE 423 M crocomputer System Hardware (3)
onc a year
nf rmat o a d te hn q es p e ented n SE 422 are used to deve p the hardware de gn of a mu t proce or mu t programm ng m cr pr e sor based sy tem Prerequ s te CSE 422
Genera Stud es L

CSE 428 Computer-Aided Processes. (3)
se e ted emesters
Hardware and softwa e o s derat ons for omputer zed manufactur ng systems Spec f c con trat on on a tomat n pect n numer a ontro r bot c and tegrated manufactur ng y tem Prerequ s te CSE 330

CSE 430 Operating Systems. (3)
fa and spr ng
Operat ng ystem structure and e v ces pro essor sched ng con cur ent proce se synchron zat o tec q e mem ry manage ment v rtua memory np t output st rage management and f e y tem Prereq s tes CSE 330 340

CSE 432 Operating System Internals. (3)
fa
PC except and nter upt proce ng memory and thread manage ment, user eve dev ce d ve s and OS server n a modern m cr ker ne based OS P e equ te CSE 430

CSE 434 Computer Networks. (3)
fa and spr ng
Cry tog aphy fundamenta s data compress on e ror ha d ng f ow co tro mu t hop out g network protoco a gor thms etwork re ab ty t m g e u ty phys ca ayer bas s Prerequ te CSE 33

CSE 438 Systems Programming. (3)
once a yea
Des n and mp ementat on of sy tems p og ams n ud ng te t ed tors f e ut tes m n t rs a semb s re o at ng nk ng aders O han ers and schedu ers Prerequ s te· CSE 421 r n tru tor appr va
Genera Stud es L

CSE 440 Comp ler Construct on I (3)
once a year
ntroduce programm ng anguage mp ement t on mp ementat on strateg e su h as comp at on nterpretat on and tran at on Ma or comp at n phases suc as ex ca ana ys s. semant c ana y s opt m zat on and c de generat on Prerequ s tes CSE 340 355

CSE 445 Distributed Comput ng with Java and CORBA. (3)
fa a d pr g
Framew rk for d str buted oftware components Foundat ns of ent server comput ng and arch tectures f r d st buted object systems Dynam d s o ery and nv cat on Le ture project Prerequ s te CSE 360 or n tructo approva

CSE 446 Cl ent-Server User Interfaces. (3)
spr g
C e t server mode a d ts u e n creat g a d manag ng w ndow nterfa e To k t and brar e c ud ng X11 M rosoft Fo ndat n C a ses and ava Ab tra t W ndow Too k t Le t re pro ect Prereq u te SE 310 or nstr tor pp ova .

CSE 450 Design and Analysis of Algorithms. 3)
fa and spr ng
Des gn and ana ys s of omp ter a g thms ng a a yt ca and emp r ca meth ds omp ex ty measu e es gn methodo og es and survey of mportant gor thms Prerequ te E 310

CSE 457 Theory of Formal Languages. (3)
e a year
T eory of grammar method f yntact ana ys and pe f c t types of art f c a anguages re at o h p between forma angua and automata Prerequ s te SE 55

CSE 459 Logic for Computing Scient sts. 3)
e ected semest rs
Pr po t na og yntax and em nt pro f theory ver s n de theory oundness n ten y and c mp eteness f st o e og g ca the r e automated theorem prov g groun res t pat tern match ng un f at on and re o ut on D kstras o proof ga t s and prog am prov ng Pre equ t E 35

CSE 460 Software Analys s and Des gn. (3)
fa and spr ng
Re u en ents ana ys and des gn arch tecture a d patterns repre se tat ons f software f rma met od co po ent ba ed deve p ment Le ture pr jects Prerequ s te CSE 360

CSE 461 Software Engineering Project . (3)
fa and pr ng
F rst of two course oftware team deve opment seq en e P a n ng management de gn and mp ementat on us ng b e t o ented tech no ogy CASE too CMM eve 5 gu de nes e ture ab o a and wr tten commun cat ons Prerequ s te CSE 36

CSE 462 Software Engineer ng Project II. (3
fa and spr ng
Second of two co rse s ftware team deve opment equence oft ware evo t o m ntenance e ng n er g reverse e g eer ng component ba ed deve pment a d out ourc ng Lecture ab ra a d wr tten c mmu cat s Pr requ s te CSE 461

CSE 470 Computer Graphics. 3)
fa and spr ng
D sp ay dev ces data structures tra sformat s nteract ve graph cs d mens o a grap cs and h dde ne prob em Prerequ tes CSE 310 MAT 342

CSE 471 Introduct on to Artificial Intelligence. 3)
fa and spr ng
State spa e search he r st c search games k ow edge repre enta t on tec n ques expert system a d aut m ted reas n ng Pre equ te CSE 240 310

CSE 473 Nonprocedural Programming Languages. (3)
se ected en ester
unct na and og c programm ng u ng angu ges ke Luc d and Pro og Typ ca app cat on wou d be a creen Ed to a d an E pe t Sy tem Prerequ te CSE 355

CSE 476 Introduction to Natural Language Processing. (3)
se ected seme ters
Pr nc p e of computat ona ngu st s f rma yntax and semant cs as app ed to the des gn of software w th natura human anguage O Prereq s te CSE 310 or str ctor approva

CSE 477 Introduction to Computer-Aided Geometric Design (3)
once a year
ntroduces parametr c curve a d surfaces Bez er and B sp ne nter po at on, and approx mat on techn ques Prerequ s tes CSE 210 470 MAT 342

CSE 484 Internship. (1 12)
se ected seme ters

CSE 507 Virtual Real ty Systems. (3)
se ected seme ters
Computer generated 3D env onments s mu at on of rea ty, spat a presen e of v rt a objects techno og es of mmers on track ng sys tem Lecture ab Prerequ s te CSE 4 8 r 47 or 508 or st uctor appr va

CSE 508 Digita Image Processing (3)
once a year
D g ta mage fundame ta s mage transforms mage enhancement and restorat on techn ques mage encod ng and segmentat on meth ds Prerequ s te EEE 03 or nstructor approva

CSE 510 Database Management System Implementation. (3)
once a year
mp ementat n f databa e ystem Data torage ndex ng query ng, and retr eva Query opt m zat on and execut on con urrency on t and transact on management Prerequ s te CSE 412

CSE 512 Distributed Database Systems (3)
once a year
D str buted database des gn q ery process ng, a d transa t o p ce ng D tr buted databa e arch tectures and teroperab ty Emerg ng te hno ogy Prerequ te CSE 412

CSE 513 Rules in Database Systems. (3)
se ected semester
De arat ve and act ve ru es Log as a data mode Eva uat on and query pt m zat n Tr gger and E A ru es Curre t research t p cs Prerequ s te CSE 41

CSE 514 Object-Oriented Database Systems. (3)
se ected seme ters
Ob e t or ented data mode ng def n t on man pu at on dent ty and nher tance Query anguage Schema evo ut on Vers on ng D tr b uted ob e t management Extended re at ona y tems Prerequ s te CSE 412

CSE 515 Mu timedia and Web Databases (3)
spr ng
Data mode s for mu t med a and Web data query process ng and opt m zat on for nexact retr eva advanced ndex ng uster ng and search techn ques Prerequ te CSE 408 412

CSE 517 Hardware Design Languages. (3)
once a year
troduces ha dwa e de g anguages M de ng c n epts for spec f cat on mu at on a d synthe s Prerequ s te CSE 423 o EEE 425 or nstructor approva

CSE 518 Synthesis w'th Hardware Des gn Languages (3)
se ected semesters
Mode ng VLS des gn ha dware des g anguages for synthes s Transformat on of anguage ba ed des gn to phys ca ay ut App ca t on of sy thes s too Prerequ s te CSE 51

CSE 520 Computer Architecture II. (3)
fa
Computer ar h tecture des r pt on anguages omputer ar t met c memory h erar hy des gn para e , vector mu t processors and put output Pre equ s tes SE 420 430

CSE 521 Microprocessor Appl cations. (4)
se ected semesters
M croprocessor techno gy and t app cat on to the des gn of pract ca d g ta systems Hardware assemb y an uage progr mm ng and terfac ng f m roprocess r based systems Lecture ab Prereq s te CSE 421

CSE 523 Microcomputer Systems Software. (3)
se ected semesters
Deve op ng system software for a mu t processor mu t programm ng m croprocessor based sy tem u ng nformat on and techn ques pre sented n SE 421 422 Prerequ s te CSE 422

CSE 526 Parallel Processing. (3)
se ected semesters
Rea and apparent concurrency Hardware organ zat on of mu t pro ces ors mu t p e computer systems sc ent f c attached processors and other para e systems Prerequ s te CSE 330 or 423

CSE 531 Distributed and Multiprocessor Operating Systems. (3)
once a year
D str buted systems arch tectu e remote f e access, message ba ed system object ba ed system c ent/server parad gms d str buted a gor t ms, rep cat on and cons stency and mu t processor ope at ng sy tems Prerequ s te CSE 432 or nstructor approva

CSE 532 Advanced Operating System Internals. (3)
se ected seme ters
Mem ry pro es or, proce and commun cat on management and con urrency contro n the W ndows NT mu t pro essor a d d str buted operat ng system kerne s and se vers Prerequ s tes CSE 432 531 o 536

CSE 534 Advanced Computer Networks. (3)
fa and spr ng
Advanced netwo k p to o s a d nfrastructu e app cat ons of h gh perf man e netw rks to d str buted sy tems h gh performan e com put ng and mu t med a doma ns spec a features of networks Prereq u s te SE 434

CSE 536 Advanced Operating Systems. (3)
spr ng
Protect n and f e system Commun cat on processes syn h on za t on, n m ng fau t to erance secur ty data rep cat o and coherence n d str buted systems Rea t me ystems Prerequ s te CSE 430

CSE 539 Applied Cryptography. (3)
spr ng
se of ryptography f se ur protoco s over etworked ystem n ud g s gnatures ert f cates t mestamp e ectrons d g ta cash and ot er mu t party coord nat on Prerequ s te CSE 310 or nstructor appr va

CSE 540 Compiler Construct on II. (3)
se ected semesters
F ma pars ng strateg es opt m zat on techn ques code generat on extens b ty and tra sportab ty cons derat ons and recent deve op ments P e eq s te CSE 440

CSE 545 Programming Language Design. (3)
se ected semesters
Lang age constructs extens b ty and abstract ns a d unt me sup p rt Language des gn process. P erequ te CSE 440

CSE 550 Combinatorial Algorithms and Intractability. (3)
once a year
C mb nat r a a gor t ms ondeterm n st c a gor t ms c as es P and NP NP hard and NP comp ete prob em and ntractab ty Des gn techn ques for fast comb nator a a gor thms Prereq s te CSE 45

CSE 555 Theory of Computation. (3)
once a year
R gorous treatment f regu ar anguages context free anguages Tur ng mach nes and dec dab ty reduc b ty, and other advanced top c n computab ty theory Prerequ s te CSE 355 r nstru tor approva .

CSE 562 Software Process Automation. (3)
on e a year
Represent ng the software process, creat ng a meas red and struc t red work ng env ronment us ng nstru t g and adapt ng c mpo ne t based too s Prerequ s te CSE 36

L te a y rt a n u y **MA** mat e at cs **CS** c p t r tat t c q a t tat ve app cat on **HU** h ma t es a d f e arts **SB** soc a and b v e e **SG** t ra en e gen a re ou e **SQ** n tu a e e q a t tat ve **C** u tur d er ty n the Un ted States **G** g oba **H** h t r ca ee nera Stud es page 3

CSE 563 Software Requirements and Specification. (3)
e ected semesters
Exam nes the def n t ona stage of software deve opment ana ys s of spec f cat on repre entat ons forma methods and te hn ques emphas z ng mportant app cat on ssues Prerequ te CSE 460

CSE 564 Software Design. (3)
once a year
Exam nes software des gn ssues nd techn que udes a urvey of des gn representat ons a d a compar son f des g method Pre requ te CSE 460

CSE 565 Software Verification, Validation, and Test ng. (3)
once a yea
Te t p ann ng requ rements ba ed a d code based test ng te h ques too s re ab ty mode s and stat t ca t t ng Prerequ te CSE 46

CSE 566 Software Project, Process, and Qual'ty Management. (3)
once a year
Project management r k man gement c nf gurat anagement qua ty management a d s mu ated pro e t management exper ences Prerequ s te CSE 360

CSE 570 Advanced Computer Graphics I. (3)
once a year
H dden surface a gor thm g t ng mode s and shad ng tec n que User nterface des gn An mat o tec n q es Fra ta s and stochast c mode Ra te a gor thm Prerequ s te CSE 4 0

CSE 571 Art'f cia Intell gence. (3)
once a year
Def n t on of nte gen e computer pr b em o v ng ame p ay ng pattern rec gn t o t e rem prov ng nd sema t c f rmat on pro cess ng evo ut onary systems heur st c programm ng Prerequ s te CSE 471

CSE 573 Advanced Computer Graph cs II. (3)
once a year
Mode ng of natura phe omena te ra n c ouds f re water and t ees Part c e systems def rmat o of so ds ant a as ng and vo ume v su a zat on Le t e ab Prerequ s te CSE 470

CSE 574 Planning and Learning Methods in AI. (3
once a year
Rea on ng about t me a d act on p an y thes and execut on mp ov ng p ann ng performan e app cat ons to manufactur g nte gent agents Prerequ te CSE 471 or ts equ v ent

CSE 576 Topics in Natural Language Processing. (3
se e ted emesters
Comparat ve pars ng strateg es scop ng and referen e prob ems nonf st order g ca sema t representat n and d course st uc ture Prerequ s te CSE 476 or n truct r approva

CSE 577 Advanced Computer-Aided Geometric Design I. (3)
onc a yea
Genera nterpo at on rev ew f curve nterpo t on and approx mat on p ne urve v sua smoothness f curves pa amete zat on of curves ntroduces surfa e nterpo at on and approx mat on P erequ tes bot CSE 470 and 477 o on y nstr ctor appr va

CSE 578 Advanced Computer-A ded Geometric Des'gn II. (3)
se ected semeste s
Coons patches a d Bez er patches tr a gu ar patch s arb trar y ocated data methods geomet y process ng of surfaces h gher d mens ona surfa e Prerequ tes both SE 4 and 477 or on y struct r approva

CSE 579 NURBS: Nonuniform Rationa B Sp ines. (3)
se ected semesters
Pro ect ve ge m try N RBS b sed mode g ba c theo y of con cs and rat ona Bez er curves rat ona B sp ne surfaces rat ona sur faces te e graph c map quadr s GES data spec f cat on Prereq u s tes CSE 470 47

CSE 593 Applied Project. (1 12)
se ected semesters

CSE 598 Spec'al Topics. (1–4)
se ected seme ters

Omnibus Courses. For an exp nat on of cour es offered but not spe f ca y sted th s cata og see Omn b s Course , page 56

Department of Electrical Engineering

www.eas.asu.edu ee
480 965-3424
ENGRC 552

Stephen M. Goodnick, Chair

Regents' Professors: Ba an s Ferry Heydt

Professors: Backus, Crouch, E Ghaza y Goodn ck, Gorur, H gg ns Hoppensteadt, Hu Karady K ae , Kozick La , Pa a s Pan, Roedel Schroder Shen S' Spanias, Tao Thornton Y Zhang

Associate Professors: Aber e A ee B rd Chakrabart , Cochran. D az E Sharawy Greene ch, Grond n, Ho bert Karam K'm Morre Rodr guez Skromme Tsaka s Ty avsky

Assistant Professors: Ayyanar Duman Joo Papandreou Suppappo a Re ss e n Tepede enl og u Vas eska Yazd , J Zhang

The professional activities of electrical engineers directly affect the everyday lives of most of the world's population. They are responsible for the design and development of radio and television transmitters and receivers, telephone networks and switching systems, computer systems, and electric power generation and distribution. Within the broad scope of these systems, the electrical engineer is concerned with a challenging and diverse array of design and development problems.

Electrical engineers design minuscule semiconductor integrated circuits that contain many thousands of elementary devices. These engineers design systems for automatically controlling mechanical devices and a variety of processes. These engineers are responsible for the design of satellite communication links as well as patient monitoring systems for hospitals. The development of the microprocessor has expanded the opportunities for electrical engineers to improve the design of familiar products since these devices are now incorporated in automobiles, consumer and office products, entertainment systems, and a vast variety of test and measurement instruments and machine tools.

Students who earn a B.S.E. degree in Electrical Engineering will be involved in a variety of electrical and electronic problems in the course of their careers. To ensure the necessary breadth of knowledge, the Electrical Engineering curriculum includes basic core engineering courses and courses in networks and electronic circuits, electromagnetic fields and waves, microprocessors, communication and control systems, solid state electronics, electrical power systems, and other specialty courses.

ELECTRICAL ENGINEERING—B.S.E.

The goal of the Electrical Engineering undergraduate program is to prepare the graduates for entry level positions as electrical engineers for the broad range of opportunities available in industrial, commercial, and governmental organizations, and to prepare the graduates for continued learning experiences either in a formal graduate program or in continuing education applications.

This goal is achieved through a curriculum designed to accomplish five objectives:

1. We will maintain a modern curriculum, which adapts to changes in technology and society.
2. Our program will foster a diverse student population entering and successfully graduating, and our graduates will function well in a diverse work force.
3. Our graduates will be self-motivated, creative people who can succeed in environments where technical innovation is important.
4. Our graduates will be sought after by our constituent industries and respected graduate programs.
5. Our graduates will be technically competent.

The curriculum in Electrical Engineering builds upon the base provided by the engineering core. Beyond the engineering core, the curriculum includes a number of required electrical engineering and technical elective courses. Approved technical elective courses serve to provide students with an opportunity either to broaden their background in electrical engineering or to study, in greater depth, technical subjects in which they have special interests. Successful completion of the curriculum leaves the student prepared to embark on a career in electrical engineering or to pursue advanced education in graduate school.

The engineering design experience is structured around four backbone courses employing engineering teams: ECE 100 Introduction to Engineering Design (freshman year), ECE 300 Intermediate Engineering Design (junior year), EEE 488 Senior Design Laboratory I, and EEE 489 Senior Design Laboratory II. The integrated experience is strengthened with required courses: EEE 120 Digital Design Fundamentals, EEE 225 Assembly Language Programming and Microprocessors (Motorola), EEE 226 Assembly Language Programming and Microprocessors (Intel), EEE 303 Signals and Systems, and EEE 360 Energy Conversion and Transport. Students focus on design pertaining to specific electrical engineering areas in their senior technical elective before the culminating, capstone design experience in EEE 488 and EEE 489.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the B.S.E. degree in Electrical Engineering. A minimum of 50 upper division semester hours is required.

GRADUATION REQUIREMENTS

A student must earn a grade of "C" or higher in the mathematics and physics courses listed in the program of study. Each mathematics and physics course in the program of study must be completed with a "C" or higher before enrolling in any course that requires that mathematics or physics course as a prerequisite. The student must also have an overall GPA of at least 2.00 for the following group of courses: CSE 100, ECE 201, 300, 334, 352, all courses with an EEE prefix, and all other courses used as technical electives.

In addition to fulfilling school and major requirements, students must satisfy all university graduation requirements. See "University Graduation Requirements," page 79.

COURSE REQUIREMENTS

The specific course requirements for the B.S.E. degree in Electrical Engineering follow:

First-Year Composition[1]

Choose one of the course combinations below 6
- ENG First Year Composition 3
- ENG 12 First Year Composition 3

- ENG 15 Advanced First Year Composition
- Elective requires departmental approval 3

- ENG 1 English for Foreign Students 3
- ENG 108 English for Foreign Students 3

Total 6

General Studies School Requirements

Humanities and Fine Arts, Social and Behavioral Sciences
- ECN 111 Macroeconomic Principles *SB* 3
  - or ECN 112 Microeconomic Principles *SB*
- HU courses 6–9
- SB courses 3–6

Minimum total 15

Literacy and Critical Inquiry
- ECE 300 Intermediate Engineering Design *L* 3
- EEE 488 Senior Design Laboratory I 2
- EEE 489 Senior Design Laboratory II 2

Total 7

Natural Sciences Basic Science
- CHM 114 General Chemistry for Engineers *SQ* . . . 4
  - or CHM 116 General Chemistry *SQ* 4
- PHY 121 University Physics I: Mechanics *SQ* 3
- PHY 122 University Physics Laboratory I *SQ* 1
- PHY 113 University Physics II: Electricity and Magnetism *SQ* 3
- PHY 133 University Physics Laboratory II *SQ* 1
- PHY 241 University Physics II 3

Total 15

Mathematical Studies
- ECE 100 Introduction to Engineering Design *CS* . . . 3
- MAT 210 Calculus with Analytic Geometry I *MA* . . . 4
- MAT 271 Calculus with Analytic Geometry II *MA* . . . 4
- MAT 272 Calculus with Analytic Geometry III *MA*[1] . . . 4
- MAT 274 Elementary Differential Equations *MA* 3
- MAT 342 Linear Algebra 3

L literacy and critical inquiry; MA mathematical; CS computational sciences; quantitative analytical; HU humanities and fine arts; SB social and behavioral sciences; SQ natural sciences; quantitative; C cultural diversity in the United States; G global perspectives; H historical perspectives; page

MAT 362 Advanced Mathematics for Engineers and Scientists I ... 3

Total ... 24

General Studies Requirements ... 61

Engineering Core

ECE 201 Electrical Networks I ... 4
ECE 214 Engineering Mechanics ... 4
ECE 334 Electronic Devices and Instrumentation ... 4
ECE 362 Properties of Electronic Materials ... 4
EEE 225 Assembly and Machine Programming and Microprocessors Motorola ... 4
or EEE 226 Assembly Language Programming and Microprocessors Intel 4

Total ... 24

A minimum grade of 'C' is required
- Both PHY 121 and 122 must be taken to secure SQ credit.
- Both PHY 131 and 132 must be taken to secure SQ credit.

Electrical Engineering Major

The following courses are required to fulfill the Electrical Engineering major:

CSE ... Principles of Programming with C++ ... 3
EEE 123 Digital Design Fundamentals ... 4
ECE 302 Electrical Networks II ... 4
EEE 330 Signals and Systems ... 4
EEE 341 Electromagnetic Engineering ... 4
EEE 342 Random Signal Analysis ... 3
EEE 360 Energy Conversion and Transportation ... 4

Total ... 30

CSE ... Principles of Programming with Java 3 can be substituted for CSE 1... with Department of Electrical Engineering approval.

The program in Electrical Engineering requires a total of 18 semester hours of technical electives. With department approval a maximum of two technical electives may be taken outside electrical engineering. Qualified students may choose from approved courses in business, engineering, mathematics, and the sciences at or above the 300 level, including graduate courses. Students must have a GPA of not less than 3.0 and approval of the dean to enroll in EEE graduate level courses. To ensure breadth of knowledge, students must select courses from at least three of the following seven areas. In addition, to ensure depth, the courses must be taken in one area.

Communications and Signal Processing

EEE 417 Digital Signal Processing ... 4
EEE 455 Communication Systems ... 4
EEE 459 Communication Networks ... 3

Computer Engineering

CSE 331 Computer Organization and Architecture ... 3
CSE 410 Computer Architecture ... 3
CSE 411 Microprocessor System Design I ... 4
CSE 420 Microprocessor System Design II ... 4

Controls

EEE 483 Feedback Systems ... 4
EEE 482 Introduction to State Space Methods ... 3

Electromagnetics

EEE 441 Electromagnetic Engineering I ... 4
EEE 443 Antennas for Wireless Communications ... 3
EEE 445 Microwaves ... 4
EEE 448 Fiber Optics ... 4

Electronic Circuits

EEE 415 Filter Design ... 3
EEE 425 Digital Systems and Circuits ... 4
EEE 433 Analog Integrated Circuits ... 4

Power Systems

EEE 416 Nuclear Concepts for the 21st Century ... 3
EEE 463 Electrical Power Plant ... 3
EEE 417 Electric Power Device ... 3
EEE 417 Power System Analysis ... 3
EEE 475 Electrical Machinery ... 3

Solid-State Electronics

EEE 454 Quantum Mechanics for Engineers ... 3
EEE 435 Microelectronics ... 3
EEE 436 Fundamentals of Solid State Device ... 3
EEE 437 Optoelectronics ... 3
EEE 459 Semiconductor Facilities and Cleanroom Practice ... 3

Electrical Engineering
Program of Study
Typical Four Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Engineers *SQ* ... 4
or CHM 116 General Chemistry *SQ* 4
ECE 101 Introduction to Engineering Design *CS* ... 3
or EEE 123 Digital Design Fundamentals 3
ENG ... First Year Composition ... 3
MAT 271 Calculus with Analytic Geometry I *MA* ... 4

Total ... 14

Second Semester

EEE 123 Digital Design Fundamentals ... 3
or ECE 101 Introduction to Engineering Design *CS* 3
ENG ... First Year Composition ... 3
MAT 272 Calculus with Analytic Geometry II *MA* ... 4
PHY 131 University Physics I Mechanics *SQ* ... 3
PHY 132 University Physics Laboratory I *SQ* ... 1

Total ... 14

Second Year

First Semester

CSE ... Principles of Programming with C++ *CS* ... 3
ECN 111 Microeconomic Principles *SB* ... 3
or ECN 112 Microeconomic Principles *SB* 3
MAT 273 Calculus with Analytic Geometry III *MA* ... 4
MAT 274 Elementary Differential Equations *MA* ... 3
PHY 131 University Physics I Electricity and Magnetism *SQ* ... 3
PHY 132 University Physics Laboratory I *SQ* ... 1

Total ... 17

Second Semester

ECE 202 Electrical Networks I ... 4
EEE 225 Assembly Language Programming and Microprocessors Motorola ... 4
or EEE 226 Assembly Language Programming and Microprocessors Intel 4
MAT 362 Advanced Mathematics for Engineers and Scientists ... 3

PHY 241 Univers'ty Phy ics III 3
HU SB and awarenes area course[2]. 3

Total 7

Third Year

First Semester

ECE 334 E ectronic Devi ce and Instrun entati on 4
EEE 3(2 El ctric al Networks II 3
EEE 34(Electron agnetic Engineering I 4
MAT 342 Linear A geb a 3
HU SB and a vareness area cou se[2] 3

Total 1

Second Semester

ECE 30) ntermediate E gineer i g Desig L 3
ECE 352 Properties of Ele t on c Materials 4
EEE 303 S gna s and Systems 3
EEE 36 Ener_y Convers on and Transport. 4
HU SB a d awa eness are co irse[2] 3

Tot al 16

Fourth Year

First Semester

ECE 214 E _ineerino Mechanics. 4
EEE 3s Random Sigria Analysis. 3
EEE 4SS S nior Des sn Laborat ry I L 2
Technical e ectives 7

ot al 16

Second Semester

EEE 489 Sei ior Des Labor t ry II L 2
HU SB and av areness area ourse[2] 3
Techi a electives 11

Total 16

Both ECE 100 and EEE 12 are required

[2] Both PHY 121 and 122 must be taken tc secure SQ credit

[3] CSE 110 Principle of Pr oramn ng s th Java s can be substi tuted t> CSE 10 w th Department t E e trical Engineering approval

[4] Both PHY 13 ar d 1 2 r i st be taken tc secure SQ credit

Engineer _ student ma n t use aero pace stud es AES r military sc ence MIS c ourses to at ty HU or SB re uiren ents

ELECTRICAL ENGINEERING (EEE)

EEE 120 Digital Des gn Fundamenta s. (3)
fa sp ng summer
Number systems convers on methods b nary and comp ement ar th met c Boo ean a gebra c r u t m n m zat on ROMs PLAs f pf ops synchronous seq ent c rcu ts Lecture ab. ross sted s CSE 120 Cred t s a owed for on y SE 120 or EEE 120 Prerequ s te computer teracy.

EEE 225 Assembly Language Programming and Microprocessors (Motorola). (4)
fa spr'ng summer
Assemb y a guage programm ng, nc ud ng nput/o tp t program m ng and ex ept on nterrupt hand ng Reg ster eve computer orga zat n O nterfaces, assemb ers and nkers Motoro a based a gnme ts Lecture ab Cr ss sted as CSE 225 Cred t s a owed for on y CSE 225 or EEE 225 Prerequ s te CSE 100 or 110 r2 0, CSE 120 or EEE 120

EEE 226 Assembly Language Programm ng and Microprocessors (Intel). (4)
fa and sp g
PU memory per phera dev ce nterface and prog amm ng System bu es nterrupts ser a and para e O DMA copro essors Inte based ass gnments Lecture ab Cro s sted as CSE 226. Cred t s a owed for n y CSE 26 or EEE 226 Prerequ s tes· CSE 100 or 110 r 200 CSE 120 or EEE 120

EEE 302 Electrical Networks II. (3)
fa spr ng summer
Ana yzes near and non near network . A a yt'ca and numer ca methods Prerequ te ECE 201 Pre or o equ s te MAT 362

EEE 303 Signals and Systems. (3)
fa spr ng summer
Introduce cont nuous and d screte t me s gna and system ana y near systems Four er a d z transforms P erequ s te EEE 302 Pre or coreq s te MAT 342

EEE 340 Electromagnetic Engineering I. (4)
fa spr ng s mmer
Stat'c and t me vary ng ve tor f e ds b undary va ue prob ems d e ec tr a d magnet c mater a s Maxwe s equat ons boundary cond t ons Prerequ tes MAT 362 PHY 131 132

EEE 350 Random Signal Analysis. (3)
fa and spr ng
Probab t c and statist ca ana ys s as app ed to e ectr ca s gna s and ystems Pre or corequ s te. EEE 303

EEE 360 Energy Conversion and Transport. (4)
fa and spr ng
T ree p ase rcu ts Energy supp y ystems Mag et c c rcu t ana y s yn hr nous generators transf rmers nduct o and DC ma h e ra sm ss on ne mode ng and des gn Lecture ab Pre requ te EEE 3 2

EEE 405 F'lter Design. (3)
fa
Pr p es of a t ve and pass ve ana og f ter des gn frequency doma n appr x mat ons sen t v ty and synthes s of f ters Prerequ s te· EEE 303

EEE 407 Digital Signa Process'ng. (4)
fa and spr ng
T me and frequency doma n ana ys s d fference eq at ons z trans form F R and R d g ta f ter des gn d screte Four er t a sf rm FFT and random equences Lecture ab Prerequ s tes EEE 303; MAT 342

EEE 425 Dig'tal Systems and Circuits. (4)
fa and spr ng
D g ta og c gate ana ys s and des gn Prop gat on de ay t me fan out power d ss pat on o se marg ns. Des gn of MOS and b po ar og c fam es n ud ng NMOS CMOS, tandard and advan ed TTL ECL and B CMOS nverter omb nat ona a d sequent a og c c rcu t des gn M S memor es VLSI c rcu ts Computer s mu at ons us ng PSP CE Lecture, ab Prerequ te ECE 334

EEE 433 Analog Integrated Circuits. (4)
spr ng
Ana ys s de gn and app cat ons of m dern ana og c r u ts us ng nteg ated b po ar and f e d effect trans st r techno og es Lecture ab P erequ s te ECE 334

EEE 434 Quantum Mechanics for Engineers. (3)
fa
Angu ar momentum wave packets Schroed nger wave equat on probab ty prob ems n one d mens on pr nc p es of wave mechan cs catter ng tunne ng, centra force angu ar momentum hydrogen ato perturbat on theory var at ona tech ques Prereq s tes ECE 352 EEE 340.

EEE 435 Microelectronics. (3)
spr ng
troduces bas c CMOS process ng and fabr cat on too s Covers the fu damenta s of therma ox dat on CVD mp antat on d ffus on and proce s ntegrat on. nternet e ture nternet or on camp s ab Fee Pre r corequ s te EEE 436

L te a y a d r t c a qu ry **MA** th at c **CS** computer tat t cs quant tat e app c t on **HU** hu an t e and f ne art **SB** soc a and beha ora en e **SG** atu a nc genera ore o r e **SQ** natura e e q a t tat ve C cu tura d ver ty t e n ted State **G** g oba H h t a Se Genera Stud

EEE 436 Fundamentals of Solid-State Devices. (3)
fa and pr ng
Sem onductor fundamenta s p u ct s meta sem nd tor on ta ts meta x de sem onductor apa to a d f e d effe t trans s tors b po ar un t on tran tors Prerequ s te ECE 352

EEE 437 Optoelectronics (3)
se ect d semeste s
Ba c operat ng pr nc p es of var ous types of o toe ctron c dev ce wh ch p y mportant ro e n commerc a a d commun at on e e tron s, ght em tt ng d des n ect on a ers and p ot detector Prerequ s te EEE 436

EEE 439 Semiconductor Fac lities and C eanroom Pract ces. (3)
fa
M crocontam t tro ed e v onment eanroom ayout and sy tem mode ng c des and eg s at t a ure wate produ t on mater a s per o ne and ope at on hazard ma a em nt advan ed c ncepts Prerequ te EEE 435 or st t r approva

EEE 440 E ectromagnet c Eng'neering I (4)
spr ng
Second ha f of an nt du tory ou se n e e tromagnet c theory and ts app cat o n e e tr a eng neer ng Ana yt ca and ume a o u t o of bou da y va e p ems Adva ed tr nsm s o ne wavegu des a te na rad at a d scatter n Le t re ab P ereq u s te EE 340 or ts equ va ent

EEE 443 Antennas for Wire ess Communications. (3)
spr ng
Fundamenta parameters rad at on t g a s w e ess syste s w re oop and m rostr p antenna antenna arrays mart antenna ground effects n u t path Prerequ te EEE 340

EEE 445 M crowaves (4)
fa
Wavegu des, c rcu t theory for wavegu d ng ysten s m cr wave dev ces systems a d energy s u es str p nes and crost ps mpedance mat h ng t a fo me mea ur me t Lecture ab Pre requ s te EEE 340

EEE 448 F ber Optics. (4)
fa
Pr nc p es of f ber pt ommun cat n Le ture ab Prerequ te EEE 3 3 340

EEE 455 Communication Systems. (4)
fa and spr ng
gna ana ys s te hn ques app ed to t e operat o f e ectr a com mun cat on sy tem ntr du t on t and verv ew of m dern d g ta and ana og commun t ons Lecture ab Prerequ s te EEE 350

EEE 459 Communication Networks (3)
pr ng
Fund menta s of commu at on networks Study of ven Layer OS mode Fo us on fu ct na ty a d perfor nce of protoco s u ed n commun at on netw rks Prerequ te EEE 350

EEE 460 Nuclear Concepts for the 21st Century. (3)
pr ng
Rad at on teract amage do e a d nstrument t Co m rays sate te effects oft er rs tra mutat on dop ng F ss rea tor nu ear power TM C ernoby Rad oact ve waste Prerequ te PHY 241 or 361

EEE 463 Electrical Power Plant (3)
fa
Nuc ear foss and o ar energy ource Ana ys s a d de g of team supp y y tem e ectr ca gen rat ng ystems and aux ary systen s Power p a t eff c en y and oper t on Prerequ s te C 2 1 34 or PHY 41

EEE 470 Electric Power Devices (3)
fa
Ana yzes dev es sed for sho t u t p ot ct n c ud g u t breakers re ay a d current and vo tage tran du er P ote t on aga nst w t h ng an g tn g over vo tages at on ord to Prerequ s te EEE 360

EEE 471 Power System Analysis. (3)
spr ng
Rev ew of transm s on ne parameter ca cu at on Zero sequence mpedan e symmetr a c mp ent for fau t na y hort cu t ca cu at n rev ew of power f w a a y s power yste tab ty and power sy tem ontro o ept Prereq s te EEE 360

EEE 473 Electrical Machinery. (3)
fa
Operat g pr n e o struct ona deta , and de g aspe t of vent ona DC a d AC mach ne transformer and mach ne u ed computer d sc dr ve pr nters wr t wat he and automob e P e req s te EEE 360

EEE 480 Feedback Systems. (4)
fa and spr ng
Ana y s a d de gn of near f edback systems Frequency resp n e and r t ocu techn ques er e ompen at on and tate va ab fe dba k e t re ab Pre equ s te EEE 3 3

EEE 482 Introduct on to State Space Methods. (3)
fa
D s rete and nt uous sy tems n tate space form ontr ab ty stab ty a d po e p a eme t Ob ervab ty and observers Pre or orequ te EEE 480

EEE 488 Senior Des'gn Laboratory I. (2)
fa and spr ng
Cap tone sen or pr e t Des gn pr cess resea ch o cept fea b ty, s mu at on pe f cat o s benc mark ng and pr p sa generat on Techn ca o mu t ns a d team sk s en hment Le ture ab P e equ te ECE 300 334 EEE 303 340 ser or status Pre or corequ te ECE 352 EEE 60
Genera Stud L f c ed t a so earned n EEE 489

EEE 489 Senior Des gn Laboratory II. (2)
fa and spr ng
apstone en r project mp ement eva ate a d document EEE 488 de gn So a econom a d safety con derat ns Techn a mmun cat ons and team s enr chment Lecture ab P ere u s te EEE 488 n t e mmed ate y preced g semeste
Genera St d s L f c ed t a so earned n EEE 488

EEE 506 D'g'tal Spectral Analysis. (3)
spr ng
P cp es and app cat on of d g ta s ect a ana ys s ea t quares random sequences. par m t and no parametr c methods for s ec tra est mat on P e e u te EEE 40~ 554

EEE 507 Mu t d mens onal Signal Process ng. (3)
fa
Pro es ng and rep e e tat of mu t d men ona gna s Des gn of systen s f p es g mu t d men ona data ntrod ces mage and a ray p ce g sues Prerequ te EEE 40 r structor appr va

EEE 508 D gital Image Process ng and Compress on. (3)
pr ng
Fundamenta s of d g ta age percept on representat on pro ess ng and compres on mphas ze mage c d ng techn ques gna s n de t p t es and ot o v deo Prerequ s tes EEE 350 and 40 or the r eq a e t

EEE 511 Artificial Neural Computation Systems. (3)
e ected semesters
Networks f r computat on ear g fun t on repre e tat on from data earn ng a g r thm and ana ys s funct on approx mat on and nf mat on representat on by netw rks app at s ontro sy tems nd s gna a ays s Prerequ te n t u tor approva

EEE 523 Advanced Analog Integrated Circuits. (3)
fa
Ana ys s and des g of ana og ntegrated c rcu t ana og c u t b ocks. referen e c u ts operat ona amp f er u ts feedback and non near rcu ts Prerequ te EEE 433 or ts equ va ent

EEE 524 Communication Transceiver Circuits Design (3)
se ected semest s
Commu to tran e vers and rad o freq e y system de gn f n damenta s of trans e ve s c cu t RF F m er f ter freq ency ynthes zer re e ers CAD too and ab wo k on de g sta to s e tu e ab Prerequ te EEE 433 and 455 or the equ va ents Pre r orequ te EEE 523

EEE 525 VLSI Design. (3)
f and sp ng
Ana y a d de gn of Very Large Sca e ntegrated VLS r t Phy c of s dev ces fabr c t on regu ar stru tu e a d y tem t m ng pen on y to graduate students

EEE 526 VLSI Architectures. (3)
fa
Spec a purpose arc tecture for s gna proces ng De gn of array pro essor sy tems at the ystem eve and pr cessor eve H gh eve synthes s Prerequ s tes both CSE 330 and EEE 40 o on y nstruc tor approva

EEE 527 Analog to Dig'tal Converters. (3)
fa
Deta ed ntr du t n t the des gn of Nyqu st rate CMOS ana og to d g ta converters Pre equ s te EEE 523

EEE 530 Advanced Sil con Processing. (3)
pr ng
h n f ms CVD x dat d ffu o on mp antat on for VLS , meta zat on s c de advanced t ograp y dry etch ng rap d therma pro cess ng Pre or corequ s te EE 435

EEE 531 Semiconductor Device Theory I. (3)
fa
ransport a d recomb at theory pn and S hottky barr er d odes b po ar a d unct on f e d effe t trans stors and MOS capa tor and trans st rs Prerequ te EEE 436 or t equ va ent

EEE 532 Semiconductor Device Theory II (3)
spr ng
Advanced MOSFE s cha ge coup ed dev ce so ar ce p otode tectors, ght em tt ng d o es m crowave dev ce and modu at n doped structure Prerequ s te EEE 531

EEE 533 Semiconductor Process Device Simulation. (3)
fa
Proces mu at on concepts ox dat on n mp antat n, d ffus n dev ce s n u at n con epts pn unct ons, MOS dev ces b po ar tr n s stors Prerequ s te EEE 436 or ts eq va ent

EEE 534 Semiconductor Transport. (3)
spr ng
arr e transport sem conducto s Ha effe t h g e ectr c f e d Bo tzman equat on co re at on funct ons and carr er carr er terac t on Prerequ tes EEE 434 436 or 531

EEE 535 Electron Transport in Nanostructures. (3)
spr ng
Nanostructure phys cs and pp cat ons Two d mens na e ectron systems quantum w es an dots ba st c transp rt quant m terfer ence and ng e e e tron tu ne g Prerequ s tes EEE 434 436

EEE 536 Semiconductor Characterization. (3)
spr ng
Measu ement tec n ques for sem co ductor ater a s and dev ces E ectr ca opt ca phy ca and chem ca character zat o methods Prerequ s te EEE 436 or t equ va ent

EEE 537 Semiconductor Optoelectronics I. (3)
fa
E ectron c states n sem ondu tors quantum theory of rad at on abs rpt on processes rad at ve processes nonrad at ve processes photo um nescen e and photon c dev ces Pre equ s tes EEE 434 436 or 531

EEE 538 Semiconductor Optoelectronics II. (3)
se ected semesters
Mater a and dev ce phys c of sem c nductor lasers ght em tt ng d odes, and photodete tor Emerg ng mater a and dev ce techno ogy n i V sem ondu tors Prerequ s te EEE 537

EEE 539 Introduction to Solid-State Electronics. (3)
fa
Crystal att ce re proca att ces quantum stat st s, att ce dynam cs equ br um and nonequ br um processes n sem cond ctors Prerequ s te EEE 434

EEE 541 Electromagnetic Fields and Guided Waves. (3)
se ected semesters
P ar zat on and magnet z t on, d e ect c, cond ct ng an s trop c and sem c nduct ng med a· dua ty un q e ess and mage theory p ane wave fun t ons wavegu de resonators, a d surface gu ded waves Prerequ s te EEE 440 or ts equ va ent

EEE 543 Antenna Analysis and Design. (3)
fa
mpedan es, broadband anten as freq e cy depe de t antenna , m atur zat on aperture anten as, horn ref e tors ens antennas and cont nu sources de gn techn q e Prereq s te EEE 443 or ts equ va e t

EEE 544 H gh-Resolut on Radar. (3)
e e ted emesters
F ndamenta s w deband coherent des gn wavef rms and pro ess ng ste ed freque cy synthet aperture r dar SAR nverse syn thet ape ture radar SAR mag ng Prereq s tes EEE 303 and 340 r the r equ va ents

EEE 545 Microwave Circuit Design. (3)
sp g
Ana ys s and des gn of m crowave atte uators phase and quadra ture phase power d v ders mag c tee s rect o a coup ers phase sh fters DC b ocks nd equa zers Prerequ s te EEE 445 or nstruc t r approva

EEE 546 Advanced Fiber Optics. (3)
se ected semesters
Theory of p o agat n f ber coup er and nne tors d str but n netw ks mo u at on no se a d detect on system des gn and f ber sens rs Prerequ s te EEE 44 r nstr ctor approva .

EEE 547 Microwave Solid State Circuit Design I. (3)
spr ng
App es em ondu t r chara ter t c to pract ca de gn of m cro w ve m xe s dete tors m ters sw tches attenuator mu t p ers p ase sh fter and amp f ers Prerequ s te EEE 545 or nstructor approva

EEE 548 Coherent Opt'cs. (3)
se ected semesters
D ff act n e ses opt ca proces ng ho ography e ectr opt cs, and a ers Prerequ te EEE 440 or t equ va ent

EEE 549 Lasers. (3)
se ected sem sters
The ry a d des gn of gas s d and en cond ctor asers P erequ s te EEE 448 r n tructor approv

EEE 550 Transform Theory and Applications. (3)
se e ted eme ter
ntr duce bstr ct nteg at on, f n t on spaces a d omp ex ana ys s n the ontext of nteg a tra sform t eory App cat n to gna ana y s s commun cat on theory a d system theory Prerequ s te EEE 303.

EEE 551 Informat'on Theory. (3)
se ct d semesters
Entropy and mutua nformat on s rce and hanne cod ng theorems app cat n for mmun cat on n s na pro ess ng Prerequ s te 554

EEE 552 Digital Commun cations. (3)
p ng
omp e s gna theory d ta modu at on, opt ma coherent and nco he ent ece ve s ha ne code coded m du at on V terb a gor thm rereq s te EEE 554

EEE 553 Coding and Cryptography. (3)
se ected seme ters
ntroduces a gebra b ock nd convo ut a ode ecod'ng a go r thms turbo codes, co ed mod at o pr vate a d pub c key cryptog raphy Pre equ te EEE 554

EEE 554 Random Signal Theory. (3)
fa
A p e stat st ca te hn ques to t e representat on and ana ys s of e ectr ca s gna a d to commu cat ons systems ana ys s Prerequ te EEE 350 or nstructor approva

EEE 555 Modeling and Performance Analysis. (3)
se ected sem ste s
M de ng a d performan e ana ys s of toc a t c sy tem and pr ce es suc as etw rk traff c queue ng systems and commun cat on channe s Prerequ s te EEE 554

EEE 556 Detection and Estimation Theory. (3)
e ected sem ste
Comb nes the ass ca techn ques of stat st c nference and the ran d m process chara ter zat on of comm n at on, radar and other modern data process ng systems Pre equ tes EEE 455 554

L te acy and cr t a nqu ry **MA** athemat s **CS** compute stat t c quant tat ve app c t on **HU** man t es and f ne a ts **SB** c and b av o c e e **SG** nat r enc gen ra r ur es **SQ** natu a e ce u nt t t ve **C** t r ve ty th ted State **G** g oba **H** h t a See Ge e a Stud e page 3

EEE 558 Wireless Commun cations. (3)
fa
Ce u ar systems path oss mu t path fad ng channe s, modu at on and gna ng f r w re ess d vers ty equa zat n cod ng pread pec trum TDMA FDMA/CDMA. P ere u s te EE 552

EEE 571 Power System Transients. (3)
sp g
S mp e sw tch ng trans ents Trans ent ana ys s by deduct on Damp ng of trans ent Capac tor and reactor sw tc ng Trans ent recovery v t age Trave ng waves on transm ss n es L g t g. P otect on of equ pment aga nst trans ent overvo tages ntr duces computer a a y of trans ents Prerequ s te EEE 471

EEE 572 Advanced Power Electronics. (3)
fa
Ana yzes dev ce operat n n ud ng thyr tor gate tur off thyr s tors and t an st rs Des gn f rect f er a d n erter c r u ts App a t ons such as var ab e speed dr ve HVDC motor tro and u te ruptab e power supp es Prerequ s te EEE 470.

EEE 573 E ectr c Power Qual'ty. (3)
spr ng
S nuso da waveshape ma tenance study f m me ta y events power system harmon s, nstrumentat o f te p wer cond t o ers a d other power qua ty enhance ent met ods Prerequ te EEE 360 or ts equ va ent

EEE 574 Computer Solution of Power Systems (3)
se ected semester
A g r thms for d g ta computat on for power f ow fau t and tab ty ana y Sparse atr x and ve tor programm ng met ods, numer ca ntegrat on te hn ques stochast c met o so ut n of the east squares prob em Prerequ s te EEE 4~1

EEE 577 Power Engineering Operations and Planning. (3)
fa
Econom c d spatch un t comm tment dynam programm ng power system p ann ng and perat on contro generat on mode ng AGC and power product on Pre equ s te EEE 4 1 or graduate stand ng

EEE 579 Power Transmiss'on and Distribution. (3)
spr ng
H gh vo tage transm ss on ne e e tr des gn onductors corona R and TV no se nsu ators c eara ces. DC ha acte st c feeders vo t age drop and capac to Prerequ s te E 470

EEE 581 Filtering of Stochastic Processes. (3)
se ected semesters
Mode ng est mat n and f ter ng of t chast c processes w th emphas on the Ka ma f ter and ts app cat ons n s gna pr cess ng and contro Prerequ s tes EEE 482 5 0 554

EEE 582 Linear System Theory. (3)
se ected semesters
Contro ab ty observab ty and rea zat on t eory for mu t var ab e cont nuous t me systems Stab zat on and asymptot tate e t ma t on D stu bance decoup ng non nteract ng contro Prerequ te EEE 482

EEE 584 Internship. (3)
fa spr ng. summer
Work performed n an nd str a sett ng that prov des pract ca exper ence and adds va ue to t e c ass om and research earn ng p o cesse

EEE 585 Digital Contro Systems. (3)
se ected semeste s
Ana ys s and de g of d g ta and samp ed data contro systems c ud ng samp ng the ry z t an fo ms the tate trans t on method stab ty des gn and sy t es s Prereq s tes EEE 482 55

EEE 586 Nonlinear Control Systems. (3)
se ected semesters
Stab ty theory 'nc ud g phase p a e de cr b g fu ct L apunov method and freq ency doma n r ter a for ont nuo and d crete non ear and t me vary ng systems Pre equ te EEE 482

EEE 587 Optimal Control. (3)
e ected semesters
Opt ma ontro of systems Ca cu us of va at ons dy am c p ogram m ng near quadrat c regu ator numer ca methods and Po tryag n s pr nc'p e Cross sted as MAE 50 Cred t s a owed for on y EEE 587 or MAE 507 Prere u s te EEE 482 or MAE 506

EEE 588 Des gn of Mult'var able Control Systems. (3)
se ected semesters
Pract ca too for des gn ng robust M MO contro ers State feedback and est mat on mode based c mpe sators M M des gn methodo og e CAD rea wor d app cat ns Prerequ s te EEE 480 or ts equ va ent

EEE 606 Adaptive Signal Processing. (3)
fa
Pr nc p es app at ons of adapt ve s gna pr cess ng adapt ve ear comb ne W ener east squares so ut on grad ent search perfor mance surface LMS R S a gor thms b ock t me frequency doma n LMS Prerequ s te EEE 506 554

EEE 607 Speech Coding for Multimedia Communications. (3)
sp ng
Spe ch and aud o cod ng a g r t m for app cat s n w re es om mun cat on and mu t med a omput ng Pre equ s te EEE 40 Pre or orequ s te EEE 506

EEE 631 Heterojunct ons and Superlatt ces. (3)
fa
P n p es of heteroju ct o s and quantum we st t res band ne ups opt ca a d e ectr ca propert e ntroduces hete unct on dev ce Prerequ s tes EEE 436 531

EEE 632 Heterojunction Devices. (3)
se ected sem sters
App es eterostructures quantum we s and uper att ce to m du a t on doped FETs heterostructure b po a trans stor asers detect rs and m du ators Prerequ tes EEE 434 631 or 537

EEE 641 Advanced E ectromagnet'c Field Theory. (3)
se e ted emesters
Cy ndr ca wave funct on wavegu des and resonators sphe ca wave fun t ons a d reso ato s scatter ng from p anar cy dr ca and spher ca surfaces Green funct ons Prer q s te· EEE 541 or ts equ va ent

EEE 643 Advanced Top cs in E ectromagnet'c Rad ation. (3)
pr ng
H gh frequen y asymptot c techn ques geometr ca and phys ca the or es of d ffract on GTD a d PTD moment method MM radar cross sect on RCS pred ct n Four er tran form n rad at on. and sy the s s methods Prerequ s te EEE 543

EEE 647 M crowave So id State Circu t Design II. (3)
fa
P act ca de gn of m crowave free runn ng and vo tage cont o ed os ato s us ng Gu n and mpatt d des and trans st rs ana y s of o se ha acter st cs of the c ator Prerequ s tes EEE 545 547

EEE 684 Internship. (1–2)
fa spr ng s mme
Work perfo med n an ndustr a ett ng that prov des pract ca e per ence and adds va ue to the c assroom and research earn ng pro cesse

EEE 686 Adaptive Contro . (3)
se ected semesters
Ma n top cs covered adapt ve de t f cat on convergence pa ametr c mode performance and robustnes propert es of adapt ve t ers pers stence of ex tat n and tab ty Prerequ s tes both EEE 582 and 586 o on y nstructor approva

EEE 731 Advanced MOS Dev'ces. (3)
spr ng
Thresho d vo tage subthresho d current a ng sma geo etry effects ot e ectrons and a ternat ve struct res Prereq s te· EEE 531

EEE 770 Advanced Topics in Power Systems. (3)
se ected semesters
Power system pr b em of c rrent nterest app oached at an advanced techn ca eve fo mature student Prerequ tes EEE 5 7 and 579 r t e r equ va ents nstructor approva

EEE 784 Internship. (3)
fa spr ng summer
Work performed n an ndustr a sett ng that prov des pract ca e per ence and adds va ue to the c a room and e ear h earn ng pr cesses

Omnibus Courses. For an exp anat n f courses offered but not spe f ca y sted th s cata og ee Omn bus Courses page 56

Department of Industrial Engineering

www.eas.asu.edu ~imse
480 965-3185
GWC 502

Gary L. Hogg, Chair

Professors: Cochran, Doo ey, Henderson, Hogg, Hube e Montgomery, Runger, Wo fe

Associate Professors: Anderson Row and, Fow er Macku ak Moor, Mou Roberts, Shunk V a obos, Ye

Assistant Professors: Car y e Ge , Ku ahc Wu

Lecturer: Borror

The industrial engineer (IE provides leadership for American organ zations in reestablishing competitiveness in the global marketplace through system integrat on and pro ductivity improvement No cha enge can be greater than improv ng productivity, which is the application of know l edge and skills to provide improved goods and services to enhance the qua ity of life, both on and off the job. This improvement must be achieved without waste of physical and human resources while mainta ning environmental bal ance. Industrial engineers are the "productivity people" who provide the necessary leadership and skills to integrate tech nology his gives IEs a wide range of interests and respoi sib lities

As n other en_ neer ng fields, ndustrial engineering is concerned with solv ng problems through the application of scier tific and practical know ledge. What sets industrial engineering apart from other engineering d scipl r es is its broader scope. An IE relates to the total picture of produc tivity An IE lo ks at the "big picture" of what makes soci ety perform best the right combination of human resources, natural resources, synthetic structures, and equip ment. An IE bridges the gap between management and oper ations, dealing with and mot vating peop e as well as deter m ning what tools shc uld be used and hov they should be used

An IE deals with people as well as things In fact, indus trial engineering is often called the "people oriented profes sion." It is a primary function of the IE to inte_rate people and technology oriented systems. Therefore, IEs are a tive in the fields of ergonomics and human factors.

To be competitive in this global econ my, it is essential to emphasize and continually improve the quality of 2oods and services Industrial er gineering s the only engineering dis c pline offering course work n designing and in p ement ng quality assurance systems.

The IE's skills are applicable to every kind of org nizza tion. IEs learn how to approach, think about, and solve pro ductivity and integration problems regardless of their set tings. IEs work in n anufacturin r facilities, banks, hosp tals govern nt. transportation, coi struction, and social ser vices. Within thi wide variety of organizations, IEs get invo ved n projects such as desi n ng and implementing q ality control systems independent work groups, the work flow in a n edical laboratory, real time product on control systems, c mpute based management information systems, and manufacturing operating system s to name a few A unique feature of n ost industrial en_ neering assign nents is that they involve interd sciplinary teams For exan p e, the IE r ight be the eader of a team cons sting of electrical and mechanical engineers accountants computer scientists, and p anners Th s IE pr_gram gives the student tl e sk lls neces sary to direct these teams. These sk ls include team build ing, brainstorming, group dyn mics, and interpersonal rela tionships.

IEs have a sound background n technology integration, m nagement theory and application, en_ineering economics and c st analysis. IEs are well equipped to deal with prob lems never seen bef re, making then prim e candidates for pror otion throu_h the mana_ement career path, especially in high tech organizations In fact, more than half of all practic n_ IEs are in n anagement positions This area of expertise has placed the IE in the leadership role n the establishment of a r ew fie d of activity called "manaement of techn logy."

Industria engineers are we l trained in the development and use of analytical tools, and their most distinctive skill is in the a ea of model build n°. IEs must quickly learn and understand the problems of their clients. In this context, good people skills and good analytic skills are essential. This industr al eng neering progran offers both.

INDUSTRIAL ENGINEERING—B.S.E.

The curriculum in Industr al Engineering builds upon mathematic . computer p o_rammin_, and the engineer n_ core Beyond this foundation, tl e curricu um includes a number of required IE core courses IE electives, and study area electives, enab n_ students to focus on a specific career bjective

By successfu lv c m p etino this curricul im, the student is prepared to embark on a career in industrial en ineering or to pursue advanced ed cat on in graduate schoo .

Tl e career focused study arc is are as follows:

1. *Indust al and M n 2 en t Syste is* For a broad traditional IE career n the desi_n and analysis of manufacturing and service systems
2. *I if mat n in l Tele n munica n Systems* F r a career in the application of in te_rated comput r and telecommunication systems to manufactur ng and serv e systems nalysis and desi_n.
3. *Gl l al In dust ial Engine ing Leade ship* For a career in global n anufactur ng and service organiza tions.
4. *Hi h Te h M nufa turin* . For a career in the design and analysis of integrated manufacturing systems.

L terac and cr t ca qu ry MA m th mat c CS computer stat st s qua t tat ve a p at n HU hu an te ar d fine art SB oc a and b h ora sc en es SG nat sc nce g era o e our e SQ atu a c e q a t tat e C ut a ver ty t e ted State G oba H h to ca ee ener Stud es page 8

5. *Preprofessional and Service Systems* For a career in law, medicine or public service or careers in the design and analysis of health care, agribusiness, banking, financial, and government public administration systems.

DEGREE REQUIREMENTS

A minimum of 125 semester hours is necessary for the B.S.E. degree in Industrial Engineering. A minimum of 50 upper division hours is required. Students must attain a GPA of at least 2.00 for the courses in the major field.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements" page 79. For information concerning admission, degree, course, and graduation requirements for the School of Engineering, see pages 218–221 of this catalog.

COURSE REQUIREMENTS

Students take 59 semester hours of university English proficiency and general studies course work, 19 hours of engineering core, 36 hours of industrial engineering courses, two hours of industrial engineering electives, and 12 hours of career focused study area electives. Each study area has an associated list of recommended General Studies, IE electives, and study area courses. The course work for the undergraduate degree can be classified into the following categories.

First Year Composition

Choose among the course combinations below	6
ENG 111 First Year Composition I	
ENG 112 First Year Composition II	
ENG 113 Advanced First Year Composition	3
Elective chosen with an advisor	
ENG 107 English for Foreign Students	
ENG 108 English for Foreign Students	
Total	6

General Studies School Requirements

Humanities and Fine Arts, Social and Behavioral Sciences

ECN 112 Macroeconomic Principles SB	3
HU courses	6–9
SB courses	3–6
Minimum total	15

Laboratory and Communication

ECE 290 Intermediate Freshman Design L	3
IEE 490 Product Design and Development L	3
Total	6

Natural Science and Mathematics

CHM 114 General Chemistry for Engineers SQ	4
or CHM 116 General Chemistry SQ	4
PHY 121 University Physics I: Mechanics SQ	3
PHY 122 University Physics Laboratory I SQ	1
PHY 131 University Physics II: Electricity and Magnetism SQ[2]	3
PHY 132 University Physics Laboratory II SQ	1
Basic science elective	3
Total	15

Mathematical Studies

MAT 242 Elementary Linear Algebra	2
MAT 270 Calculus with Analytic Geometry I MA	4
MAT 271 Calculus with Analytic Geometry II MA	4
MAT 272 Calculus with Analytic Geometry III MA	4
MAT 274 Elementary Differential Equations MA	3
Total	17
General Studies school requirements total	53

Engineering Core

ECE 110 Introduction to Engineering Design CS	3
ECE 201 Electrical Networks I	4
ECE 210 Engineering Mechanics I Statics	3
ECE 212 Engineering Mechanics II Dynamics	3
ECE 350 Structure and Properties of Materials	3
IEE 463 Computer Aided Manufacturing and Control CS	3
Total	19

[1] Both PHY 121 and 122 must be taken to secure SQ credit.
[2] Both PHY 131 and 132 must be taken to secure SQ credit.

Industrial Engineering Major

The following courses are required.

ASE 485 Engineering Statistics CS	3
CSE 110 Principles of Programming with C++ S	3
or CSE 110 Principles of Programming with Java	3
CSE 210 Concepts of Computer Science	3
ECE 380 Probability and Statistics for Engineering Problem Solving CS	3
IEE 294 ST Industrial Engineering Applications Seminar	2
IEE 310 Economic Analysis for Engineers	3
IEE 336 Manufacturing Processes	
IEE 365 Facilities Analysis and Design	3
IEE 374 Quality Control CS	
IEE 446 Production Control	3
IEE 475 Simulating Stochastic Systems CS	3
IEE 476 Operations Research Techniques Application CS	4
Total	36

Industrial Engineering Electives Area

Students select two semester hours of industrial engineering electives. IEE 361 Manufacturing Processes Lab is highly recommended. For course information, see the list of recommended courses in the department advising office.

Career-Focused Study Area Electives

Students select a minimum of 12 semester hours from the following recommended electives in one of the five career focused study areas.

Industrial and Management Systems

IEE 305 Information Systems Engineering CS	
IEE 433 Engineering Administration	
Any approved engineering or business elective	3
Any approved engineering elective	

Information and Telecommunication Systems

CSE 110 Object Oriented Design and Data Structure	3
CSE 240 Introduction to Programming Languages	3
IEE 305 Information Systems Engineering CS	3
IEE 484 ST Information Systems Development Tools	3

Global Industrial Engineering Leadership

ECN 3 6 Survey of Int rnation E nomics *SB G* . 3
IBS 3 Principle of International Business *G* 3
IBS 4 Cult ral Fact rs in Internatic nal Bus ness *C G* 3
Any approved nter ationa b s ness e ect ves 3

High-Tech Manufacturing

ECE 352 Properties of E ectroni Materials 4
EEE 435 Microelectr nics 3
EEE 436 Fundame tals f Solid State Devices 3
MSE 355 It troduction to Materia s S ience an l En eerin_ . . . 3
MSE 44 Analysis of Mater a s Fai ures 3
MSE 47 Po vi ers and Composites 3

Preprofessional and Service Systems*

Ag il us ness Sy tems

AGB 34 Food Processin_ 3
AGB 341 Food Anal s s 3
AGB 351 Management Sc e ce *CS*. 3
AGB 364 A r business Techn loe es I 3
AGB 414 Agr business Analysis *L* 3
AGB 44 Fo d Safetv 3
AGB 442 Fo d and Industr a Mi robi o_y 4

Banking and Financial Systems

FIN 30 Fundamentals f Finai ce 3
FIN 331 F ancia Markets and Inst tutions 3
FIN 36 Managerial Finan e 3
FIN 43 Management of Financia Inst tutions 3

Government and Public Administration Systems

POS 310 American Nat onal Government *SB* 3
POS 316 State and Loca Government *SB* 3
POS 320 Public Admin'strat on *SB* 3
POS 333 Interest Groups *SB* 3

Health Care Systems

HSA 498 PS. Hea th Care Finance. . . . . .
HSA 498 PS. Hea th Econom cs. 3
HSA 498 PS: Health Ser ice Adn inistrat on and Poli s 3
HSA 498 PS: Po icy Issues in He alth Care. . 3

Pre law Systems

A S 360 Substantive Criminal a s ASU West 3
COM 429 Advanced Argumentation 3
GLB 300 Gateway to G obal Bu ness AS West 3
POL 470 Law and Polit ca Order ASU West 3

Premedicine System

BIO 187 General Bi lo y I *SG* 4
BIO 188 Genera Bi loey II *SQ* 4
BIO 351 Deve opn ental Anatom s . 3
CHM 331 Genera Organic Chem stry . . 3
CHM 332 General Organic Ch r stry . . . 3
CHM 335 General Organ c Chem t try Lab 1
CHM 336 General Organic Chemistry Lab 1

Certa n focus tudy areas t ay requ re more than 12 seme ter h urs du to class prereq s t s

Industrial Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Eng r e rs *SQ* . . . 4
or CHM 116 General Chemistry *SQ*
ECE 100 It troduct on to Engineering Design *CS* 3
ENG 101 Fir t Year Com po sition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
HU SB elective* .

Tota 17

Second Semester

ECN 1 2 Microeconom c Principles *SB* 3
ENG 2 F r t Year C n p tion . 3
MAT 271 Ca c lus w th Analytic Geor etry II *MA* . . 4
PHY 21 Un v r ity Phy es I Mechanics *SQ* 3
PHY 122 versity Phys cs Lab ratory I *SQ* 1
HU SB elective . . . 3

T tal 17

Second Year

First Semester

CSE 1 Principles of Program in_ w th C++ *CS* 3
r CSE 110 Princ ples of Pr_gram ming w th Java 3
IEE 3 Econ omic Analysis for Eng r e rs . 3
MAT 242 E en entary L near Algebra . 2
MAT 272 Ca c lus with Analyti Geor etry III *MA* 4
PHY 131 U versity Phy es II E ectricity and Ma netism *SQ*[4] 3
PHY 132 Un ver ity Phys cs Lab rat ry II *SQ*[4] 1

Tc tal 16

Second Semester

CSE 2 C ncepts of C mputer S ience. 3
ECE 35 Structure ar d Propert es of Mater a s . 3
ECE 38 Probability and Statistics for Engineer ng Problen So ving *CS* 3
IEE 294 ST Industr a Engineerin_ Applic ations Seminar 2
MAT 274 E en entary Differ ntia Equatio s *MA* . . 3
Basic c n e e ective 3

Tota 17

Third Year

First Semester

ASE 485 En ineerin Stat stics *CS* 3
ECE 21 Engineering Mechan I: Stat cs 3
IEE 36 Manufactu in_ P oc sses 3
IEE 368 Fa lit es Ana y sis and Des _n . 3
IEE 374 Quality Contro *CS* 3
Industrial Eng neering e ect ve 2

T ta . . 17

Second Semester

ECE 3 Intermediate Eng neering Design *L* 3
ECE 2 2 E gineerin Mechanic II Dynamics 3
IEE 463 C n p ter Aided Manufacturing and C ntrol *CS* . . . 3
IEE 476 Operat ns Research Techn que App cat ons *CS* 4
St dy area elect ve 3

Total 16

Fourth Year

First Semester

ECE 2 1 Electri al Networks I 4
IEE 461 Producti n Contr l 3
IEE 475 S mulati n Stochast c Systems *CS* 3
HU SB elective* 3
Study area electi 3

Total 16

L teracy and cr t a nq ry MA m t e t CS co p te stat st s qua t tat v app at ons HU uman te a d f e art SB so a a d be ra e e SG atura en ge e e u e SQ atu a ce q ant tat C t ra d ve ty the ted St te G g ba H h st r a See e era Stud e pa e 83

Second Semester

IEE 49 Project in Des gn and Devel op ent. . . .	3
HU SB elect ve	3
Study area elective	6
Tota	1?

Studer ts who h ve take n h gh s h ol chem stry sh u d take CHM 113 and 116

- Eng neer ng students may not use a rospace studies (AES or m litary c ence MIS c urses to satisfy HU r SB requ rements
- [3] Both PHY 121 a d 12_ m st be taken to secure SQ cre t
- [4] Both PHY 131 and 1 2 m st be take to s cu e SQ cred t
- [5] This elect ve must be an earth science cr l fe s r n e ourse, t phy sics or chem stry. the course must be of c ore advanced level than CHM 14 or 116 o PHY 131

INDUSTRIAL ENGINEERING (IEE)

IEE 294 Special Topics. (1–4)
fa and spr ng
Top c may c de the fo ow ng
• ndu tr a Eng nee g App cat ons Sem nar 2

IEE 300 Econom c Ana ysis for Engineers. (3)
fa and spr g
Econom c eva uat on of a ternat ves for eng neer ng dec s ons empha z ng the t me va ue of money Prerequ s tes ECE 100 MAT 270

IEE 305 Information Systems Engineer ng. (3)
fa
Overv ew of computer and nformat on systems app cat ons Top s nc ude ent/ erver d str buted comput ng, netw rks p ocess mode ng· e commerce enterpr e app cat ons ternet Prerequ s te. CSE 200
Genera Stud es: S

IEE 360 Manufacturing Processes. (3)
fa and spr ng
Product on te hn que and equ pment Cast ng and mo d ng form ng mach n ng o n ng and assemb y computer ntegrated manufactur ng rap d prototyp ng and e ectro cs man factur ng Cross sted as MA 351 Cred t s a owed for on y EE 360 or MAE 351 Prerequ te ECE 350

IEE 361 Manufacturing Processes Lab. (1)
fa and sp g
Ser es of abs des gned to ust ate concepts presented n EE 360 n produ t on techn que and equ pment C requ s te EE 360 or MAE 351

IEE 368 Faci ities Analysis and Design. (3)
fa
P ann ng ana y s and des gn of meth ds of the tang b e phy ca assets of the f rm Empha ze fac t es o ato mate a s hand ng automat on omputer ntegrat on a d ut zat on of f nan a resources App at ons n d ver e f e ds Lecture ab Prerequ te EE 300

IEE 369 Work Analysis and Des gn. (3)
spr ng
P ann ng ana ys s and des gn of method of accomp s ng work Emphas zes human fa tors work p ann ng methods ana ys s and de gn and wo k measureme t App cat ons n d verse f e ds Lec ture ab

IEE 374 Quality Control. (3)
fa
Cont o cha t ng and other stat st ca proce s ontro techn ques Organ zat on and manager a aspects of qua ty assurance p u acceptance samp ng p ans Prerequ s te ECE 380
Genera Stud es CS

IEE 431 Engineering Administration. (3)
fa
nt odu es quant tat ve and qua tat ve appr aches to management funct on eng neer ng adm n strat on organ zat ona ana ys s dec s on mak ng and commun cat on Cred t s a wed for on y EE 431 or 541 Prerequ s te sen or stand ng

IEE 437 Human Factors Engineering. (3)
fa
Study f the huma psych og a and phys o og ca facto s that under e t e de gn of equ pment and t e nteract on between pe p e and mach nes Cred t s a owed for on y EE 437 or 547

EE 461 Production Control. (3)
fa
e q es for the p an ng co tro and eva uat on of product n sys tem Pro ect ma agement foreca t g nventory contr chedu ng enterpr se requ rement p ann ng Prerequ s tes ASE 485 SE 00 EE 476

IEE 463 Computer-A'ded Manufacturing and Contro . (3)
spr ng
Computer contro n manufactur ng C M NC og c contro e g up tec no ogy process p ann ng, and robot cs Cred t s a owed for n y EE 463 or 543 Prerequ s te EE 360 or MAE 351
Genera Stud e CS

IEE 475 Simulating Stochastic Systems. (3)
fa and spr ng
Ana yzes tochast c systems us ng ba c que ng netw rks and d s rete event s mu at on. Bas c network m de ng shared resources rout g assemb y og c Cred t s a owed for on y EE 475 or 545 P e requ te CSE 200
Genera Stud e CS

IEE 476 Operations Research Techniques App ications. (4)
fa and spr ng
ndustr a systems app cat ons w th ope at ons resea ch techn que Res ur e a ocat on product m x product o sh pp ng task ass gn ment market share mach ne repa r ustome serv ce Cred t a owed for n y EE 476 or 546 Prerequ te CSE 200
Genera Stud es CS

IEE 490 Project in Design and Development. (3
fa and spr ng
nd v dua r team apstone pro e t n reat ve des gn a d synthes s Prerequ s tes EC 300, 4 5 Pre or co equ s te EE 461
Genera Stud es

IEE 494 Special Topics. (1–4)
fa and spr ng
Top cs m y nc ude the fo w ng
• nformat n Systems De e pme t oo s 3

IEE 505 Information Systems Engineering. (3)
fa and spr ng
Stud es nformat on systems app at n e g eer ng op nc ude nformat on tec n gy data mode ng data organ zat on proce s mapp ng app cat on and data ase eng neer ng and user nterface deve opment. Prerequ s tes CSE 2 0 graduate stand ng

IEE 511 Analysis of Dec'sion Processes. (3)
spr ng
Methods of mak ng de s ns n omp ex env ro ment and stat st ca de s theory effect of r sk uncerta nty and trategy on eng neer ng a d manager a dec s on Prerequ tes ECE 380. graduate stand ng

IEE 520 Ergonom cs Design (3)
spr ng
Human phy o og ca and psych g ca factor n the des gn f w rk env ronments and n t e emp oyment of peop e n man mach ne sys tem Open shop ab s gnments n add t on to c a s work Prerequ s te EE 437 or graduate stand ng

IEE 530 Enterprise Modeling. (3)
spr ng
F cuses on so a econ m c and tech a mode s of the enterpr se w th emphas on the management f techn og ca resources nc udes organ zat on econometr c f nanc a and a ge sca e mathe mat a mode s Prerequ s te· graduate tand ng

IEE 531 Topics in Eng'neering Adm'nistration. (3)
spr ng n even years
Co s derat on g ven to ph osoph ca psycho og a po t ca , a d oc a mp cat ons f adm n strat ve de s o s Pre equ s te grad ate tand ng

IEE 532 Management of Technology. (3)
fa
Top c nc ude des gn ng a techn ca strategy techno og ca forecast ng terfac ng market ng eng neer ng and manufactur ng des gn ng

and manag ng nnovat on systems creat v ty app at on of ba c management pr nc p es t techno ogy management Prerequ s te EE 431 or 541

IEE 533 Scheduling and Network Analysis Models. (3)
spr g
App es schedu ng and sequenc g a gor thms determ st c and to chast c network ana ys s and f w a gor thms Prerequ tes ECE 380 EE 476 or 546

IEE 541 Engineering Administration. (3)
fa
nt oduces quant tat ve and qua tat ve appr ac es to a agement funct ons eng neer ng adm n strat on o gan zat ona ana ys s dec s on mak ng and comm n cat on Cred t s a wed fo on y EE 541 or 431 Prerequ s te g aduate tand g

IEE 543 Computer-Aided Manufacturing and Control. (3)
spr ng
Computer contro n manufactur ng, C M NC og c contro ers, gr up techno ogy proce s p ann ng and robot cs ed t s a owed for on y EE 543 r 463 P e equ te g aduate stand g

IEE 545 Simulat ng Stochastic Systems. (3)
fa and spr ng
Ana yzes stochast c systems us ng bas c queu ng networks and d crete event s mu at n Bas network m e ng shared resour es rout ng assemb y og c Cred t s a owed for o y EE 545 or 475 Pre requ s tes CSE 200 EE 476 or 546 Pre or corequ s te ASE 485 or 500

IEE 546 Operations Research Techn ques Applications. (4)
fa and spr ng
Mode s and ana yzes ndustr a systems app cat o s w th operat ons resear h te h ques Resource a at n prod t m x product o sh pp g task ass gnment market are mac e epa r customer serv ce Cred t s a owed for on y EE 546 or 476 Prerequ s te ECE 380 graduate sta d ng

IEE 547 Human Factors Engineering. (3)
fa and spr ng
Study of pe p e at work· des g ng f r uman perf rma ce effect ve ness and product v ty Co s derat o s of man p ys o og ca and p y cho og ca factors Cred t s a owed for on y EE 547 or 437 Prerequ s te graduate stand ng

IEE 552 Strategic Technological Planning. (3)
sp ng
Stud es concepts of strategy, strategy f rmu at on process a d strate g c p an ng met od og es w th emp as s eng neer g des gn and manufactur ng trategy comp emented w t ca e tud es Pre ents and uses an ana yt a exe ut ve p ann ng dec s o support system throughout cour e Prerequ s te graduate stand ng Pre or c requ te EE 545 561 572 574

IEE 560 Object-Oriented Information Systems. (3)
spr ng
App es ob ect or ented techn ogy and con ept to enterpr se nf r mat n systems Top n ude requ rement ana ys s ob ect or ented des gn and programm ng rap d app cat on deve opment ob e t data management and deve opment of ob ect or ented d str buted app a t on Prereq s te EE 505

IEE 561 Production Systems. (3)
spr ng
Understand ng how fa tor es perate h w performance s measu ed and how operat ona change mpact performance metr cs Opera t ona ph osoph es n reas ng product on eff c ency through quant ta t ve method Prerequ s te ASE 485 EE 4 6

IEE 562 Computer-Aided Manufacturing (CAM) Too s. (3)
spr ng
Current t p cs n automat n, d tr buted c ntro contro code genera t on contro og c va dat on CAM ntegr t on CAD AM data st u tures p ann ng for ont o systems Top s vary by seme ter Prerequ s te EE 463 or 543

IEE 563 Distributed Information Systems. (3)
fa and pr ng
ntrod ct on to concepts and tec n g es that form the core of d trib uted e terp se format on ystems Top cs nc ude c ent server arch te tures d tr buted ob e ts and parad gms nternet Wor d W de Web d tr buted nformat on shar ng network programm ng and e commerce and enterpr se app cat on Prerequ s te EE 5 5

IEE 564 Planning for Computer Integrated Manufacturing. (3)
fa
Theory and use of DEF methodo ogy n p ann ng for f ex b e manufac tur ng robot cs and rea t m contro . S mu at on concepts app ed to computer ntegrated manufactur g p ann ng Prerequ s te graduate stand ng

IEE 565 Computer-Integrated Manufacturing Research. (3)
spr ng
Determ nat on and eva uat on of resear h are s n computer nte grated ma ufactur ng nc ud ng rea t me software manufactur ng nformat systems, f ex b e and ntegrated manufactur ng systems obot s and omp ter graph cs Prerequ s te EE 564

IEE 566 Simulation in Manufacturing. (3)
spr ng n even years
Uses s mu at on n comp ter tegrated ma ufactur ng w t an empha s s on mode ng mater a hand ng sy tems Programm ng dec arat ve and nte gen e based s mu at on env ronments Prerequ s te EE 4~5 or 545

IEE 567 S mulation System Analys s. (3)
fa
S mu at on mode ng of pr cesses nvo v g d s rete and co t nuous system omponents Top cs c ude random number generator , out put ana ys var ance educt o and stat t sues re ated to s mu at o Prerequ s te· EE 475 or 545

IEE 569 Advanced Stat stical Methods. (3)
fa ven years
App es stat st ca mode ng and feren e te hn q es to prob em n eng neer ng and sc ence Top cs may nc ude mu t var ate methods pat a mode ng and nonpa ametr'c methods Prerequ s te ASE 485 o 500

IEE 570 Advanced Quality Control. (3)
spr ng
Process mon tor ng w th c ntro chart Shewhart cusum EWMA feedback ad ustment and e g eer ng proces contro proce capa b ty auto orre at se ected top cs from current terature Prerequ s te ASE 485 or 5

IEE 571 Qua ity Management. (3)
fa
Tota qua ty concepts qua ty strateg e qua ty and compet t ve pos t on q a ty costs ve dor re at s the qua ty manua and qua ty n the serv es P ere u s te graduate stand ng

IEE 572 Design of Engineering Experiments. (3)
fa and spr ng
Ana yzes var an e and e pe mental des gn Top cs n de genera des gn methodo ogy ncomp ete b o ks c nfound g fract ona rep at on and resp nse s rfa e meth do ogy Prerequ s te ASE 485.

IEE 573 Rel ab lity Engineer ng (3)
pr ng
Nature f re ab ty t me to fa ure dens t es ser es para e stan by systems c mp ex system re ab ty Baye a re ab ty and sequen t a re ab ty tests Prerequ s te ECE 380

IEE 574 Applied Determ'nist'c Operations Research Models. (3)
fa and spr ng
Deve ops dvanced techn ques n perat s resea c f r t e so ut on of m ex ndustr a systems prob ems Goa programm ng nteger programm g heur st c met od dynam c and non near pr gram m ng Prerequ s te: EE 476 r 546.

IEE 575 App ied Stochastic Operations Research Models. (3)
spr ng
F rmu ate and so ve ndustr systems prob ems w th stochast c com ponents us ng ana yt ca techn ques Convo ut on cont nuous t me Markov cha ns q eues w th batch ng, pr o t es ba k ng open c osed q eu ng networks Prerequ s tes ASE 485 or 5 0 EE 476 or 546

IEE 577 Applied Intell gent Systems. (3)
fa
te gent sy tem techno og es and the r app cat ons n ndu tr a eng neer ng Top cs nc ude a t f a ne ra networks genet c a go r thms data m ng, Bayes an dec on mak ng know edge based

L tera y a d r t ca nq ry **MA** mathen at c **CS** computer stat st cs q a tt t ve a p at o **HU** h n t e n f ne rt **SB** o a d behav ora en **SG** nat r e e ge era ore o r e **SQ** atura en e—qua t tat ve **C** cu tu a d ver ty n t e ted tate **G** g ba H h tor a ee Gener Stud e page 83

dec s n s pp rt a d t e r eng neer ng app cat ons Prerequ s te EE 505

IEE 578 Regression Analysis. (3)
fa
Regress on mode bu d ng r ented toward eng neers and phys ca sc ent t Top cs nc ude ea regress on d agno t cs b a ed and robust f tt g non near regress on Prereq s te ASE 485 or 500

IEE 579 Time Series Analysis and Forecasting (3)
fa n odd years
Foreca t ng t me ser e by regre s on based exponent a sm oth g *and AR MA mode techn que uses d g ta omputer program to aug* ment the theory P erequ te ASE 485 or 500

IEE 582 Response Surfaces and Process Optimization. (3)
spr ng
C ass ca resp se surface a a y s and des gns nc ud ng steepe t as ent anon ca ana y s and mu t p e re p n es Other top nc ude process robustne s tud es robust des gn a d m xture exper ments Prerequ s te EE 572

IEE 593 Applied Project. (1 12)
se ected semeste s

IEE 594 Conference and Workshop. (1)
fa and spr ng
Or entat n t the deve p ng work n the f e d w th an emp as s on what t e E facu ty are d ng

IEE 598 Specia Topics (1–4)
se ected sem e ters
Top cs may nc ude the fo w ng
- Advanced Top c n Determ st c Operat ons Resear h 3
- Advanced Top c n Schedu g 3
- Ana ys s of Mass ve Data Sets 3
- Computer and H man V on 3
- DOE SPC for Sem conductor Pro esses 3
- Enterpr se nternet ntranet 3
- ntroduct on to Rap d P ototyp ng 3
- Mechatron c 3
- Product Mode ng 3
- Strateg c De gn of Manufa tur ng Systems 3
- Strateg c ssue n Man facturi ng 3

IEE 599 Thesis (1–12)
se cted seme te s

IEE 672 Advanced Topics in Exper'mental Design. (3)
spr ng n e en years
Mu t eve and m xed eve fact r a s and f act ons, des gn pt ma ty comp ete b ock unba anced des gns random effect a d var ance comp ents ana ys s f covar ance Prereq s te EE 572

IEE 677 Regression and Genera ized Linear Models (3)
spr ng n odd years
T eory of near mode s nc ud ng east sq a es max mum ke ood ke h d based nference enera zed ear mode s nc ud g Po son a d g st c regre s genera zed est mat ng equat o s P ereq s te EE 578

IEE 679 T me Series Analysis and Control (3)
fa n even yea s
de t f cat on e t mat n d agnost c che k ng techn ques for AR MA mo e s tran fer funct ons mu t p e t me se es mode for feedback and feedforward co tro cheme Prerequ s te EE 579

IEE 681 Reliabil'ty, Availabi ity, and Serviceability. (3)
fa n even years
Organ z ng hardware and software ntegr ty and fau t t erant des gn ma ntenance des gn and strategy, Markov mo e s fau t free ana y s and m tary standards Prerequ s te EE 573

Omnibus Courses. F r a exp anat on of courses offered b t not spec f ca y ted n th s cata og ee Omn bus Course page 56

Department of Mechanical and Aerospace Engineering

www.eas.asu.edu ~mae
480 965-3291
ECG 346

Robert E. Peck, Chair

Professors: Boyer, Chattopadhyay Dav dson, Evan Fernando Jankowsk Krajc nov c, Laananen, L u, M gno et, Peck Reed Roy Sar c Shah, S eradzk Tseng W e Yao

Associate Professors: Chen, Kuo, Lee, Phelan, Rank n *Squ res*, We s

Assistant Professors: Ca houn, Chapsky, McNe , M ke des Pera ta, Sugar

The Department of Mechanical and Aerospace Engineer ing is the administrative home for two undergraduate majors, Aerospace Engineering and Mechanica Engineer ing. Consistent with the department s mission to provide the best possible education to its students, a departn ent goal is to attract and retain from the metropolitan community the state, and the country—outstanding and diverse students and to give each the opport unity to become competent in contemporary sub ect that bear on an engineering career. This goal is achieved through a curriculun designed to accomplish the fo owing four objectives:

1. *Tec l nic al C mpetency* Graduates are able to model and predict the behavior of engineering systems by applying the fundan ental principles from n athe matics, physics and chemistry and by using modern computational and experim enta tools
2. *P oduct Real ati n Abilit* . Graduates are able to design components or systen s at the conceptual and embodiment design leve including the issues of pro duction, manufacturability, and cost
3. *C ommunicati n Skil s*. Gradu ates can present and document effectively, using both oral and written communication, their work and ideas to a diverse audience.
4. *Pro fessio alism* Graduates are prepared for modern engineering practice by working in teams, keeping technologically abreast, and having an understand ing of related ethica , env ronmental, and societa issues.

The Aerospace Engineering major provides students an education in technological areas critical to the des gn and development of aerospace vehicles and systems Aerospace Engineering graduates are typica y en ployed n aerospace industries or at government laboratories (e.g., NASA . The Mechanical Engineering major is perl aps one of the most

broadly applicable programs in engineering, providing edu cation for a wide variety of employment opportunities.

The two majors can serve as entry points to im mediate professional em ployment or to graduate study. Th empha sis in all fields is on the development of fundamenta knowl edge that w have long lasting utility in a rapid y changing technical society.

DEGREE REQUIREMENTS

All degree programs in the depart ment require that stu dents attain a minimum GPA of 2.00 in the engineering core and in the major and take a minimum of 50 upper division semester hours to be eligible for graduat on Also the department may req ire additional or remedia course work for those students who have demonstrated a t end toward academic d fficu t es

GRADUATION REQUIREMENTS

In addition to fu fi lling school and major requirements, majors must satisfy a l university graduat on equirements. See "University Graduat on Requirements," page 79

COURSE REQUIREMENTS

General Studies

See "Course Requ rements," page 220 for Gen eral Stud ies, school, and eng neering core course requirements

Engineering Core

Students in the Department of Mechanical and Aerospace Engineering are required to take the follow ing from among the choices shown under "Engineering Core Requirement," page 221, as part of the engineering core requirements.

ECE 1 Intr du t on to Eng neering Desi n CS	3
ECE 201 Electr a Networks I	4
ECE 210 Eng n eri Mechanics I: Static	3
ECE 212 Eng n eri ng Me hanics II: Dyn mic	3
ECE 300 Interme diate E gineering Desi n L	3
ECE 315 Introduction to Defo rmab e Solids	3
ECE 324 Th rmodynam cs.	3
ECE 325 Structu e and Properties of Materials	3
Total	25

AEROSPACE ENGINEERING—B.S.E.

The goal of the Aerospace Engineering program is to pro vide students with an educati n in technological areas criti cal to the design and deve opment of aerospace vehic es and systems The program em phas zes aeronaut cal engineerin with topics in required courses covering aerodynamics, aerospace mater als, aer space structures, prop lsion flight mechanics, aircraft performance, and stability and control. Astronaut c topics such as orbital mechanics, attitude dynamics, spacecraft control, and rocket propu sion are also covered in required c urses.

Design s integrated throughout the curriculum beginning with ECE 100 Introduction to Engineering Design and fol lowed later by ECE 300 Intermediate Engineering Design, both of which focus on basic design theory as well as pro fessiona pract ce These required courses are followed by topic specific design content in aerospace engineering courses in the junio and senior years. The senio capstone design course integrates design and analysis topics from the earlier courses and completes the required design sequence. This sequence includes a minimum of one half year of required desi n In addition, many of the aerospace techni cal elect ves have design content.

Laboratory experience is provided in the areas of aero dynamics, aerospace structures, and vibrations. Laboratory facilities include four major wind tunnels, an integrated mechanical testing laboratory, a controls laboratory, and a vibrations aboratory

Aerospace Engineering Major

Aerospace Engineering students are required to take the follow ing two courses in addit on to those required for the ma jor:

MA 242 Elementary Linear Algebra	3
PHY 136 Int oductory Modern Physics.	3

The Aerospace Engineering major consists of the follow ing courses:

ECE 354 Numerical Methods for Engineers	4
MAE 101 ntroduction to Ae sp ce En eering	2
MAE 317 Dynam c Systems and Co tro	3
MAE 319 Measurements a d Data Ana ysis	3
MAE 361 Ae dyn mics	3
MAE 411 Aircraft Perf rmanc e Stabilit and Contro	3
MAE 415 V brat on Analysi	4
MAE 425 Aerospace St uctures	4
MAE 444 Fundamental of Aerospace Design	3
MAE 46 Ga Dynam cs	3
MAE 467 Spa e Vehicle Dynam cs and Co trol	3
MAE 463 Propulsion	3
MAE 464 A ro pace Laborat ry	3
MAE 468 Aerospace Systems Design L	3
Area f study technical elect ve	6
ota	50

Aerospace Engineering Areas of Study

To further the design experience, all Aerospace Engineer ing students must choose at least one technical elective from the follow ing list of courses:

MAE 426 Des gn of Aerospace Structures	3
MAE 465 Rocket Propulsion	3
MAE 466 Rotary Wi g Aerodyn m cs and Performance	3
MAE 46 A craft P f rmance	3
MAE 469 P ojects n Astronautic or Aeron a t cs	3

The remaining technical elective s may be selected from among any of the courses listed in the follow ing course tables or from courses listed under the Mechanical Engi neering areas of study The courses are grouped so that the student may select an e ective package of closely re ated course . A student may, with prior approva of the advisor and department, select a general area and a corresponding set of courses not listed that wou d support a career objec tive not covered by the categories shown below *N te* MAE 371 may *n t* be substituted for MAE 361, MAE 427 may

L t racy and cr t ca nqu ry MA thema t cs CS computer stat t c qua t tat ve a p cat on HU h man t e and f ne art SB c a and behav ora s en e SG nat a en e gene a core cour e SQ natu sc en e qua t tat ve C tura d ve s ty n the n ted State G g oba H h t r e Ge a Stud e page 83

not be substituted for MAE 425, and MAE 441 may *not* be substituted for MAE 444.

Aerodynamics
MAE 372 Fluid Mechanics 3
MAE 435 Turbomachinery 3
MAE 461 Aerodynamics II 3
MAE 463 Propulsion 3
MAE 466 Rotary Wing Aerodynamics and Performance 3
MAE 471 Computational Fluid Dynamics 3
MAE 490 Projects in Design and Development *L* 3
MAT 342 Applied Computational Methods *CS* 3

Aerospace Materials
MAE 455 Polymers and Composites 3
MSE 355 Introduction to Materials Science and Engineering 3
MSE 424 Physical Metallurgy 3
MSE 440 Mechanical Properties of Solids 3
MSE 441 Analysis of Material Failures 3
MSE 450 X-ray and Electron Diffraction 3
MSE 477 Introduction to Ceramics 3

Aerospace Structures
MAE 404 Finite Elements in Engineering 3
MAE 426 Design of Aerospace Structures 3
MAE 455 Polymers and Composites 3
MAE 490 Projects in Design and Development *L* 3

Computer Methods
ASE 485 Engineering Statistics *CS* 3
CSE 131 Data Structures and Algorithms 3
CSE 422 Microprocessor System Design II 4
CSE 428 Computer Aided Processes 3
IEE 463 Computer Aided Manufacturing and Control *CS* 3
IEE 475 Simulating Stochastic Systems *CS* 3
MAE 404 Finite Elements in Engineering 3
MAE 406 CAD CAM Applications in MAE 4
MAE 471 Computational Fluid Dynamics 3
MAE 541 CAD Tools for Engineer 3
MAT 471 Applied Computational Methods *CS* 3
MAT 423 Numerical Analysis I *CS*
MAT 425 Numerical Analysis I *CS* 3

Design
MAE 341 Mechanics Analysis and Design 3
MAE 404 Finite Elements in Engineering 3
MAE 406 CAD CAM Applications in MAE 4
MAE 426 Design of Aerospace Structures 3
MAE 435 Turbomachinery 3
MAE 442 Mechanical Systems Design 3
MAE 446 Thermal Systems Design 3
MAE 455 Polymers and Composites 3
MAE 466 Rotary Wing Aerodynamics and Performance 3
MAE 467 Aircraft Performance 3
MAE 490 Projects in Design and Development *L* 3
MSE 344 Mechanical Properties of Solids
MSE 441 Analysis of Material Failures 3

Mechanical
Any course listed under the Mechanical Engineering concentrations except MAE 327, 422 and 441 3

Propulsion
MAE 382 Thermodynamics 3
MAE 385 Heat Transfer 3
MAE 434 Internal Combustion Engines 3
MAE 435 Turbomachinery 3
MAE 436 Combustion
MAE 461 Aerodynamics II 3
MAE 463 Rocket Propulsion 3
MAE 466 Rotary Wing Aerodynamics and Performance 3
MAE 471 Computational Fluid Dynamics 3
MAE 490 Projects in Design and Development *L* 3

System Dynamics and Control
CSE 428 Computer Aided Processes 3
EEE 480 Feedback Systems 4
EEE 482 Introduction to State Space Methods 3
MAE 417 Control System Design 3
MAE 447 Robotics and Its Influence on Design 3
MAE 469 Projects in Astronautics Aeronautics 3
MAE 490 Projects in Design and Development *L* 3

TYPICAL FOUR-YEAR SEQUENCE

The first two years are usually devoted to the General Studies and engineering core requirements. Thus, the degree programs in the department share essentially the same course schedule for that period of time. A typical schedule is given below.

Aerospace Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester
CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry *SQ* 4
ECE 110 Introduction to Engineering Design *CS* 3
or HUSB elective[1]
ENG 101 First Year Composition 3
MAE 111 Introduction to Aerospace Engineering 2
MAT 210 Calculus with Analytic Geometry I *MA* 4
Total 16

Second Semester
ENG 102 First Year Composition 3
MAT 242 Elementary Linear Algebra 2
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 121 University Physics I: Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ*[2]
HUSB and awareness area course 3
or ECE 100 Introduction to Engineering Design *CS* 3
Total 16

Second Year

First Semester
ECE 211 Engineering Mechanics I: Statics 3
ECE 250 Structure and Properties of Materials 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3]
Total 17

Second Semester
ECE 201 Electrical Networks I 4
ECE 212 Engineering Mechanics II: Dynamics 3
ECE 213 Introduction to Deformable Solids 3
ECE 340 Thermodynamics 3
ECE 384 Numerical Methods for Engineers 4
Total

Third Year

First Semester

ECE 3 0 Intern ed ate Engineering Desi n *L* 3
MAE 31 Dynamic Systems and Control 3
MAE 3 9 Measurements and Data Analys s 3
MAE 36 Aerodynan es I 3
MAE 42 Aerospace Structures 4

Total 6

Second Semester

MAE 41 Aircraft Performai ce, Stabil ty, and Control 3
MAE 444 Fundamentals of Aer spac Design . 3
MAE 460 Gas Dynamics 3
PHY 361 Introductory Modern Phvsics 3
HU SB and awareness area c urse 3

Total 15

Fourth Year

First Semester

MAE 415 Vibration Analysis . . . 4
MAE 462 Space Vehicle Dvn imics and Control . . 3
MAE 463 Propulsion 3
MAE 464 Aerospace Laboratory 3
HU SB and awareness area course 3

Total 16

Second Semester

MAE 468 Aerospace Systems Design *L* 3
HU SB and awareness area courses 6
Required des gn technical elective 3
Technical e ect ve 3

Total 15

[1] Engineering students may not use aerospace stud es AES or military science MIS courses to satisfy HU or SB requirements.

[2] Both PHY 121 and 122 must be taken to secure SQ credit

[3] Both PHY 131 and 132 must be taken to secure SQ credit.

MECHANICAL ENGINEERING —B.S.E.

Mechanical engineering is a creative discipline that draws upon a number of basic sciences to design the devices, machines, processes, and systems that involve mechanical work and its conversion from and into other forms. It includes the conversion of thermal, chemical, and nuclear energy into mechanical energy through various engines and power plants, the transport of energy via devices such as heat exchangers, pipelines, gears, and linkages, and the use of energy to perform a variety of tasks for the benefit of society, such as in transportation vehicles of all types, manufacturing tools and equipment, and household appliances. Furthermore, since all hardware products must be constructed of solid materials and because most products contain parts that transmit forces, mechanical engineering is involved in the structural integrity and materials selection for almost every product on the market.

Mechanical engineers are employed in virtually every kind of industry. They are involved in seeking new knowledge through research, in generating creative design and development, and in the production, control, management, and sales of the devices and systems needed by society. Therefore, a major strength of a mechanical engineering education is the flexibility it provides in future employment opportunities for its graduates

The undergraduate curriculum includes the study of the principles governing the use of energy; the principles of design, instruments and control devices; and the application of these studies to the creative solution of practical, modern problems

Design is integrated throughout the curriculum, beginning with ECE 100 Introduction to Engineering Design and followed later by ECE 300 Intermediate Engineering Design, both of which focus on basic design theory as well as professional practice. These required courses are followed by topic specific design content in mechanical engineering courses in the junior and senior years The senior capstone design course combines the design topics from the earlier courses and completes the required design sequence In addition, many of the mechanical technical electives have design content

Laboratory experience is provided in the areas of thermo fluid systems, mechanics of materials, and controls Laboratory facilities include a thermal systems laboratory, an integrated mechanical testing laboratory, a control s aboratory, and a manufacturing laboratory

Mechanical Engineering Major

Mechanical Engineering students are required to select the following supplemental courses.

ECE 384 Numerical Methods for Engineers . . . 4
MAT 242 Elementary Linear Algebra. . . . 2
PHY 361 Introductory Modern Physics 3

The Mechanical Engineering major requires the following departmental courses:

MAE 317 Dynamic Systems and Control 3
MAE 319 Measurements and Data Analysis 3
MAE 371 Fluid Mechanics . . . 3
MAE 388 Heat Transfer 3
MAE 422 Mechanics of Materials 4
MAE 441 Principles of Design 3
MAE 443 Engineering Design. 3
MAE 490 Projects in Design and Development *L* 3
MAE 491 Experimental Mechanical Engineering 3
Area of study technical electives 18

Total 46

Mechanical Engineering Areas of Study

Technical electives may be selected from among any of the following courses or from courses listed under the Aerospace Engineering areas of study. The courses are grouped to assist a student in identifying areas of specialization. Students preferring a broader technical background may choose courses from different areas Generally, no more than two technical elective courses from outside the department are allowed. Credit for courses not on the list requires prior approval of the advisor and department Mechanical Engineering students may not use MAE 361, 425, or 444 to fulfill degree requirements.

L teracy and cr t a nqu y MA mat e at cs CS omp ter stat st s quant tat ve app cat ons HU huma t es a d f e arts SB so a a d behav o e ce SG t ra c en genera o e our es SQ natura e ce— uant tat ve C tura d ve ty n the Un ted States G g oba H tor ca See Genera Stud e p g 83

Aerospace

Any course listed under the Aerospace Engineering areas of study except MAE 361, 425, and 444 . . 3

Biomechanical

BME 411 Biomechanical Engineering I 3
BME 412 Biomedical Engineering II 3
BME 416 Biomechanics . . 3
BME 419 Biocontrol Systems . .
EEE 302 Electrical Networks II . . 3
EEE 434 Quantum Mechanics for Engineers 3

Computer Methods

ASE 485 Engineering Statistics *CS* 3
CSE 310 Data Structures and Algorithms 3
CSE 422 Microprocessor System Design II 4
CSE 428 Computer Aided Processes 3
IEE 463 Computer Aided Manufacturing and Control *CS* 3
IEE 475 Simulating Stochastic Systems *CS* 3
MAE 404 Finite Elements in Engineering 3
MAE 406 CAD CAM Applications in MAE . 4
MAE 407 Computational Fluid Dynamics 3
MAE 541 CAD Tools for Engineers . 3
MAE 421 Applied Computational Methods *CS* 3
MAT 423 Numerical Analysis I *CS* 3
MAT 425 Numerical Analysis II *CS* 3

Control and Dynamic Systems

CSE 428 Computer Aided Processes 3
EEE 360 Energy Conversion and Transport 4
EEE 450 Feedback Systems 4
EEE 452 Introduction to State Space Methods 3
IEE 463 Computer Aided Manufacturing and Control *CS* 3
MAE 413 Aircraft Performance, Stability, and Control 3
MAE 417 Control System Design 3
MAE 462 Space Vehicle Dynamics and Control 3
MAE 467 Aircraft Performance 3

Design

MAE 314 Mechanism Analysis and Design . . . 3
MAE 351 Manufacturing Processes 3
MAE 404 Finite Elements in Engineering 3
MAE 406 CAD CAM Applications in MAE 4
MAE 413 Aircraft Performance, Stability, and Control 3
MAE 417 Control System Design 3
MAE 434 Internal Combustion Engines 3
MAE 435 Turbomachinery 3
MAE 442 Mechanical Systems Design 4
MAE 446 Thermal Systems Design 3
MAE 447 Robotics and Its Influence on Design 3
MAE 462 Space Vehicle Dynamics and Control 3
MAE 467 Aircraft Performance 3

Energy Systems

EEE 360 Energy Conversion and Transport 4
MAE 372 Fluid Mechanics 3
MAE 382 Thermodynamics 3
MAE 434 Internal Combustion Engines
MAE 435 Turbomachinery 3
MAE 436 Combustion . 3
MAE 446 Thermal Systems Design . . . 3

Engineering Mechanics

MAE 341 Mechanism Analysis and Design . . 3
MAE 402 Introduction to Continuum Mechanics 3
MAE 414 Finite Elements in Engineering 3
MAE 415 Aircraft Performance, Stability, and Control 3
MAE 425 Vibrations Analysis 4
MAE 426 Design of Aerospace Structures . . . 3
MAE 442 Mechanical Systems Design 4
MAE 463 Gas Dynamics 3
MAE 464 Aerodynamics II 3
MAE 471 Computational Fluid Dynamics 3
MAT 421 Applied Computational Methods *CS* . . 3
MAT 423 Numerical Analysis I *CS* 3
MSE 443 Mechanical Properties of Solids 3

Manufacturing

CSE 428 Computer Aided Processes 3
IEE 361 Economic Analysis for Engineers 3
IEE 374 Quality Control *CS* 3
IEE 416 Production Control 3
IEE 463 Computer Aided Manufacturing and Control *CS* . . 3
MAE 314 Mechanism Analysis and Design . . 3
MAE 351 Manufacturing Processes 3
MAE 404 Finite Elements in Engineering 3
MAE 442 Mechanical Systems Design 4
MAE 444 Robotics and Its Influence on Design 3
MAE 455 Polymers and Composites 3
MSE 355 Introduction to Materials Science and Engineering
MSE 422 Physical Metallurgy 3
MSE 424 Corrosion and Corrosion Control. 3
MSE 443 Mechanical Properties of Solids 3

Stress Analysis, Failure Prevention, and Materials

MAE 341 Mechanism Analysis and Design . . . 3
MAE 404 Finite Elements in Engineering . . . 3
MAE 426 Design of Aerospace Structures 3
MAE 447 Robotics and Its Influence on Design . . . 3
MAE 455 Polymers and Composites 3
MSE 355 Introduction to Materials Science and Engineering 3
MSE 422 Physical Metallurgy . . . 3
MSE 431 Corrosion and Corrosion Control 3
MSE 443 Mechanical Properties of Solids 3
MSE 451 X-ray and Electron Diffraction 3

Thermosciences

MAE 372 Fluid Mechanics . . . . .
MAE 382 Thermodynamics 3
MAE 413 Air Conditioning and Refrigeration . . . . . .
MAE 434 Internal Combustion Engines 3
MAE 435 Turbomachinery 3
MAE 436 Combustion . . . . . .
MAE 446 Thermal Systems Design 3
MAE 463 Gas Dynamics . . . . . .
MAE 464 Aerodynamics II 3
MAE 471 Computational Fluid Dynamics. . . . . .

Mechanical Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 114	General Chemistry for Engineers *SQ*	4
	or CHM 116 General Chemistry *SQ*	4
ECE 101	Introduction to Engineering Design *CS*	3
	or HU SB elective[1]	
ENG 101	First Year Composition	3
MAT 271	Calculus with Analytic Geometry I *MA*	4
HU SB	Humanities/Fine Arts/Social Sciences elective	3
Total		17

Second Semester

ENG 102	First Year Composition	3
MAT 242	Elementary Linear Algebra	2
MAT 272	Calculus with Analytic Geometry II *MA*	4
PHY 121	University Physics I *SQ*	3
PHY 122	University Physics Laboratory I *SQ*	1

HU SB and awareness area course 3
or ECE 1 I troducti n t Engineerin Design CS 3

Total 6

Second Year

First Semester

ECE -1) En neeri - Mechanics I Statics..... 3
ECE 35) Stru t re and Properties f Mat ials 3
MAT 27- Calculus with A alyt c G ometry III *MA* 4
MAT 274 E ementary Differentia Equati ns *MA* 3
PHY 131 Univers ty Phy cs II E ectricity and Magnetism *SQ* 3
PHY 132 Univer ty Phys cs Laborat ry II *SQ*[3] 1

Total 17

Second Semester

ECE 2(Electrical Networks I 4
ECE 2 2 Engineering Me hanics I : Dynamics 3
ECE 313 Introduction to Deformable Solids 3
ECE 34(Therm ody a ic .... .
ECE 384 Numerical Methods f r Engineers 4

Total 17

Third Year

First Semester

ECE 300 Intermedi ate Engineering Design *L* 3
MAE 317 Dynamic Systems and Control 3
MAE 319 Measurements ar d Data Analysis 3
MAE 371 Flu d Me hanics 3
MAE 422 Mechan cs of Materials 4

Total 6

Second Semester

MAE 388 Heat T nsfer 3
MAE 441 Principles f Design 3
H SB and awareness area courses 3
Technic l e ective 6

Total 15

Fourth Year

First Semester

MAE 491 Exper n ental Me han ca En ine in 3
PHY 361 Introductory Modern Phys'cs 3
HU SB and aw arei ess area course 3
Technical electives 6

Total 15

Second Semester

MAE 443 Engineerin Design 3
MAE 49) Pr jects in Desig and Development *L* 3
HU SB a d awarene s area course 3
Tech ri cal elect ve 6

Total 15

Engineer ng students may n t use aerospace studies AES or milit ry sc ence MIS courses to satisfy HU or SB requirements.

[2] B th PHY 131 a nd 132 must be taken to secure SQ credit

[3] Both PHY 131 a d 1 _ ust be taken to secure SQ redit

MECHANICAL AND AEROSPACE ENGINEERING (MAE)

MAE 101 ntroduction to Aerospace Engineering (2)
fa a d spr ng
Careers n aerospace eng neer ng prob em so v ng co puter usage n aerospace e g eer ng ontemporary ssues of the aerospace ndustry the aerospace eng neer ng curr cu um Pre r corequ s te ECE 100

MAE 317 Dynamic Systems and Control. (3)
fa and spr ng
Mode ng and repre enta ons of dynam c phys ca systems, nc ud ng tran fer f nct ons b ock d agram and state equat on Trans ent response P c p es of feedback contro and near ystem ana ys s n ud g oot oc and frequency response Prerequ s te ECE 212

MAE 319 Measurements and Data Analysis. (3)
fa and spr ng
Theory of mea urement systems sens s d g ta data cqu s t on s gna pro es ng and stat t ca a a ys s C mputer s mu t on and ea t me exper ments des gned to ustrate these t p ect re ab Prerequ s te ECE 201 Pre or corequ s te MAE 317

MAE 341 Mechanism Analysis and Design. (3)
once a year
Pos t on ve oc t es and acce erat on of ma h e parts cams gears f ex b e on e to and ro ng contact ntroduces synthes s P ereq u te ECE 212

MAE 351 Manufactur'ng Processes. (3)
fa and spr ng
Product on techn que and equ pment Cast ng and mo d ng, form ng mach ng jo n ng and assemb y, computer ntegrated manufact r ng rap d prototyp ng and e ectron cs manufactu ng Cross sted as EE 360 Cred t s a owed for on y IEE 360 or MAE 351 Prerequ s te ECE 350

MAE 361 Aerodynam'cs I (3)
once a year
F u d stat cs conservat on p c p es st eam f nct on, e o ty po'en t a vort c ty nv sc d f ow Kutta Jouk wsk , th n a rfo the ry and pane method Prerequ tes ECE 212 340

MAE 371 Flu d Mechanics (3)
fa and spr ng
ntroductory c ncept of f d mot n f u d stat cs contro vo ume forms of bas c pr nc p e v scous nter a f ows Prerequ s tes ECE 212, 340

MAE 372 F uid Mechan cs (3)
once a year
App es ba c pr c p es f f u d mechan c to prob em n v scous and ompres b e f ow P erequ s tes ECE 384 MAE 361 r 371

MAE 382 Thermodynam cs. (3)
once a year
App ed therm dynam cs, gas m xture psychrometr cs prope ty re a t onsh p power and efr ge at on cyc es and react ve systems Pre requ te ECE 34

MAE 388 Heat Transfer. (3)
fa and spr ng
Steady and u steady heat d ct on nc ud ng numer a so ut s therma boundary ayer co cepts and app cat ons to free and forced c ve t on. Therma rad at on concept Prerequ tes. ECE 384 MAE 361 or 371 .

MAE 402 Introduction to Cont nuum Mechanics. (3)
once a yea
App es the pr c p es of c nt nuum mechan cs to such f e ds as f ow n p rou med a b omec an s e ectromagnet c cont nua and mag net f u d mechan cs P erequ sites ECE 313 MAE 361 or 37 MAT 242 or 342

MAE 404 Finite Elements in Engineering. (3)
once a year
ntrodu e deas and methodo ogy of f n te e ement ana ys s App ca t ons to o d mechan cs heat transfer f u d mechan cs nd v bra t ons Prerequ s tes ECE 313 MAT 242 or 342

MAE 406 CAD CAM Applications in MAE. 4)
o ce a year
So t on f eng neer ng prob ems w th the a d of state of the art ft wa e too s n so d mode ng eng neer q a a ys s nd manufactur ng

L tera and r t a nq ry **MA** th at c **CS** computer stat t qu nt t v p at **HU** man t es and f n rt **SB** oc and b a e **SG** atu a s en e genera ore r **SQ** atur e q nt tat v **C** t a d v ty the U ted St t G g b H h t r See Genera Stud e page 83

se e t on of ode ng parameters e b ty te ts on software 3 h u ecture 3 hours ab Prerequ s tes ECE 384 MAE 422 441 or 444

MAE 413 Aircraft Performance, Stability, and Control. (3)
sp ng
A rcraft performance, cru se c mb ng and turn ng f ghts energy maneuverab ty, 6 DOF equat ons for a rcraft, aer dynam stab ty de vat ves f ght stab ty contro Prerequ s tes MA 31 361

MAE 415 Vibration Analysis. (4)
fa
F ee and forced respon e of s ng e and mu t p e degree of freedom systems c t nuous systems app cat ons n mec an a and ae spa e system numer ca methods Lectu e ab Prerequ s tes ECE 212 MAE 319 422 or 425 MAT 242 or 342

MAE 417 Control System Design. (3)
once a year
To s and methods of cont o system des gn and c mpensat on nc ud g s mu at o respo se pt m zat n f equen y doma te n ques state var ab e f edba k and sens t v ty ana ys ntr d ces on near and d screte t me systems Prerequ s te MAE 3

MAE 422 Mechan'cs of Materials (4)
fa and spr ng
Fa ure t eor es e ergy methods f te e ement methods p ates tor s on of nonc rcu ar members unsymmetr ca bend ng shear center and beam co umn Lecture ab Prerequ te ECE 313 MAT 242 or 342 Pre or corequ te ECE 384

MAE 425 Aerospace Structures. (4)
fa
Stab ty energy methods f n te e ement methods t rs on unsymmet r ca bend ng and tor on of mu t ce ed tructure des gn f aero space structures Lecture ab Prerequ tes ECE 313 MAT 242 or 342

MAE 426 Des'gn of Aerospace Structures. (3)
o ce a year
F ght ve c e oads des gn of sem monocoq e structure oca buck ng and cr pp ng fat gue aerospace mater a s compo tes jo nts and f n te e ement app cat ons Prerequ s te MAE 422 or 425

MAE 433 Air Condit on ng and Refrigerat on. (3)
once a year
A r cond t on ng processes env ronmenta contro , heat ng and coo g oads psy hrometry· efr gerat on cyc es Pre equ s te MAE 388 or MET 432 o nst u tor approva .

MAE 434 Internal Combustion Engines. (3)
once a year
Performan e character st cs combust on carburet o and fue njec t on, and t e coo ng a d contro of nterna com ust on eng nes Com puter mode ng Lab Prerequ s te MAE 388

MAE 435 Turbomachinery. (3)
once a year
Des gn and performance of turbomach nes nc ud ng steam gas and hydrau c t rb nes centr fuga pumps compressors fans and b w ers Pre or corequ s te MAE 361 o 371

MAE 436 Combustion. (3)
once a year
Thermoc em ca and react on rate processes combu t on of gaseous and condensed phase fue s App cat ons to propu on and heat ng system Po utant format on Prerequ s te MAE 388

MAE 441 Principles of Des gn. (3)
fa and spr ng
Conceptua and embod ment des gn of mechan ca e ements form synth s s mater a se ect on, fa ure modes manufacturab ty to er ances, common mechan sms and mach e e ements Lecture ab pro e t Prerequ s tes. ECE 300 350 P e or corequ s te MAE 319 422 or 425

MAE 442 Mechanical Systems Design. (4)
spr g
App es des gn pr nc p es and techn ques to the sy thes s mode ng and opt m zat on of mechan ca e ectromechan ca , and hydrau sys tems Prerequ s tes MAE 317 441 or 444

MAE 443 Engineer ng Des gn. (3)
fa and spr ng
Group pro ects to des gn eng neer ng components and systems Prob em def n t on deat on mode ng and ana ys s emp as ze dec s on mak ng and do ume tat n act v t es 6 hour ab Prerequ te MAE 441

MAE 444 Fundamentals of Aerospace Design. (3)
p ng
Des gn theo y and des gn too app ed to aerospace e g neer ng Eng neer ng raw ngs so d mode ng RFP s Federa Av at on Regu at ns an m ta y sp c f cat ons a r raft z g rap d prototyp ng a project Pr requ te E E 300 350 MAE 31 361 425 Pre or corequ s te MAE 413

MAE 446 Thermal Systems Design. (3)
o ce a year
App es eng eer ng pr nc p es and te que to the mode ng and ana y of therma sy tems a d component Presents and m strates opt 1 zat on techn q e a d the r use Prerequ s te ECE 3 MAE 388

MAE 447 Robotics and Its Influence on Design. (3)
once a year
Robot app at ons onf gurat ons s gu ar po t ons and work pace m des of contro v s on· p ogramm ng exerc se des g f part for as emb y Pre equ s te· MAE 31~

MAE 455 Polymers and Composites. (3)
fa
Re at onsh p between hem try structure and propert es f eng neer ng po ymers D s g propert e and behav or of f ber compos te sy tems C oss ste as MSE 4~0 red t a owed for n y MAE 455 or MSE 470 Pre equ s te ECE 313 350

MAE 460 Gas Dynamics. (3)
pr ng
Compres b e f ow at subso c and super on c speeds duct f ow nor ma and ob q e shocks perturbat on theory and w nd tu ne des gn P e equ s tes ECE 384 MAE 61 or 371

MAE 461 Aerodynamics I. (3)
once a year
Transon c hyperson c f ows w g theory Nav er Stokes am ar turbu e t shear f ow pressure drop n tubes separat on drag v scous nv c d nteract on and w ng des gn Prerequ s te MAE 460

MAE 462 Space Veh c e Dynam cs and Control. (3)
fa
Att tude dynam c and contro aunch veh c es orb ta mechan s orb ta transfer rendezvous, space m s on des gn space structures spacecraft contro sy tems des gn Prerequ s te MAE 31

MAE 463 Propu sion. (3)
fa
Fundamenta s of gas turb ne eng es and des gn of compone ts Pr nc p es and des gn of rocket propu s on and a ternat ve dev ces Lecture des gn projects Prerequ s tes ECE 384 MAE 382 r 460

MAE 464 Aerospace Laboratory. (3)
fa
Aer dynam f ow parameters f ow over a rfo and bod es of revo u t on f ow v sua zat on omputer a ded data acqu t on and process ng boundary ayer theory 1 hour ecture 4 hours ab Pre equ s te ECE 384 MAE 319 460

MAE 465 Rocket Propulsion. (3)
once a year
Rocket f ght performance nozz e des gn combust on of qu d and so d prope ants component des gn advanced prop s on systems nterp anetary m ss ons test ng Prerequ s te MAE 382 or 460

MAE 466 Rotary Wing Aerodynam cs and Performance. (3)
once a year
ntroduces he copter and prope er ana ys s techn q es Momentum b ade e ement an vortex met ods Hover and forward f ght Ground effect autorotat on a d compress b ty effects Prerequ s tes both ECE 384 and MAE 361 or on y nstru tor approva

MAE 467 Aircraft Performance. 3)
once a year
ntegrates aerodynam c and propu ve for es nto a rcraft perfor mance de gn Est mat on of drag parameters for de gn Eng ne a r fo se ect on Concept a des gn methodo gy Lecture des gn pr e ts Prerequ s te MAE 361 or 371 Pre or orequ s te MAE 444

MAE 468 Aerospace Systems Design. (3)
fa and spr ng
Gr up projects re ated to aerospace veh c e des gn, work ng from m s on def n t on and cont nu ng through pre m na y des gn P erequ s tes· MAE 413 444 Pre or corequ s te MAE 463
Genera Stud es· L

MAE 469 Projects in Astronautics or Aeronautics. (3)
fa and spr ng
Var ous mu t d c p 'nary team projects ava ab e each semester. Projects nc ude de g of h gh speed rotocraft autonomous vehic e qu d fueled rocket m croaer a veh es sate tes Prerequ s te nstructor approva

MAE 471 Computational Fluid Dynamics. (3)
once a year
Numer ca o ut ons f r se ected prob ems n f u d mechan s Prereq u tes ECE 384 MAE 361 r 371

MAE 490 Projects in Design and Development. (3)
fa and spr ng
Capstone pro ect n fu da enta or app ed aspects of eng neer ng Prerequ s tes MAE 441 491
Genera Stud es L

MAE 491 Experimental Mechanical Engineering. (3)
fa and spr ng
Exper menta and ana yt ca stud es of phenomena and performance of f u d f ow heat transfer, thermodynam cs refr gerat on, and mechan a power syste s 6 ho rs ab Prerequ s tes· MAE 319 388

MAE 498 Pro-Seminar. (1 3)
se ected semesters
Spec a top cs for adva ced students App es the eng neer g d sc p nes to des gn and ana y of m dern techn ca dev e and sys tems. P erequ s te nst uctor approva

MAE 504 Laser Diagnostics. (3)
spr ng
F ndamenta s of pt cs a d the nteract on of ght w th matter Laser sour es aser spectroscopy ve oc metry part c e s z ng, and surface character zat on

MAE 505 Perturbation Methods. (3)
se ected semester
Non near osc at ons stra ned co rd nates ren rma zat on mu t p e sca es bou dary ayers matched asymptot c expans ons, t rn ng po nt prob ems and WKBJ method Cross sted as MAT 505 Cred t s a owed for on y MAE 505 or MAT 505

MAE 506 Advanced System Modeling, Dynamics, and Control. (3)
spr ng
Lumped parameter mode ng of phys ca systems w th examp es State var ab e representat ons and dynam c response ntroduces modern contro Prerequ te ASE 582 or MAT 442

MAE 507 Optimal Control. (3)
fa
pt ma contro of systems Ca cu us of var at ons dynam program m n , nea quad at c regu ator numer ca methods and Pontryag n pr c p e Cross sted as EEE 587 Cred t s a wed for on y EEE 58" or MAE 5 7 Prerequ s te EEE 482 or MAE 5 6

MAE 509 Robust Multivariable Control. (3)
spr ng
Character zat on of uncerta nty n feedback systems robustness ana ys s synthes s techn q es, mu t var ab e Nyqu st cr ter a computer a ded ana ys s and de gn Pre equ s tes MAE 417 506

MAE 510 Dynamics and Vibrations. (3)
fa
Lagrange s and Ham ton s equat o s, g d body dynam cs, gyroscop c m t on and sma osc at on theory

MAE 511 Acoustics. (3)
fa
Pr nc p es under y ng the generat on transm s on and re ept on of acoust waves App cat ons to no se contro arch tectura acoust cs random v brat ons and acoust c fat gue

MAE 512 Random Vibrations. (3)
spr ng
Rev ews probab ty t eory ra dom processes stat onar ty power pectrum wh te no e p ocess rand m re pon e of s g e and mu t p e DOF ystems, and Markov pro esses s mu at on Prerequ te MAE 510 or tructor approva

MAE 515 Structural Dynamics. (3)
spr ng
Free v brat on and forced response of d screte and cont nuous ys tems exact and approx mate methods of o ut on f n te e eme t mod e ng and c mputat ona techn ques Prerequ s te MAE 510 or nstr ctor approva

MAE 518 Dynamics of Rotor-Bearing Systems. (3)
spr ng
Nat ra wh r frequency, cr t ca speed and re ponse ana ys s of r g d and f ex b e rotor systems Bear ng nf uence and representat on Sta b ty ana ys s Meth ds of ba an ng

MAE 520 Sol d Mechan cs. (3)
fa
ntroduce ten or k ne at cs k net cs and onst tut ve a sumpt ons ead ng to e ast c p ast c and v coe ast c behav or App cat ons

MAE 521 Structural Optimization. (3)
se ected emesters
L nea and non near programm ng Prob em formu at on Constra ned and unconstra ned opt m zat n Sen t v ty ana ys s Approx mate techn ques FEM based opt mal des gn of mechan ca and aerospace structures Cross isted as CEE 533 Cred t s a owed for on y CEE 533 or MAE 521 Prerequ s te nstructor approva

MAE 523 Theory of Plates and Shells. (3)
fa
near and non near theor es of p ates Membrane and bend ng theo r es of she s She s of revo ut n Prerequ s te MAE 520.

MAE 524 Theory of Elastic ty. (3)
spr ng
E ast c behav or n two and three d men ons. A ry stress funct ons and d sp a ement potent a s E ements of fracture Prerequ s te MAE 520

MAE 527 Finite Element Methods in Engineering Science. (3)
fa
D scret zat on nterpo at on e ementa matr ces assemb y and om puter mp ementat on. App cat on to s d and f u d mechan cs heat tran fer and t me dependent prob ems Prerequ s te ASE 582

MAE 536 Combustion. (3)
se ected semesters
Thermodynam cs chem ca k net cs of combust on Exp os on and gn t on theor es React ve gas dynam cs Structure, propagat on and stab ty of f ames Exper me ta methods Prerequ s te MAE 436 or nstructor approva

MAE 540 Advances in Engineer ng Design Theory. (3)
fa
Su vey of resear h n eng neer ng des g pro ess art fact and des gn, know edge forma and nforma og c heur st c and n mer ca searches theory of stru ture and comp ex ty Prerequ s te graduate stand ng

MAE 541 CAD Tools for Engineers. (3)
fa
E ements of mpute techn ques requ red to deve op CAD software Data structures n d ng sts, trees and graphs Computer graph cs nc ud ng 2 and 3 d mens na a gor thms and u er nterfa e tech n ques

MAE 544 Mechanical Design and Failure Prevention (3)
fa
Modes of mechan ca fa ure app es pr nc p es of e ast c ty and p as t ty n mu t ax a state of stre s to des gn synthes s fa re the r e fat gue eep; mpact Prerequ te MAE 443

MAE 546 CAD CAM Applications in MAE. (4)
once a year
So ut on of eng neer ng prob ems w th the a d of state of the art soft ware too s n so d mode ng eng neer ng ana ys s, and manufa tur g se ect on of m de ng parameters re ab ty tests on oftware Open on y to students w thout prev ous cred t for MAE 406 3 hour ecture 3 hours ab P ereq s tes ECE 384 MAE 422 441 o 444

L teracy a d r t ca nqu ry **MA** athe t **CS** computer tat t cs qua t tat e app at o s **HU** h m n t e and f e a t **SB** s a and behav ora e ce **SG** tu a sc ence gener re cou e **SQ** atu a en e quant t t ve **C** u t a d ve s ty th nted State **G** g oba H h st ee Genera Stud e p 83

MAE 547 Mechanica Design and Contro of Robots. (3)
se e ted semesters
H m geneous tran format ons 3 d men ona k nen at c eometry of mot n forward and nver e k nemat cs workspace nd mot tra jector es dynam c c ntro , and tat c f rces

MAE 548 Mechanism Synthesis and Analys s. 3)
p g
A gebra c and graph ca method for ex t nd approx mate sy thes s of cam gear and nkage mechan ms d g pt m zat o met od of p anar m t on ana y s ha acter st s f p ane mot on spat a k ne mat cs

MAE 557 Mechan cs of Composite Materials (3)
spr ng
Ana yzes compos te mater a and app at ons M rome ha a and macrome han ca behav or C ass a am nat n t e ry eve ped w th vest gat on of be d ng extens on c up ng

MAE 560 Propulsion Systems. (3)
se ected emesters
Des n of a breath ng ga turb ne eng nes f r a rc aft p opu s on m ss on ana ys s yc e a ayss e ne s z ng ompone t des gn

MAE 561 Computational Flu d Dynamics (3)
sp ng
F te d ffere ce a d f n te v ume te n ques f o v ng the ub on c t a on and super o f w equat on Method f f a a te t c Nun er ca gr d gene at on tecl n ques Prerequ te MAE 5 or nstru t r approva

MAE 563 Unsteady Aerodynam cs (3)
spr ng
Unsteady ncompress b e and mpres b e f w W ng and b d e osc atory and tran ent m t ons Kerne funct on app ach an pa e method Aeroe ast c app at n Pre e s te MAE 46 or 461

MAE 564 Advanced Aerodynamics. (3)
fa
Perturbat on meth d L ne r zed s bso c a d s pe c f w Th n w ng s ende body the r es ft ng surface theo y Pane et od om p tat n Prereq s te MAE 460 46

MAE 566 Rotary-Wing Aerodynam cs. (3)
fa
ntroduces he copter and pr pe er ana ys s tech q es M mentum b ade e em nt and vo tex met od Hover a d forward f g t Ground effe t aut r tat and mp e s b ty effects Pr requ te MAE 361

MAE 571 Flu d Mechanics. (3)
fa
Bas k nemat dynam and therm dy am c equat n of the f u d o t nuum a d the r app cat o t ba c f u d m de

MAE 572 Inv sc d Fluid Flow (3)
spr g
Me han s f f ds for f ows wh the effect of v s o ty may be gnored Potent a f ow t eory waves and nv d c mpre s b e f ows Prerequ te MAE 571

MAE 573 Viscous Flu d Flow. (3)
fa
Mechan f f u ds for f ows w h t e effe t of v ty a e s gn f cant Exact and appro mate so t ons of the Nav er Stoke sy tem am nar f w at w and h gh Reyno ds number Prerequ s te MAE 5 1

MAE 575 Turbulent Shear Flows. (3)
fa
H m gene us sotr p and wa turbu ence Exper ment res ts ntrodu e turbu ent f ow ca at ons Prerequ s te MA 57

MAE 577 Turbulent F ow Mode ing. (3)
spr ng
Reyno ds equat on and the r c sure Mode g of s mp e and com p ex turbu ent f ow a c t ons of nterna and exte a f ws and app cat on to eng neer ng prob ems P ereq s te MAE 5 1

MAE 581 Thermodynamics. 3
fa
Ba c n epts a d aw f c ca u br m thermodynam c app cat ons to eng nee g y tem trodu e tat t a the mody nam s

MAE 582 Stat stical Thermodynam cs (3)
on e a year
K net an quantum theory t t t a me han cs ense b e theory Stru ture and therm odynam of n nteract ng a d teract ng part c es B tzn ann nteg d ffere t a equat on Pre equ s te grad ate stand ng

MAE 585 Conduct on Heat Transfer. (3)
fa
Bas c eq at on a d ncepts of c ndu t on eat tran fer Mathemat a fo m at a d so ut on ana yt ca an numer a of steady and unsteady one nd m t d men o a eat c nd t n a d p a e ange prob ems Pre equ s te ECE 384 MAE 88

MAE 586 Convect on Heat Transfer. (3)
pr ng
Ba c concepts an ver g equat ons Ana yzes am nar and t bu nt heat t an fer for ter a and e terna f ow Natura and m x d con ect n Prerequ s te MAE o8

MAE 587 Radiation Heat Transfer. (3)
fa
Advan ed concept a d o t on methodo og e for rad at on heat transfer ud ng e change of the ma rad at on between surfaces ad at on n absorb ng em tt g and tter ng med a a d rad at on con b ned w th c nd ct a d c nve t on Prerequ te MAE 388

MAE 588 Two-Phase Flows and Bo ling Heat Transfer. (3)
spr ng
P o and f w bo ng heat tran fer ondensat on eat tran fer va u m de of va or u d m xture f w as s m xture f ow and e pe menta measu ent te hn ques

MAE 589 Heat Transfer (3)
fa
Ba oncepts phy a and mathemat a mode s f r heat t a sfer App cat ons t d ct ve c nve t ve ad at ve nd nb ned mode h at t a fer Prerequ s te MAE 388

MAE 594 Graduate Research Conference. (1)
fa an spr g
Top s ontemporary resear R qu red every seme ter of a departm ta graduate tudents eg tered for 9 o more eme ter ho r Not for degree cred t

MAE 598 Specia Topics. (1–4)
fa and sp g
Spe a top c urses nc ud n t e fo ow g wh ch are regu ar y ff red are open to qua f ed st dent T p s m y n ude the fo ow ng
- Advan ed Spa ecraft Contro 1 3
- Aeroe a t c ty 1 3
- Aeros ace Ve e Gu dance and o tro 1 3
- B dary ayer Stab ty 1 3
- Hyd dy am c Stab ty 1 3
- P ast c ty 1 3
- ym r and Comp s te 1

Omnibus Courses. For an e p nat on of cour e ffered but ot pe f ca y sted n th cata ee mn bu u es age 56

Programs in Engineering Special Studies

480 965-1726

ECG 104

Ronald J. Roedel, Director

The major in Engineering Special Studies accommodates students whose educational objectives require more intensity of concentration on a particular subject or more curricu

lar flexibility within an engineering discipline than the traditional departmental majors generally permit. The major is in School of Engineering programs. Unlike the departmental major areas, however, there is not a separate faculty. The faculty teaching and advising in these programs are from the various departments within the School of Engineering.

For many students, engineering studies form the basis of preparation for professional engineering work where proficiency in the application of science and the physical and social technologies is brought to bear on problems of a large scope. The necessary breadth that these students seek often is not obtainable in traditional engineering fields. Rather, specially designed programs of course work that merge the required principles and approaches drawn from all fields of engineering and other pertinent disciplines are desired.

The B.S.E. degree in Engineering Special Studies is designed primarily for students intending to pursue engineering careers at a professional level in industry or graduate studies.

ENGINEERING SPECIAL STUDIES B.S.E.

Premedical Engineering. In recent decades, the interrelation between engineering and medicine has become very rigorous and exciting. Rapidly expanding technology dictates that engineering will continue to become increasingly involved in all branches of medicine. As this develops, so will the need for physicians trained in the engineering sciences. Medical men and women with a knowledge of computer technology, transport phenomena, biomechanics, bioelectric phenomena, operations research, and cybernetics. This concentration is of special interest to students who desire entry into a medical college and who have medical interests in research, aerospace and undersea medicine, artificial organs, prostheses, biomedical engineering, or biophysics. Since both engineering and medicine have as their goal the well being of humans, this program is compatible with any field of medical endeavor. This program is administered with the Department of Bioengineering.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the B.S.E. degree in Engineering Special Studies with a concentration in Premedical Engineering. A minimum of 50 upper division hours is required. Students must attain a GPA of at least 2.0 for the courses in the major field.

GRADUATION REQUIREMENTS

In addition to the university and school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 79.

Note. To fulfill medical school admissions requirements, BIO 187 General Biology is required in addition to the degree requirements and is best taken in a summer session before the Medical College Admission Test.

COURSE REQUIREMENTS

The course work for the undergraduate degree can be classified into the following categories (in semester hours):

First-Year Composition

Choose among the three combinations listed below . . . 6

ENG 105 First Year Composition 3
ENG 107 First Year Composition 3

ENG 115 Advanced First Year Composition 3
Elective chosen with advisor 3

ENG 97 English for Foreign Students 3
ENG 98 English for Foreign Students 3

Total 6

General Studies School Requirements

Humanities and Fine Arts Social and Behavioral Sciences

ECN Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB*[1] 3
HSB and awareness courses 12

Total 15

Laboratory Courses

BME 413 Biomedical Instrumentation *L* 3
BME 423 Biomedical Instrumentation Laboratory *L* 1
ECE 311 Intermediate Electronic Design *L* 3

Total 7

Natural Sciences

PHY 121 University Physics I: Mechanics *SQ* . . 3
PHY 123 University Physics Laboratory I *SQ*[3] 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[4] 3
PHY 133 University Physics Laboratory II *SQ*[4] 1

Total 8

Mathematical Studies

ECE Introduction to Engineering Design *CS* 3
ECE 384 Numerical Methods for Engineers 4
MA 27 Calculus with Analytic Geometry *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MA 3? Calculus with Analytic Geometry III *MA* 4
MA 4 Elementary Differential Equations *MA* 3

Total 22

General Studies school requirements total . 52

Engineering Core

ECE 201 Electric Networks I . . 4
ECE 210 Engineering Mechanics I: Statics . . . 3
ECE 254 Electronic Devices and Instrumentation . 4
ECE 264 Thermodynamics 3
ECE 350 Structure and Properties of Materials . 3

Total 17

Engineering Special Studies Program Major
Premedical Engineering Concentration

BIO 188 General Biology II *SQ* 4
BME 3? Introduction to Biomechanics *I* 3
BME 3?5 Biomaterials 3
BME ? Biomedical Engineering Transport Fluids ?
BME ?4 Biochemical Heat and Mass Transfer ?
BME 416 Biomechanics . . . 3
BME 41 Biomedical Engineering Capstone Design I 3
BME 435 Physiology for Engineers 4

L laboratory and creative inquiry **MA** mathematics **CS** computer tools **I** interactive applications **HU** humanities and fine arts **SB** social and behavioral sciences **SQ** natural science and technology—quantitative **C** cultural diversity in the United States **G** global perspectives **H** historical perspectives

Engineering Special Studies page 8

BME 4 Mi rocomputer Applicati ns in Bioengineering 4
BME 490 Bi ome ical En neering Capstone De i n II 3
CHM 1 Ge eral Chemistry *SQ* 4
CHM 116 Ge eral Chemistry *SQ* 4
CHM 331 General O g m Ch n istry 3
CHM 33_ General Or an c Chen istry 3
CHM 335 Ceneral Or an c Chemistry Laboratory . . . . . .
CHM 336 General Or an c Ch mistry Lab oratory 1
ECE 380 Pr babil ty nd Statistics f r En ineering Prob em Solv ng *CS* 3
Technical elect e 1

Total 53

[1] ECN 111 o 112 must be included t fulfill the HU and SB requ rements

Engineering students n av n ot use aer space studies AES or military scie ce MIS courses to fu nill HU and SB require me ts

[3] Both PHY 121 and 122 must be taken tc secure SQ credit

[4] Both PHY 131 ar d 132 must be taken to secure SQ credit

Premedical Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 3 General Chen istry *SQ* . 4
ECE 1 Introducti n t Engineering Des gn *CS* 3
ENG 1 First Year Composition 3
MAT 27 Ca cu us with A alyt c Geo etry I *MA* 4

Total . 4

Second Semester

CHM 1 6 General Chem stry *SQ* . . 4
ENG 102 First Year Con position 3
MAT 271 Ca cu us with Analytic Geometry II *MA* 4
PHY 121 University Physics I Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ*[1] 1

Total 15

Second Year

First Semester

BIO 188 General Biol gy II *SQ* 4
BME 201 Introduction to Bioengineering *L* 3
ECE 210 Engineering Mechanics I Stat cs 3
MAT 272 Calculus w th An alyt c Geometry III *MA* 4
PHY 131 Ur versity Phys cs II Electr ity and Magnetism *SQ*[2] . . . 3
PHY 132 University Physics Lab ratory II *SQ*[2] . 1

Total 18

Second Semester

CHM 331 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory 1
ECE 2 1 E ectrical Netw rks I 4
ECE 350 Structure ar d Properties of Materials 3
ECN 1 Macroec nomic Principles *SB* 3
or ECN 112 Microec nomic Princip es *SB* 3
MAT 274 E ementary D ffe ent a Equations *MA* 3

Tota 17

Third Year

First Semester

BME 331 Biomedi al Engineeri c Transport F uids 3
BME 435 Phys ogy for Enginee s. 4
ECE 301 Interm ediate Eng neering Des gn *L* . . .
ECE 340 Tl ermodynami s. 3
ECE 384 Num er cal Methods for Eng neers 4

Tot 7

Second Semester

BME 318 Bi on aterials 3
BME 334 B engineerin Heat and Mass Transfer 3
CHM 332 Ger eral O ganic Chemistry 3
CHM 336 General Organic Chemistry Lab ratory 1
ECE 334 E ectronic De ices and Inst umentat on 4
HU SB and awareness area course[3] 3

Tc t al 17

Fourth Year

First Semester

BME 413 Biomedical Instrumentation *L* 3
BME 416 Bi echanic 3
BME 417 Biomedical Engineering Capst ne Design I . . . 3
BME 423 Biomedical Instrun entation Labo atory *L* . . 1
HU SB and awareness area courses[3] 6

Total 16

Second Semester

BME 470 Microc mputer Applications n Bioengineering . . 4
BME 490 Biomedica Engineering Capstone Des gn II 3
ECE 380 Probability and Stat sti s for Engineering Problen Solving *CS* 3
HU SB and awareness area course[3] 3
Techn ca elective 1

Total 14
T ta degree requirements 128

[2] Both PHY 121 and 122 must be taken to secure SQ credit

[2] Both PHY 131 and 132 must be taken tc secure SQ cred t

[3] Engineer ng students may not use aer space studies AES or military science MIS courses t satisfy HU cr SB requirements

The Katherine K. Herberger College of Fine Arts

herbergercollege.asu.edu

J. Robert Wills, Ph.D., Dean

PURPOSE

The Katherine K. Herberger College of Fine Arts at ASU provides both preprofessional and professional education in the arts disciplines and an opportunity for nonmajors to become culturally literate through participation and involvement in the creative and performing arts.

The college, through its programs in art, dance, music, and theatre, reflects a wide range of challenges facing the contemporary artist and scholar. The arts, as an integral part of the curriculum, offer the student a rewarding educational experience balanced and strengthened by studies in related fine arts areas, the humanities, social sciences, and the natural sciences.

In addition to professional curricula offered in each department and school, the college provides courses designed to meet the specific educational needs of students pursuing majors in other colleges throughout the university. The cultural life of the university community is further enriched by study opportunities offered at off campus sites. The Herberger College of Fine Arts also offers community audiences many hours of cultural enjoyment through a myriad of concerts, art exhibitions, music and dance concerts, dramatic productions, operas, lectures, and seminars.

ORGANIZATION

The College houses the School of Art, the Department of Dance, the School of Music, and the Department of Theatre. An average of 2,600 students per semester enroll as majors in various degree programs offered through these units. The college also includes the ASU Art Museum and the Institute for Studies in the Arts.

ADMISSION

Students meeting the university requirements for admission may matriculate in the Herberger College of Fine Arts. Separate admission procedures and approvals are required for some programs within the college. Students must contact specific departments or schools for details.

Transfer of Community College Credits. The university standards for evaluation of transfer credit are listed under "Transfer Credit," page 61. Transfer students are encouraged to contact their department or school or the Herberger College of Fine Arts Undergraduate Student Academic Services (GHALL 127) to ensure a smooth transition to the Herberger College of Fine Arts. Credits transferred from any accredited junior or community college may be accepted up to a maximum of 64 semester hours. A community college student planning to transfer at the end of his or her first or second year should plan to take community college courses that meet the requirements of the ASU curriculum selected. Students attending Arizona community colleges are permitted to follow the degree requirements specified in the ASU *General Catalog* in effect at the time they began their community college work, providing their college attendance has been continuous.

Courses transferred from community colleges are not accepted as upper division credit at ASU. Arizona students are urged to refer to the *Course Applicability System* for transferability of specific courses from Arizona community colleges. In choosing courses at a community college, students should be aware that a minimum of 45 hours of work taken at the university must be upper division credits. While attending a community college, it is suggested that students select courses similar to ASU General Studies lower division courses in the major field.

For optimal course selection, access the ASU Transfer Guides on the Web at www.asu.edu provost articulation.

General Transfer Credit. Direct transfer of courses from other accredited institutions to the Herberger College of Fine Arts are subject to 1) the existence of parallel and equal courses in the college's curriculum and 2) departmental or school evaluation of studio courses with respect to performance standards. Every candidate for the bachelor's degree must earn a minimum of 30 semester hours in resident credit at ASU. Transfer students enrolled in the college must complete a minimum of 15 semester hours of resident credit in the major as approved by the faculty.

ADVISING

Advising is handled as a decentralized activity within the college. To offer personalized attention, each academic unit establishes its own graduation advising procedures. Students are encouraged to make appointments through the central office of their department or school.

L tera y a d t q ry MA athemat s CS omputer stat st c qua t tat ve app at o s HU hu a e a d fine a ts SB soc a a d behav a e c SG natu a sc ence g era core cour e SQ ra en e qua t tat ve C t a er ty t e U ted State G g oba H h t See Gene Stud s page 83

Herberger College of Fine Arts Baccalaureate Degrees and Majors

Major	Degree	Concentration	Administered By
Art	B.A	Art history, digital art, museum studies, studio art	School of Art
	B.F.A	Art education, ceramics, drawing, fibers, intermedia, metals, painting, photography, printmaking, sculpture	School of Art
Dance	B.F.A	Choreography, dance education, dance studies, performance	Department of Dance
Music	B.A		School of Music
Music Education	B.M.	Choral general, instrumental, string	School of Music
Music Therapy	B.M		School of Music
Performance	B.M.	Guitar, jazz, keyboard, music theatre, orchestral instrument, piano accompanying, voice	School of Music
Theatre	B.A		Department of Theatre
Theory and Composition	B.M.	Composition, theory	School of Music

This major requires more than 120 semester hours to complete

Baccalaureate Degrees

The three baccalaureate degrees differ in curricula with respect to the amount of specialization permitted in the major field. The B.A. degree provides a broad, scholarly, humanistic program, while the other two programs place greater emphasis upon the major field. See the "Herberger College of Fine Arts Baccalaureate Degrees and Majors" table on this page for more information.

The university General Studies curriculum plays an integral role within the educational mission of the university and as such constitutes an important component of all undergraduate degrees in the Herberger College of Fine Arts. See "General Studies," page 83 for more information.

In cooperation with the College of Education a K-12 endorsement for teacher certification is available in the disciplines of art, dance, and music for students preparing for a teaching career in the public schools. Students should, with the advice and counsel of their arts education advisors, fulfill the requirements for the appropriate area of specialization under the Bachelor of Fine Arts or Bachelor of Music degrees. In addition, a student who wishes to be admitted to the Initial Teacher Certification (ITC) program in the College of Education leading to teaching certification) must consult with an advisor from the Office of Student Services in the College of Education before making application for the ITC. Students must have completed 56 hours with a minimum GPA of 2.50 and also have submitted scores from either the Pre-Professional Skills Test (PPST) or the ACT. Further details on admission requirements and procedures for the ITC can be found under "Teacher Education," page 186.

Minors

The Herberger College of Fine Arts provides an opportunity for students majoring in other disciplines to sustain their interest in the arts through a structured program of required courses and elective hours in an art minor. The minor is not intended as a substitute for professional work in the arts, but as a complement to various liberal arts and preprofessional curricula.

Minors are offered in Art History, Dance, Music, and Theatre. The total number of semester hours required for a minor ranges from 18 to 22. Students should contact the relevant academic unit for specific requirements and guidelines regarding the minor.

Graduate Degrees

Master's programs range from 30 to 60 semester hours, depending upon the degree chosen. Doctoral programs vary in scope and curricula. See the "Herberger College of Fine Arts Graduate Degrees and Majors" table, page 278, for more information. See the *Graduate Catalog* for specific requirements.

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students must meet all university graduation requirements. For more information, see "University Graduation Requirements," page 79.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy a university requirement of a minimum of 35 semester hours of approved course work in General Studies, as described under "General Studies," page 83. Note that all three General Studies awareness areas are required. Consult your advisor for an approved list of courses. General Studies courses are listed in the "General Studies" table, page 86, in the course descriptions, in the *Schedule of Classes*, and in the *Summer Session Bulletin*.

Courses in the major or in a related field area may not be used to satisfy both the major and core area portions of the General Studies requirement. Concurrent listings in the literacy areas, numeracy, computer applications areas, and awareness areas are an exception. Students are encouraged to consult with an academic advisor to ensure that they comply with all necessary requirement.

COLLEGE DEGREE REQUIREMENTS

The Herberger College of Fine Arts degree requirements supplement the General Studies requirement. Descriptions

of additional required courses fc llow. Students are encour aged to consult with an academ c adv isor to ensure that they comply with all necessary requirements.

Fine arts majors must take at least six semester hours of fine arts course work in areas outside of the major school or department. These courses may be in art, dance, music, or theatre A student may concurrently fulfill this requirement and the humanities and fine arts portion of the General Stud ies requirement by selecting approved courses as indicated in the *Sche lule of Classes* This requirement may also be met by taking any Herberger College of Fine Arts course outside of the student's n ajor.

A B A degrees require the equivalent of 16 semester hours n one foreign language except for the B.A. degrees in Theatre and Art w th a concentration in studio art. Foreign language study s strongly recommended but not required for these degree programs Course work may be selected in any anguage and must follow the sequence of language courses 101, 102, 2(1, and 202. This requirement may be fulfilled at the secondary school level or by examination. If acquired in secondary school, tw > years of instruction in one foreign language is considered the equiva ent of one vear of college instruction Transfer students are placed n language study at the level above completed work.

Cand dates for the B.M. degree in Performance with a concentration in voice have specific foreign language requirements which are stated with each of the degree requiren ents. There is no foreign anguage requirement for other concentrations of the B F A or B M degrees.

MAJOR REQUIREMENTS

The m nimum requirement for a baccalaureate degree is the completion of 120 semester hours with a minimum cumulative GPA of 2.00. Of these 120 semester hours, at least 45 must be selected from upper division courses

Several professiona programs within the college requ re additional semester hours for graduation and a higher cumu lative GPA of their majors. To be acceptable as degree credit, all course work in the major discip line must show an earned grade of "C" 2 00 or higher.

In addition to the general information given below, con sult the school and department il sections that follow for specific degree requ rements.

Bachelor of Arts (B.A.) Degree. The B A degree requires from 45 to 69 semester hours for the major. Dependino on the major 18 to 24 hours must be selected from upper divi sion 300 or 400 level courses. The semester hour require ments in the major are distributed between a field of special ization 3(to 5? hours ar d one or more related fields an additional 15 hours) The exact content of the ma or is selected by a student in consultation with an advisor under rules and regulat ons of the department or school concerned. A successful entrance audition is also required for adm s sion to the B.A degree in Music program.

Bachelor of Fine Arts (B.F.A.) Degree. The B F.A. degree requires 52 to 79 semester hours for the major. At least 30 of the e hours, dependit g on the major, must be selected from upper d v sion 300 or 4( ) level) courses. The curriculum for the n ajor s des oned as preprofessional study in art or dance educat on. Auditions and or interviews are required for admission to the B.F.A. degree program in Dance. Con sult these departments for specific information

Bachelor of Music (B.M.) Degree. The B.M. degree requires 79 semester hours for the major. The required num ber of upper division (300 or 400 level) courses is depen dent upon the area of specia ization. The curriculum is designed to provide a broad yet concentrated preparation with a choice of specialization among various areas. See the "Herberger College of Fine Arts Bacca aureate Degrees and Ma ors" table, page 276, for available majors and concen trations. An entering undergraduate music student, regard less of the area of specialization, must pass an entrance audition in his or her primary performing medium v o ce or instrument).

Academic Standards. The terms of disqualific ation, rein statement, and appeals are consistent with those set forth by the university under "Retention and Academic Standards," page 75. In addition, a student disqualified in any proo ram is normally not eligib e for reinstatement for two semesters

SPECIAL PROGRAMS

Working closely with faculty, visiting scholars, and art ists in residence, students in all fields of the college partici pate in dynamic, innovative programs. Students receive a great deal of individual attention to their creative work and artistic development.

School of Art. The School of Art is one of the largest pr grams of its kind in the country and offers students a w de range of specialties in art media, art history, and art educa tion. The faculty are nationally recognized and provide excellent instruction in curricula with many different educa tional opportunities. Some of the unique offerings are in bookmaking and papermaking, digital art, film, neon, video computer animation, and foundry. In addition, internships are available in galleries and museums throughout the Phoe nix area. The Children's Art Workshop is an on campus pro gram taught by students in art education for school a e ch l dren in the metropolitan area. Northlight, Harry Wood, and Step galleries host exhibitions organized and curated by stu dents. Visiting artists and guest lecturers enrich the basic curriculum. Graduates of the School of Art have been accepted to top graduate schools and many are in leadership pos t ons in art, education, and industry

Department of Dance. The department's strengths include choreography and perform ance, dance science and son atic, educational outreach and methodology, media and technol ogy, as well as contemporary directions. Prominent and renowned faculty and guest artists create repertory for dance majors and for the Dance Arizona Repertory Theatre (DART), a student performing outreach company. Throu h instructional curriculum, workshop intensives, guest resi dencies, strong performance programs, professional intern sh ps and apprenticeships, students are exposed and trained

L t racy and r t a nq y **MA** mathe at cs **CS** con puter stat st s q a t tat ve app c t n **HU** h ma t es a d fine a ts **SB** s c a and behev ora c en e **SG** natu a c e ce—ge era ore co rses **SQ** natura e e—qua t tat ve **C** cu tu a d ve ty n the U ted State G g o a H h to ca See Gene a Stud e page 83

Herberger College of Fine Arts Graduate Degrees and Majors

Major	Degree	Concentration	Administered By
Art	M.A.	Art education, art history	School of Art
	M.F.A.	Ceramics, drawing, fibers, intermedia, metals, painting, photographic studies, photography, printmaking, sculpture, wood	School of Art
Composition	M.M.		School of Music
Creative Writing	M.F.A.[2]		Creative Writing Committee
Curriculum and Instruction	Ph.D.[1]	Art education	School of Art
Dance	M.F.A.		Department of Dance
History and Theory of Art[3]	Ph.D.		School of Art
Music	M.A.	Ethnomusicology, music history and literature, music theory	School of Music
	D.M.A.	Conducting, music composition, music education, performance	School of Music
Music Education	M.M.	Choral music, general music, instrumental music, jazz studies	School of Music
Performance	M.M.	Music theatre opera musical direction music theatre opera performance, performance, performance pedagogy, piano accompanying	School of Music
Theatre	M.A.		Department of Theatre
	M.F.A.	Performance, scenography, theatre for youth	Department of Theatre
	Ph.D.	Theatre for youth	Department of Theatre

[1] This program is administered in collaboration with the College of Education and the Graduate College.
[2] This program is administered by the Graduate College.
[3] This major is offered with the University of Arizona.

to meet the demands of professional preparations. An environment that encourages creative collaboration, interdisciplinary views, and community awareness is central to the mission of the department.

School of Music. Ranked among the top programs in the United States, the School of Music offers a broad scope of degree options for the study of performance, music education, music therapy, composition, theory, history and literature, jazz, music theatre, ethnomusicology, pedagogy, accompanying, and conducting. This wide spectrum of areas is supported by special programs and facilities that enrich the opportunities for professional training and musical growth. Music education and pedagogy are supplemented by the Piano and Guitar Preparatory Programs, the Music for Tots series, special classes for certification in Orff and Kodaly methods, and the publication on campus of a major research journal. Performance opportunities are enhanced by a wide variety of ensembles, including such groups as Mexican marimba, African drumming, and mariachi. Voice students may pursue training in opera or in Broadway musicals. Composition students work in the Electronic Music Studio, and all benefit from the Electronic Classroom, a state of the art computer facility. A variety of community partnerships, including a gang intervention program, stem from the music therapy area. The scope and variety of the School of Music's programs are made possible by the wide range of expertise of the faculty, who are performers, teachers, conductors, composers, and scholars recognized both nationally and internationally.

Department of Theatre. The Department of Theatre's B.A. degree features a broad liberal arts education, which cultivates in the student the ability to understand human behavior and values in societies of the past and present, an essential element in the creation of and response to theatre. Special strengths of the department include internationally acclaimed programs in theatre for youth; an outstanding playwriting area that infuses each specialization with new script work, multiethnic courses; programs in acting and directing; an acting program that allows work with nationally acclaimed directors and acting coaches; and a nationally recognized scenography area that provides for further specialization in costume, lighting, or scene design as well as theatre technology.

Production is at the core of ASU theatre and the quality of the faculty, student body, and facilities often attracts professionals to ASU. The department recently premiered productions by three Pulitzer prize winning playwrights. Four to six subscription series plays are produced annually in the 496 seat Galvin Playhouse and the smaller Lyceum Theatre. An additional eight to 14 student directed shows are presented.

Theatre for youth artists, students, and scholars are attracted to ASU by the opportunities to work on national K-12 theatre curricula and research projects, theatre tours to area schools, and opportunities to teach on and off campus. The Child Drama Special Collection in Hayden Library, which includes rare books, plays, and personal and national

association archives, is the most complete and extensive collection of its kind in the English speaking world and also contributes to the international recognition of the theatre for youth faculty.

ASU EXTENDED CAMPUS

The College of Extended Education was created in 1990 to extend the resources of ASU throughout Maricopa County, the state, and the region. The College of Extended Education is a university wide college that oversees the ASU Extended Campus and forms partnerships with other ASU colleges, and the Katherine K. Herberger College of Fine Arts to meet the instructional and informational needs of a diverse community.

The ASU Extended Campus goes beyond the boundaries of the university's three physical campuses to provide access to quality academic credit for working adults through flexible schedules; a vast network of off campus sites; classes scheduled days, evenings, and weekends; and innovative delivery technologies including television, the Internet, and Independent Learning

For more information, see "ASU Extended Campus," page 703, or access the Web site at www.asu.edu/xed

GENERAL INFORMATION

Undergraduate Credit for Graduate Courses. To enable interested students to benefit as much as possible from their undergraduate studies, the Graduate College and the Herberger College of Fine Arts extend to seniors with a GPA of at least 2.50 the privilege of taking 500 level graduate courses for undergraduate credit. Students requesting to take 500 level graduate courses must have the approval of the instructor of the class and their academic advisor.

Preprofessional Programs. Students preparing for admission to professional graduate schools should obtain information regarding admission requirements by writing directly to the schools in which they are interested.

Courses. The academic units within the Herberger College of Fine Arts may use the CFA prefix for course offerings that cross disciplinary boundaries.

COLLEGE OF FINE ARTS (CFA)

CFA 194 Special Topics. (1–4)
fa
Topics may include the following
• Academic Balance for the Fine Arts Major 1

CFA 422 Concepts in Collaborative Multimedia. (3)
spring
Designed to bring students from different disciplines throughout the Herberger College of Fine Arts to experience the collaboration process in creating art Lab, studio

CFA 484 Internship. (1–12)
fa and spring

CFA 494 Special Topics. (3)
fa and spring

CFA 498 Pro-Seminar. (1 7)
fa and spring

CFA 522 Concepts in Collaborative Multimedia. (3)
spring
Designed to bring students from different disciplines throughout the Herberger College of Fine Arts to experience the collaboration process in creating art Lab, studio

CFA 584 Internship. (1–12)
fa and spring

CFA 598 Special Topics. (1–4)
fa and spring

CFA 684 Internship. (1–12)
fa and spring

CFA 784 Internship. (1–12)
fa and spring

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see Omnibus Course page 56

School of Art

herbergercollege.asu.edu/art
480 965-3468
ART 102

Jon W. Sharer, Interim Director

Regents' Professor: Weiser

Professors: Austin, Bates, Britton, Cockerham, Eckert, Erickson, Fahlman, Fronske, Gasowski, Ingwater, Hajicek, Kadar, Kettenbach, Magenta, Marcus, Maxwell, Messinger, Pace, Pimentel, Rasseeuw, Schmidt, Sharer, Stokrocki, Sweeney, Verstegen, White, Young

Associate Professors: Collins, Duncan, Guylay, Jenkins, Pesserillo, Pettigrew, Scheaffer, Schoebel, Schutte, Segura, Serwint, Umberger, Wolfthal

Assistant Professors: Brown, McIver, Mesch, Newport

Senior Lecturer: Hokin

All students registering in a School of Art degree program enroll through the Herberger College of Fine Arts. Each degree program and area of specialization has its own check sheet, which describes the particulars of course sequence and special requirements. Check sheets are available in the School of Art Undergraduate Advising Center.

Art majors seeking a second B.A. or B.F.A. degree in art must petition the Herberger College of Fine Arts after completing 12 semester hours in the specialization of the second degree. The second degree in art requires at least 30 semester hours of courses which meet art requirements in the major. These 30 semester hours should not duplicate any of the courses taken for the first degree

ART—B.A.

The faculty in the School of Art offer four concentrations for students in the B.A. degree in Art program: art history, digital art, museum studies, and studio art. These concentrations are intended to give the student a broadly based

Literacy and critical inquiry **MA** mathematics **CS** computer/statistics quantitative applications **HU** humanities and fine arts **SB** social and behavioral science **SG** natural science—general core courses **SQ** natural science quantitative **C** cultural diversity in the United States **G** global **H** historical See General Studies page 8

general education in the field with specialized work at the upper division level.

The major in Art consists of 45 to 79 semester hours, depending on the concentration and includes the requirements listed on this page for each concentration. B.A. degree programs are especially suited for individuals pursuing interdisciplinary studies or a minor in another discipline. All courses in the major must be completed with a "C" or higher.

Graduation Requirements. In addition to fulfilling the major requirements, students must meet all university graduation requirements and college degree requirements. See "University Graduation Requirements," page 79, and "College Degree Requirements," page 26.

Art History

This concentration consists of a minimum of 45 to 61 semester hours. It requires 33 semester hours of art history, 12 semester hours of related study, and 16 semester hours of foreign language (101, 102, 201, and 202 or demonstrated proficiency in one foreign language which is equivalent to the completion of two years of language at the college level). At least 27 of the 45 semester hours must be upper division credit. Satisfactory completion of ARS 483 Research Methods is required before the senior year.

Art History Requirements

ARS 101 Art of the Western World I *(HUM)*	3
ARS 102 Art of the Western World II *(HUM)*	3
ARS 483 Research Methods *(L)*	3
ARS 498 PS: Art History	3
Total	12

Also required is at least one 300- or 400-level art history (ARS) course from each of the following areas:

Ancient	3
Medieval	3
Modern/Contemporary	3
Non-Western	3
Renaissance/Baroque	3
Any ARS courses	6

Related Subject Field. Select three courses (nine semester hours) from those with the prefix APH, ARA, ARE, or from the following:

ART 111 Drawing	3
ART 112 Visual Dimensions in Design	3
ART 113 Color	3
ART 115 Three-Dimensional Design	3
ART 211 Photography I	3
ART 274 Woodworking	3
ART 294 Special Topics	3

Also required is an approved upper division elective. Six semester hours of ART courses are recommended.

Foreign Language. Sixteen semester hours of 101, 102, 201, and 202 language courses, or demonstrated proficiency in at least one foreign language equivalent to the level attained through the completion of two years of study at the college level is required. For specific courses, see the "Department of Languages and Literatures," page 399. (SHS courses are not acceptable.

Digital Art

Sixty-nine semester hours are required for the concentration in digital art. It requires 15 semester hours of core curriculum, 18 semester hours of course work with a digital art emphasis, nine semester hours of art history, and 24 semester hours of related study. The faculty in the student's declared emphasis must approve course work in the digital art concentration and the related subject field. A senior exhibition is also required.

Portfolio Review. Admission to digital art courses requires both a portfolio review and a minimum CPA of 2.70. Students must also declare an emphasis in 3D imaging and animation, digital photography or video. The portfolio deadlines are October 15 for spring classes and March 15 for fall classes.

Core Curriculum. See "Studio Art" page 281 for courses that make up the core curriculum.

Specialization. Select 15 semester hours, including 12 semester hours of upper division study, from the following:

ART 294 ST: Digital Art	3
or ART 394 ST: Digital Arts	
ART 308 Digital Photographic Images	3
ART 345 Visualization and Prototyping	3
ART 346 3D Computer Imaging and Animation (CS)	3
ART 348 Computer Animation	3
ART 440 New Media Concept	3
ART 441 Video Art	3
ART 443 Computer Animation and Video	3
ART 451 Computer Art and Audio	3
ART 477 Computer Art Animation Portfolio (CS)	3
ART 494 ST: Digital Photographic Images II	3
ART 494 ST: Visualization and Prototyping I; 3 or any ARE 494 digital art courses	

Related Subject Area. Select 24 semester hours of course work outside of the specialization. This may include courses in the School of Art, Herberger College of Fine Arts, and throughout the university that further students' fine arts goals in digital media and aid them in preparation for the senior exhibition.

Museum Studies

A minimum of 67 hours is required for the museum studies concentration. This concentration is an interdisciplinary program, which involves courses in the School of Art, Department of Anthropology, College of Business, American Humanics, Department of Recreation Management, and the Department of Languages and Literatures.

Specialization

ARS 101 Art of the Western World I *(HUM)*	3
ARS 102 Art of the Western World II *(HUM)*	3
ARS 201 Art of Asia *(HUM)*	3
ARS 202 Art of Africa, Oceania and the Americas *(HUM; GH)*	3
ARS 483 Research Methods *(L)*	3
ARS 484 Internship/Museum	3

Also required is at least one 300- or 400-level art history (ARS) course from each of the following areas:

ART 4 9 Photo_raphic Exhibitio) 3
) ARA 46 Ga le s Exl bit ns 3
ASB 4 1 Intro du tion to Mu eum s 3
) ARS 4 04 S · Introduction to Muse ms 3
Ancie nt .. 3
Any ARS cours s 6
Med val 3
Modern contemporary 3
Non Western ... 3
Ren ssance/ba oque 3

Related Study

COB 38 Sm a Busine s Lead rs ip 3
COB 351 Sm a Bust ess Acco nting and F n nce 3
COB 382 Sma Bus nes Sal s a d Marketi g Deve op ent. . . 3

Free Electives. Students must select a minimum of 12 semester hours of free electives. Recommended courses include REC 300 or 310; art history, anthropology, history, and or bu iness courses.

Foreign Language. S xteen semester hours of 101, 102, 201, and 202 language co urses; or a demonstrated profi ciency in at least one foreign language equ valent to the level attained th rough the completion of two years of study at the col ege level For specific courses see the "Depart ment of Lan_uages and L teratures," page 399. SHS courses are not acceptable.

Studio Art

Core Curriculum. The fol ow ng courses make up the core curric ilum.

ARS 01 Art of the Western Wor d I *HL H* 3
ARS 02 Art of the Western Wor ld II *HL H* 3
ART 11 Draw n I
ART 11_ Two D mensio al Design . 3
ART 113 C or ... .
ART 115 Three D mensional Desi_n . . .

Total 15

Specialization. Eighteen semester hours including 12 hours of upper div sion study of ART focus courses must be selected from the fo ow in areas: ceramics, drawing, fibers, intermed a, metals, pai ting, photography, printmak ing, and sculpture.

Art History. Nine semester hours of ARS courses are required, which must include three semester hours of non Western art. At least six semester hours must be upper divi sion ARS courses

Related Subject Area. Re ated subject area includes courses outs de the area of special zation i the School of Art, Herberger Co le_e of Fine Arts, and the university. Course selection must be rel ated to studen t's professiona goa s in art and approved by are a of specialization faculty and an academic advisor. A minimum of 24 hours is required, of wh ch 18 hours must be of upper division study.

Art History Minor

The School of Art offers a minor in Art History consisting of 15 semester hours of course work, includins 12 upper division electives. A minimum grade of "C" is required of all classes in the minor and for those pursuing a minor a minimum overal GPA of 2 00 is required. Courses may not be double counted in a n a or and the minor, and a min imum of 2 hours of res dent credit at ASU Main is required

ARS 100 or 300 may be used toward a minor. ARS 100 and 300 may not be used t oward an Art History minor t the student is an Art major or has credit n ARS 101 and 102.

Required Courses. Select two of the follow ing four required courses.

ARS 101 Art of the Western Wor ld I *HL H* 3
ARS 102 Art of the Western Wor ld II *HL H* 3
ARS 201 Art of Asia *HL G H* 3
ARS 202 A t of Afr ca O eania and the Amer cas *HL C H* 3

Elective Courses. Students pursuing an art history n inor select four three semester hour upper division courses. A seminar is strongly recommended for those consider ng graduate study. Students need to be aware of lower division prerequisites for a l upper division courses. Interested stu dents should contact the Schoo of Art for specific require ments and admissio n procedures

ART—B.F.A.

The major in Art consists of 75 sem ester hours, with a concentration in one area selected on the basis of the stu dent's interests. The following concentrations are available to the student. art educat on, ceramics, drawing fibers intermedia, n etals, painting, photography, printmaking, and sculpture

B.F.A. Core Curriculum. All stu dents in this degree pro gram follow the same core curricu um in art for the first two semesters:

ARS 101 Art of the Western W rld I *HL H* 3
ARS 102 Art of the Western W rld II *HL H* . . 3
ART 111 Draw n I 3
ART 112 Two D mensional D sign 3
ART 115 Co or 3
ART 115 Three Dimen sional Design 3

Tota 18

At least 30 upper division sem ester hours must be earned within the major, with a n minimum of 12 semester hours within the concentration

All course work counted in the major must be completed with a "C" or hi_her. The specific requirements for each concentration are recommended by the faculty advisors of the area and are isted on Schoo l of Art check sheets

Courses from other departments, when approved by the advisor and the School of Art, may be applied to the major if deemed appropr ate to the student's program of study Art courses that do not have the same title and descript on as ASU catalo_ courses must have the app oval of the Schoo l of Art Standards Co mm ittee.

Graduation Requirements. In addition to fulfilling the major requirements, students n ust meet all university

graduation requirements and college degree requirements. See "University Graduation Requirements," page 79, and "College Degree Requirements," page 276.

Art Education

Core Curriculum. See "B.F.A. Core Curriculum," page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ARE	440	Disciplines of Art Education 3
ARE	450	Teaching Inquiry in Art 3
ARE	470	Art Criticism: Aesthetics 3
ARE	482	Teaching Art Processes 3
ARE	486	Art Education: Strategies and Applications 3
ARE	494	Special Topics 3
ARE	496	Methods and Assessment of Learning in Art 3
Total		 21

Area of Proficiency. Twenty-one semester hours are required with a minimum of 15 semester hours in a specific area of studio art or art history. Twelve of these semester hours must be upper-division credits.

Art History. Six semester hours of ARS upper-division courses are required. One course must be a 20th-century ARS course. Non-Western art is recommended for the second course.

Additional Requirements. The following courses are additional requirements:

ART	201	Photography I 3
ART	223	Painting I 3
ART	231	Sculpture I 3
		or ART 261 Ceramic Survey (3)
		or ART 272 Jewelry I (3)
		or ART 274 Wood I (3)
		or ART 276 Fibers I (3)
Total		 9

The concentration in art education consists of 75 semester hours with 21 semester hours in art education and 21 semester hours in an art proficiency approved by an art education advisor. The art proficiency courses must include a minimum of 15 semester hours in a specific area of studio art or art history. Twelve of these semester hours must be upper-division credits. The art proficiency can be in art history, ceramics, drawing, fibers, intermedia, metals, painting, photography, printmaking, or sculpture. Teaching experience is provided in the Children's Art Workshop, which is an on-campus program based in studio art and art history for children ages five to 15. Participation in the workshop is part of the requirements for ARE 486 Art Education: Strategies and Applications. ARE 486 meets the state certification requirements for the elementary methods class, and ARE 496 Methods and Assessment of Learning in Art meets the requirements for the secondary methods class in the subject area. Both of these courses have prerequisites.

The Art Building

Tim Trumble photo

A student pursuing a B.F.A. degree in Art with a concentration in art education may also choose to become certified for teaching art K-12. If certification is elected while pursuing the art education undergraduate degree, additional semester hours are required in the College of Education. Students must make special application to the Initial Teacher Certification (ITC) program in the College of Education three months before the beginning of the junior year. Certification may also be pursued after receiving an undergraduate degree in art through the postbaccalaureate program in the College of Education. Interested students should contact an advisor in the College of Education and in art education for admission requirements to the postbaccalaureate program. Art education courses for this program are as follows:

ARE	453	Teaching Inquiry in Art	3
ARE	482	Teaching Art Processes	3
ARE	486	Art Education Strategies and Applications	3
ARE	496	Methods and Assessment of Learning in Art	3
Total			12

The B.F.A. degree in Art with a concentration in art education and the postbaccalaureate program for certification in art has a special art education application procedure. This procedure is separate from, and in addition to, the admission requirements of ASU. Acceptance is based on a 2.50 GPA, completion of foundations courses (ART 111, 112, 113, and 115), completion of 12 semester hours of art history courses (ARS 101 and 102 and two upper division courses), and a "B" or higher in ARE 440 and 450. In addition, undergraduate and postbaccalaureate students seeking K-12 certification should check requirements and deadlines for admission to the College of Education professional program.

Student teaching in art education occurs only in the spring semester. To be accepted into student teaching, a student must be recommended in writing by the art education faculty and must have completed all art education classes except for ARE 496, which should be taken concurrently with student teaching. Students who are not recommended may complete the B.F.A. degree in Art with a concentration in art education without certification or may reapply after meeting deficiencies in knowledge and skills related to the teaching of art.

Ceramics

Core Curriculum. See "B.F.A. Core Curriculum," page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART	231	Sculpture I	3
ART	261	Ceramic Survey	3
ART	360	Ceramic Throwing	3
ART	364	Ceramic Handbuilding I	3
ART	365	Ceramic Handbuilding II	3
ART	461	Ceramic Clay	3
ART	463	Ceramic Glaze	3
ART	466	Special Problems in Ceramics	6
Total			24

Art History. Six semester hours of upper division ARS courses, including a 20th-century and a non-Western ARS course, are required.

Additional Requirements. One of the following four courses is required.

ART	211	Drawing II	3
ART	214	Life Drawing I	3
ART	227	Watercolor I	3
ART	443	Intermedia	3

Two of the following three courses (six semester hours) are required:

ART	272	Jewelry I	3
ART	274	Wood I	3
ART	276	Fibers I	3

Art Electives. Fifteen semester hours of ARA, ARE, ARS, and ART courses are required.

Drawing

Core Curriculum. See "B.F.A. Core Curriculum," page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART	211	Drawing II	3
ART	214	Life Drawing I	3
ART	223	Painting I	3
ART	227	Watercolor I	3
ART	311	Drawing III	3
ART	314	Life Drawing II	3
ART	315	Life Drawing III	3
ART	411	Advanced Drawing	3
Total			24

Also required are six semester hours of ART 411, 414, or 494 drawing, painting, or printmaking (three semester hours).

Art History. Nine semester hours, including six semester hours of upper-division and three semester hours of non-Western ARS courses, are required.

Additional Requirements. Two of the following six courses (six semester hours) are required:

ART	201	Photography I	3
ART	231	Sculpture I	3
ART	261	Ceramic Survey	3
ART	272	Jewelry I	3
ART	274	Wood I	3
ART	276	Fibers I	3

Art Electives. Nine semester hours of ARA, ARE, ARS, or ART courses are required.

L literacy and critical inquiry **MA** mathematics **CS** computer statistics quantitative application **HU** humanities and fine arts **SB** social and behavioral sciences **SG** natural science general course **SQ** natural science—quantitative **C** cultural diversity **L** the United States **G** global **H** historical See "General Studies" page 83

Fibers

Core Curriculum. See "B.F.A. Core Curriculum," page 281 for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART	276	Fibers I
ART	376	Fibers Loom Techniques
ART	377	Surface Design
ART	476	Fibers: Multiple Harness Weaving
ART	477	Printed Textiles
Total		

Art History. Six semester hours of upper division ARS courses are required, including a 20th century elective.

Additional Requirements. Three of the following six courses (nine semester hours) are required:

ART	261	Photography I
ART	231	Sculpture I
ART	261	Ceramic Survey
ART	272	Jewelry I
ART	274	Wood I
ART	276	Fibers I

Art Electives. Twenty-one semester hours of ARA, ARE, ARS, and ART courses are required.

Intermedia

Core Curriculum. See "B.F.A. Core Curriculum," page 281, for the courses that make up the core curriculum.

Portfolio Review. Admission to the courses listed below requires both a portfolio review and a minimum GPA of 2.70. Students must also declare an emphasis in mixed media, 3D imaging and animation, or video. The portfolio deadlines are October 15 for spring classes and March 15 for fall classes.

Specialization. Eighteen to nineteen semester hours are required. Students must select three semester hours of Non Electronic Media and three hours of Digital Imaging. The remaining fifteen to sixteen hours are completed in either Non Electronic Media or Digital Imaging depending on the emphasis selected.

The following courses make up the specialization:

Select three semester hours from the following Non Electronic Media courses:

ART	459	Mixed Media
ART	442	Folk Outsider Art
ART	443	Intermedia
ART	494	ST: Nonelectronic Intermedia

Select three or four semester hours from the following Digital Imaging courses:

ART	345	Visualization and Prototyping I
ART	346	3D Computer Imagery and Animation I
ART	348	Computer Animation I
ART	440	New Media Concepts
ART	441	Video Art
ART	494	Visualization and Prototyping II
		or any ART 494 digital art course

Intermedia-Related Study

Two of the following two dimensional courses (six semester hours) are required:

ART	261	Photography I
ART	211	Drawing II
ART	214	Life Drawing I
ART	223	Painting I
ART	227	Watercolor I
ART	351	Intaglio I
ART	352	Lithography I
ART	354	Screen Printing I
ART	355	Photo Processes for Printmaking I

Two of the following three dimensional courses (six semester hours) are required:

ART	231	Sculpture I
ART	261	Ceramic Survey
ART	272	Jewelry I
ART	274	Wood I
ART	276	Fibers I

Art History. Nine semester hours, including three hours of non-Western, and six hours of 20th century and/or contemporary art history (ARS) classes are required. Six hours must be in the upper division.

Art Electives. Seventeen to eighteen semester hours of ARA, ARE, ARS, and ART courses are required.

The deadline for submitting review materials to enroll in computer animation courses is March 15 for fall semester and October 15 for spring semester.

Metals

Core Curriculum. See "B.F.A. Core Curriculum," page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART	272	Jewelry I
ART	372	Jewelry II
ART	373	Metalworking I
ART	472	Advanced Jewelry
ART	473	Advanced Metalworking
ART	494	ST: Metals
Total		

Art History. Six semester hours of upper division ARS courses are required, including a 20th century elective.

Additional Requirements. Three of the following six courses (nine semester hours) are required:

ART	261	Photography I
ART	223	Painting I
ART	231	Sculpture I
ART	261	Ceramic Survey
ART	274	Wood I
ART	276	Fibers I

Art Electives. Eighteen semester hours of ARA, ARE, ARS, and ART courses are required.

Painting

Core Curriculum. See "B.F.A. Core Curriculum," page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART	2	Drawing II 3
ART	214	Life Drawing I 3
ART	223	Painting I 3
ART	22	Watercolor I 3
AR	31	Drawing I 3
ART	3 4	ife Drawing I 3
ART	323	Painting I 3
ART	324	Painting II 3
		or ART 327 Watercolor I 3
ART	325	Figure Painting 3
ART	423	Advanced Painting 3
		or ART 42 Advanced Watermedia (3
Total		 3

One of the following six courses (three semester hours) is required:

AR	324	Painting III 3
ART	32	Watercolor I 3
ART	411	Advanced Drawing 3
ART	4 3	Advanced Painting 3
ART	425	Advanced Figure Painting 3
ART	427	Advanced Watermedia 3
ART	494	S Drawing 3
		or ART 494 ST Painting 3

Art History. Nine semester hours of ARS courses are required including three hours of non Western. Six hours must be upper division ARS courses

Additional Requirements. Two of the following six courses (six semester hours) are required.

ART	201	Photography I 3
AR	1	Sculpture I 3
ART	261	Ceramic Survey 3
ART	272	Jewelry I 3
ART	274	Wood I 3
ART	276	Fiber I 3

Art Electives. Nine semester hours of ARA, ARE, ARS, and ART courses are required

Photography

Core Curriculum. See "B.F.A. Core Curriculum," page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ARA	2 2	Understanding Photographs 3
ART	2 1	Photography I 3
ART	3 1	Photography II 3
ART	304	Advanced Photography 3
Total		 12

Three of the following ten courses nine semester hours are required:

ART	305	Color Photography I 3
ART	308	Digital Photographic Images 3
ART	401	Nonsilver Photography 3
AR	4 3	Senior Photographic Projects 3
ART	4 4	Portrait or Photography .....
AR	4 5	Advanced Color Photography 3
ART	4 6	Photo Techniques 3
ART	4 7	View Camera 3
ART	4 9	Photographic Exhibition 3
AR	494	ST Photo 3

Art History. Twelve semester hours are required including ARS 250 History of Photography and a Non Western art history course. Six hours must be upper division

Additional Requirements. Select one of the following courses.

AR	21	Drawing II
ART	2 4	Life Drawing I 3
AR	223	Painting I 3
AR	227	Watercolor I 3

One of the following five courses three hours is required.

ART	3	Sculpture I 3
ART	26	Ceramic Survey 3
ART	272	Jewelry I 3
ART	274	Wood I 3
ART	276	Fibers I 3

Art Electives. Eighteen semester hours of ARA, ARE, ARS, and ART courses are required

Printmaking

Core Curriculum. See "B.F.A. Core Curriculum, page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART	21	Drawing II 3
		or ART 214 Life Drawing I 3
ART	351	Intaglio I 3
ART	352	Lithography I .....
ART	354	Screen Printing I 3
Total		 1

Three of the following ten courses nine semester hours are required.

ART	253	Introduction to Printmaking 3
ART	355	Photo Processes for Printmaking .....
ART	451	Advanced Intaglio .....
ART	452	Advanced Lithography 3
ART	454	Advanced Screen Printing .....
ART	455	Advanced Plot Processes for Printmaking .....
ART	456	Fine Printing and Bookmaking I 3
ART	457	Fine Printing and Bookmaking II 3
ART	458	Papermaking 3
ART	459	Monoprinting 3

Literary and Critical Inquiry **MA** Mathematics **CS** Computer Statistics Quantitative Application **HU** Humanities and Fine Arts **SB** Cultural and Behavioral Science **SG** Natural Science and Technology **SQ** Quantitative Reasoning **C** Culture Diversity in the United States **G** Global Historical Perspectives See General Studies page

Two of the following five courses six semester hours are required.

ART 214 Life Drawing I 3
ART 314 Drawing II 3
ART 314 Life Drawing II 3
ART 315 Life Drawing III 3
ART 415 Advanced Drawing 3

Art History. Six semester hours of upper division ARS courses are required.

Additional Requirements. Two of the following eight courses six semester hours are required

ART 260 Photography 3
ART 333 Painting I 3
ART 422 Watercolor I 3
ART 331 Sculpture 3
ART 361 Ceramic Survey 3
ART 372 Jewelry I 3
ART 374 Wood I 3
ART 376 Fibers I 3

Art Electives. Eighteen semester hours of ARA, ARE, ARS, and ART courses are required.

Sculpture

Core Curriculum. See "B.F.A. Core Curriculum," page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART 223 Painting I 3
ART 231 Sculpture I 3
ART 274 Wood I 3
ART 331 Sculpture II 3
ART 333 Sculpture III 3
ART 431 Special Problems in Sculpture 3

Total 18

Four of the following nine courses 12 semester hours are required (note that all are repeatable except ART 333

ART 333 Foundry Casting Methods 3
ART 374 Wood II 3
ART 431 Special Problems in Sculpture 3
ART 432 Neon Sculpture 3
ART 436 Architectural Sculpture 3
ART 437 Film Animation 3
ART 438 Experimental Systems in Sculpture 3
ART 474 Advanced Wood 3
ART 494 Special Topics in Sculpture 3

Art History. Six semester hours of upper division ARS courses are required

Additional Requirements. Two of the following three courses are required:

ART 361 Ceramic Survey 3
ART 372 Jewelry I 3
ART 376 Fibers I 3

Art Electives. Fifteen semester hours of ARA, ARF, ARS, and ART courses are required

GRADUATE PROGRAMS

The faculty in the School of Art offer programs leading to the M.A. degree in Art, with a concentration in art education or art history, the Master of Fine Arts degree with a concentration in ceramics, drawing, fibers, intermedia, metals painting, photographic studies, photography, printmaking, sculpture, or wood, and a Ph.D degree in History and Theory of Art. In cooperation with the College of Education, the Doctor of Education degree is offered with a concentration in art education. See the *Graduate Catalog* for requirements for all graduate degrees.

ART AUXILIARY (ARA)

ARA 202 Understanding Photographs. (3)
once a year
Slide lecture ure en understanding photography as a fine art form

ARA 311 Art Appreciation and Human Development. (3)
fa
Foundations of art for children and young adult Emphasis on learning development and understanding art in history and culture on texts Lecture discussion Prerequisites ENG 101 102; junior standing
General Studies HU

ARA 460 Gallery Exhibitions. (3)
fa and spring
Practical experience in a phases of department gallery operations and preparation of gallery publications May be repeated for credit Prerequisite instructor approval

ARA 488 Understanding Art. (3)
fa and spring
Understanding art as an emergent cultural phenomenon with an emphasis on a critical examination of conceptual issues in art Requires writing Prerequisite both ARS 101 and 102 or only instructor approval
General Studies UHU

ARA 494 Special Topics. (1–4)
fa and spring
Topic may include the following
• Advanced Photo Aesthetics 3

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog see Omnibus Courses page 56

ART EDUCATION (ARE)

ARE 301 Studio Art and Human Development. (3)
once a year
Study of human development in studio art from early childhood to adult years

ARE 440 Disciplines of Art Education. (3)
once a year
Exploration in art education disciplines, history and people art making development to diverse ages events and abilities Lecture discussion Prerequisites combination of ARS 101 and 102 and ART 113 and 115 or only instructor approval.

ARE 450 Teaching Inquiry in Art. (3)
fa and spring
Designing inquiry based curriculum units but on development of art making and art understanding Lecture discussion Prerequisites ARS 1 1 1 2

ARE 470 Art Criticism: Aesthetics. (3)
fa
Traditions of aesthetics and art criticism conceptual issues in contemporary art education in the visual arts Prerequisite ARE 440 or instructor approval

ARE 482 Teaching Art Processes. (3)
spring
Art traditions of the 20th century as a basis for studio and art history instruction Meets art postbaccalaureate certification requirement 2 hours lecture 2 hours studio Prerequisite ARE 450

ARE 486 Art Education: Strategies and Applications. (3)
fa
mp ementat on and eva uat on of art nstruct on for K 12 popu at on nc udes teach g f Saturday c a es the Ch dre s Art Workshop Meet art postba ca aureate cert f cat o requ rement Prerequ s te ARE 482

ARE 494 Special Topics. (3)
once a yea

ARE 496 Methods and Assessment of Learning in Art. (3)
once a yea
d v dua or group research on the as essment of art earn ng ncor porat ng theory and pra t ce Meets art postbacca aureate cert f cat on requ rement Prerequ s tes both ARE 470 and 486 or on y nstructor approva

ARE 510 Art Education Colloqu'um. (3)
se ected semesters
H stor ca foundat ons of art educat on and facu ty presentat ons regard ng teach ng and resea h re ated to the v sua arts

ARE 520 Issues in Teaching Inquiry in Art. (3)
once a year
issues n tea h ng and earn ng thro gh nqu ry about artworks us ng pr nt and e ectron c reproduct ons and nformat n Re ommended to be taken before ARE 525

ARE 525 Research on Teaching Art History. (3)
once a year
Rev ew f emp r ca and h sto ca research research methods earn ng theory and assessment of earn ng n art h story. P ot stud es n the effects of nstruct'on upon earn g Recommended to be take after ARE 520

ARE 530 Issues in Teaching Studio Art. (3)
once a year
Cr t ca exam nat on of ssues con ern ng teach ng mu t cu tura art to d fferent popu at ons of students H stor ca and ph osoph ca founda- t ons rev ewed Recommended to be taken before ARE 535 Lecture d scuss on

ARE 535 Research on Teaching Studio Art. (3)
once a year
Rev ew of emp r ca and stor ca research methods earn ng theo y and assessment of earn ng n stud o art nc ud ng deve opmenta stud es and the r m tat ons P ot stud es on the effects of nstruct on upon earn ng Recommended to be taken after ARE 530

ARE 540 Teaching Art in Cultura Contexts. (3)
once a year
Re at onsh p of mu t cu t ra pe spect ves to tea h ng earn ng art cr t c sm aesthet cs stud o art and art h story.

ARE 610 Issues and Trends in Art Education (3)
se ected semesters
Doctora eve nvest gat on of h stor ca and ontemporary ssues re ated to teach ng and research n art educat on

ARE 611 Curriculum Development in Art Education. (3)
se ected semesters
Doctora eve nqu ry nto the ph osoph ca psycho og ca , and soc o og ca foundat ons of c rr cu um deve opment.

Omnibus Courses. For an exp a at on of courses offered but not spec f ca y sted n th s cata og, see Omn bus Courses page 56

ART HISTORY (ARS)

ARS 100 Introduction to Art. (3)
fa spr ng summer
Understand ng of art and ts re at onsh p to everyday fe through pa nt ng, scu pture arch tecture and des gn No cred t for Art ma ors or stu dents who have comp eted ARS 01 or 102 or 300
Genera Stud es HU

ARS 101 Art of the Western World I. (3)
fa spr ng summer
H story of Western art from the Pa eo th c per od t rough the M dd e Ages
Genera Stud es HU H

ARS 102 Art of the Western World II. (3)
fa spr ng summer
H tory of Western art from the Rena ance to the pre ent
Genera Stud es HU H

ARS 201 Art of Asia. (3)
once a year
H story of the art of the As an tures w th emphas s on Ch na Japan, and nd a Meet non Western art h story requ rement.
Gene Stud es HU G H

ARS 202 Art of Africa, Oceania, and the Americas. (3)
sp ng
H story of art of Afr a Ocean a and the New Wor d Meets non West ern art h story requ rement ecture d scuss on Cross sted as AFH 202 Cred t s a owed for on y AFH 202 or ARS 202.
Genera Stud es HU G H

ARS 250 History of Photography. (3)
once a year
H story of photography from the 9th ce tury to t e present
G nera Stud es H

ARS 300 Introduction to Art. (3)
fa and spr ng
Cou se content same as ARS 1 0 but requ'res a h gher eve of accomp shment and comprehens o No cred t for students who ave comp eted ARS 100 or used as art h tory cred t by Art majors
Genera Stud es HU

ARS 302 Art of Africa, Oceania, and the Americas. (3)
o ce a y ar
H tory of art of Afr ca Ocean a and the New Wor d Meets non We t ern art h tory requ rement Cred t s a owed for on y ARS 302 or 202 Prerequ s tes ARS 101 102
Genera Stud es HU G, H

ARS 310 The Renaissance in Tuscany. (3)
summer
Course taught n F orence, ta y H tory of art n Tuscany w th focus on c ty of F orence from 14th through 16th centur es Comp et on of ARS 101 and 102 suggested. Lecture tours

ARS 340 Art n America. (3)
once a year
Amer can art from co on a t mes through the Second Wor d War. Not ava ab e to stude ts who have comp eted ARS 444 542, or 543 Pre requ s tes· both ARS 101 and 102 or on y nstru tor approva
Genera Stud es HU, H

ARS 400 History of Pr ntmaking. (3)
once a year
H story of the pr nt as an art form and ts re at on to other mode and forms of a t st c express on Prerequ s tes both ARS 101 and 102 or on y nstructor approva
Genera Stud es HU H

ARS 402 Art of Ancient Egypt. (3)
se ected semesters
Aesthet c, ph osoph ca and cu tura bas s of Egypt an art from pre Dynast per od through New K ngdom Emphas s o scu pture a d arch tectura monuments Prerequ s tes both ARS 101 and 102 or on y nstructor approva
Genera Stud es HU H

ARS 404 Greek Art. (3)
once a year
H story of art arch tecture of Aegean c v zat ons Cyc ad c M noan Mycenaean and of Greece to end of He en st c per od Prerequ s tes· both ARS 101 and 102 or on y nstructor approva
Genera Stud es. HU H

ARS 406 Roman Art. (3)
once a year
Art and arch tecture of Etrur a the Romar Repub c and the Roman Emp re Prerequ s tes· both ARS 101 and 102 or o y nstructor approva
Genera Stud es. HU H

L te acy and cr t a nqu ry **MA** mat emat s **CS** mputer tat t quant tat ve app cat o s **HU** m n t e a d f ne a t **SB** a and be av c e **SG** tu a c e e gene a co e courses **SQ** natura e e a t tat **C** c t r d ver ty the U ted State **G** g oba **H** t a See Genera Stud e p g 83

ARS 410 Ear y Christian and Byzantine Art. (3)
once a year
Art and a ch tecture of the ear y chur h a d the Byzant ne Emp re from the 4th to the 15t century Prereq s tes bot ARS 101 and 102 r on y nstru tor approva
Genera Stud es H

ARS 412 Ear y Medieval Art. (3)
se ected semesters
Pa nt ng s u pt re, arch tecture and the m n r arts fr m M grat on Caro ng an and Ott n an per ods con dered w th n re g o s c a and econom c c ntexts Prerequ s tes both ARS 101 and 1 2 r on y nstructo appr va
Genera Stud es HU H

ARS 414 Romanesque Art (3)
once a year
S u pt re pa nt ng arch te t re a d m no rt n we tern Europe a 1030–120 con dered w th n e g o s econom c and soc a n text Prereq s tes b th ARS 101 a d 1 2 or y n tructor approva
Genera Stud es HU H

ARS 416 Goth c Art. (3)
once a year
Pa nt ng sc pt re, and ar h tecture n we ter E ope du ng the Goth per od P erequ s te bot ARS 101 and 102 on y st to approva
Genera Stud es HU

ARS 417 Late Gothic Art in Central Europe (3)
se ected semesters
Scu pture pa nt g, and arch te ture of the ate Goth sty e a 135 1525 con dered w th n re g ous s c a ec nom c and p t a c ntexts Prerequ s tes both ARS 101 and 102 or on y n tru to approva

ARS 418 Renaissance Art 'n Northern Europe. (3)
once a year
Graph cs pa nt ng scu pture and arch tecture a 1450 1550 Ref r mat on themes and Rena ssance sty e con dered w th n re g ou po t ca s c a and e onom c c ntexts Prerequ tes both ARS 1 1 and 102 r on y n tructo app ova
Genera Stud e HU

ARS 420 Early Renaissance Art in Italy. (3
se ected emeste s
Pa nt ng u pture and ar h te t re n ta y f om 13 0 to 15 0 Pre requ s te both ARS 101 a d 102 or on y n tructor approva
Genera Stud es HU H

ARS 422 Italian High Renaissance Art and Mannerism. (3)
once a year
H st ry f Ita an art dur g the 16th e tu y nc ud ng the ach eve ments and nf ue ce of Leona do da V n Raphae , and M che an ge o Prerequ s tes both AR 101 and 102 on y nstructor approva
Genera Stud es H

ARS 424 Italian Baroque Art. (3)
once a year
ta an pa nt ng scu pture and arch tecture of the 1 th century Pre requ s tes both ARS 101 and 102 or on y str tor approva
Genera Stud es H H

ARS 426 Art of the 17th Century in Northern Europe (3)
once a year
Baroque pa nt ng scu ptu e and ar h te t re n F ander t e Nether ands, Fran e, and Eng a d Prereq s tes both ARS 101 and 102 or on y nstructor approva
Genera Stud es HU, H

ARS 428 Art of the 18th Century. (3)
once a yea
H st ry of pa nt ng scu pture a ch tectu e graph c arts and the deco rat ve arts from 1700 to the French Revo ut o 1789 P erequ tes both ARS 1 1 and 102 or on y nstru tor approva
Genera Stud es HU H

ARS 430 Art of Spain and Its Colonies (3)
once a year
Arch tect re pa t ng and s u pture from 15 t 1800 Co n a focu on centra Mex o and the Amer can So thwest Pre equ te ARS 102 or nstructor approva
Genera Stud es HU H

ARS 432 19th Century French Art and Cu ture. (3)
fa
H sto y of pa nt ng graph c art cu pture and ar h tectu e 1800 to 190 n Fra e n ts p t a s c a and e nom c ontexts P e e u tes both ARS 101 and 102 r on y nstructor app ova
Genera St d e H H

ARS 434 From Courbet to Cezanne: History of European Art 1860–WWI. (3)
spr ng
Aest et c p t a and s c a force affect ng the v sua art n the ate 19t entury Conce trat n n cub m expre on sm mp ess on m, and po t mpress on m Prerequ tes both AR 101 and 102 or o y nstructor app va
Genera Stud es HU

ARS 436 Art at the Turn of the Century: 1885–1914. (3)
fa
H t ry of European avant garde movement Concentrat n o po t mpre s on sm ymbo sn . express on sm, and ub m Prerequ s te both ARS 101 and 102 or n y nst u tor app va
Gene a St es HU

ARS 438 Art of the 20th Century I. (3)
once a year
Deve opments and d rect ons n art between 1900 a d Wor d War Prerequ s tes both AR 101 nd 102 on y st tor approva
Gene a St d es HU H

ARS 439 Art of the 20th Century II. (3)
once a year
Art s n e Wo d War w th s derat on of new con epts and exper mentat n w th med a and m des of p e e tat on Prerequ s tes a comb nat n of ARS 1 1 and 102 and 438 or n y nstructor approv
G era Stud es HU H

ARS 442 Critical Issues n American Painting I. (3)
once a year
Exp res themes and s c a s ue n Amer can a t w th a cr t ca tudy of Amer can pa nt ng from the 18th century t 185 Lecture d u s P e eq s tes b th ARS 1 and 102 or on y tru tor approva
Genera Stud es HU

ARS 443 Cr'tical Issues in American Painting II. (3)
once a year
Exp re the e and oc a ssues n Amer can art w th a r t ca st dy of Amer can pa nt ng from 1850 t 1900 ecture d scuss on P e eq u tes both ARS 1 1 a d 102 or on y nstru t r app ova
Gen ra Stud es H

ARS 444 Modern American Art, 1900–1945. (3)
once a yea
Amer a pa t ng scu pture photography and arch tect re 1900–1945 Cover major monument ud ng the E g t modern m pre c n m reg ona sm, and the WPA Prerequ s tes both ARS 101 nd 102 or on y nstr to approva
Genera St d es H H

ARS 458 Critical Theories in the Visual Arts. (3)
e ected semesters
Exam ne current cr t ca theor es through the r app at on t a v sua rts May nc ude n w h st m Marx sm deconstruct on post str t ra m sem ot cs La a a psychoana ys s fem n sm po t modern m ecture d scus on stude t presentat ons Prerequ tes b th ARS 101 and 1 2 or on y n tructor app va
Genera Stud es H

ARS 459 Writing Art Crit cism (3)
se ected emesters
Trad t ona and ontemporary approa he to the cr t c sm f art Stu dents wr te r t ca e says Latt r ha f of the semester st e ses the r t sm of ontemporary art n va ous med a P erequ te ARS 458 or nstructo approva

ARS 462 Pre-Co umbian Art. (3)
o ce a y ar
A ch te ture s u ptu e ce am c pa t ng a d ot er arts f Me oamer ca bef re European contact Meets on Western art h tory requ reme t P ere u te bot ARS 101 and 102 or on y str cto appr v
Gen a Stud es H H

ARS 465 Native North American Art (3)
on e a year
Nat ve Amer can art forms of the n ted State and Ca ada from p e h stor c t mes to the present Meet non We tern art h tory requ re ment Prerequ s tes b th ARS 101 and 102 or n y n tructor approva
Genera Stud es· HU H

ARS 466 Native American Art of the Southwest. (3)
once a year
Amer can d a a t n t e s uthweste tates from ts or g ns to the present day Meets on We ter art h story requ reme t Prerequ s te both ARS 01 a d 102 or o y nstr t approva
Genera Stud es· HU C H

ARS 468 Art of the Arctic and Northwest Coast. (3)
e ected s meste s
Art asso ated w t eremony shaman m a d da y fe the Arct c and n the Northwest Coast Meets non Western art h story requ re ment Prerequ s tes both ARS 101 and 102 r on y n tructor approva
Genera Stud es HU

ARS 469 Mexican Art. (3)
once a year
Art of Mex co nd re ated Centra Amer can u tures from the preh t r c to the contemporary schoo s Meets non Western art h story requ rement. Prerequ's tes oth ARS 101 and 1 2 or on y n tru tor approva
Genera Stud es· HU H

ARS 472 Art of China. (3)
once a year
Study of major forms n Ch ne e art r tua b nze s u ptu e eram c ca graphy pa nt ng and arc tecture Meets non Western art h story requ rement Prerequ te b th ARS 101 and 102 or on y nstructor app ova
Gene a Stud es H

ARS 473 Art of Japan. (3)
once a year
Japanese art from the oman per od to the present Meets non West ern art h story req rement Pre equ s tes both ARS 101 and 102 o on y stru tor approva
Genera Stud es HU

ARS 475 Chinese Pa'nting. (3)
once a year
From Ku K a ch n to Ch Pa sh h Major art st ty es and move ments n Ch ne e pa nt ng Meet non Western art h story requ re ent Prereq s tes b th ARS 101 and 102 or on y nstructor app ova
Genera Stud es. H

ARS 480 Research Methods. (3)
fa and spr ng
Methodo gy and resource mate a for art h stor c research Tech n ques of s ho ar y and cr t a wr t ng and eva uat on of b b ograph c ources Prerequ tes both ARS 101 and 102 or on y nstr ctor approva
Genera Stud es L

ARS 484 Internship. (1 12)
e ected semesters
T p cs m y nc ude the fo w ng
- Museum

ARS 485 Women in the V sual Arts. (3)
spr ng
H stor ca study of art by women n var ou med a re ated s c a po t cal. ed cat ona ss e , representat on of women n art Lecture d s cuss Pre equ s tes. both ARS 101 and 10 or on y nst tor approva
Genera Stud es L

ARS 494 Special Topics (1–4)
fa and sp g
Top cs may n ude the fo ow ng
- H story of Photography 3
- Introduct o to Mu eu 3

ARS 498 Pro-Seminar. (1 7)
o ce a y ar
ndergraduate sem nar Prob ems or cr t c sm n top s that may nc ude the fo w ng
- Amer can Art 3–6
- Amer can In an Art 3–6
- Anc ent Art 3–6
- Art H story 3–6
- Baroque Art 3–6
- Br t sh Emp re 3–6
- Ch nese Art 3–6
- Med eva Art 3–6
- Modern Art 3–6
- Photograph c H story 3–6
- Pre o umb an Art 3–6
- Rena ssance Art 3–6

Prerequ te n tructor approva

ARS 501 Methodologies and Art History. (3)
fa
H story of the d c p ne and an explorat n of var ous methodo og es cr t a theory and b b ograph es u ed by a t h stor ans Sem nar

ARS 502 Critical Studies in Egyptian Art. (3)
se ected semesters
Egypt an art from pre Dynast c to New K ngdom per ods Focus on ae thet c ph os ph ca and u tura context Requ res research paper and read ngs

ARS 504 Critical Approaches to Greek Art. (3)
once a year
Art and arch tecture of Aegean c v zat ons Cy ad c, M noan Myce naean and of Greece to end of He en st c per od Requ res research pape and read ngs

ARS 506 Critical Studies in Roman Art. (3)
once a year
Art and arch tecture of Etrur a the Roman Repub c and the Roman Emp re Requ res resear h pa er and or supp ementa read gs

ARS 514 Critical Approaches to Romanesque Art. (3)
e ected semesters
cu pt re, pa nt ng, ar h t ture and the m n r arts n western E rope ca 103 120 con dered w th re g ous eco om c and s c a ntexts Requ res e earch paper.

ARS 516 Critical Approaches to Gothic Art. (3)
se ected semesters
Arch tectu e scu pt re, pa nt ng and the m nor arts n western Europe ca 1150 1350 cons dered w th e g ous o a and eco nom c contexts Req res rese rch pape

ARS 517 Critical Approaches to Late Gothic Art. (3)
s ected semesters
Art of the ate Goth sty e ca 1350–1525 con dered w th n re g ous so a econom c and po t ca contexts Requ res research or read ng pro ect

ARS 522 16th-Century Italian Art. (3)
once a year
Cr t ca study of pa nt ng scu pture. and arch tecture n 16th century ta y n ts re g ous and h stor a c ntext

ARS 528 18th-Century Art 'n Europe. (3)
once a yea
Cr t a study of Eu pean art from the ate Baroque to the ear y years of Neoc as c m

ARS 530 Art of Spa n and New Spain. (3)
once a year
Cr t a study f a te t re pa t ng and s u pt re from 1500 to 1800 Lecture co fere ce

ARS 532 Art, Politics, and Patronage 1770–1850 (3)
fa
Cr t ca ana yses of po t ca events n Europe Exam nes ssues of patronage art a propaganda mpact of war and rev ut on on v sua arts

L tera y and r t a nqu **MA** mathemat **CS** omputer stat st q nt t t ve pp cat on **HU** hun an t e and f e art **SB** oc a a d e av or ce **SG** at ra e ce gene a ore ur es **SQ** nat ra en e q nt t t **C** t r d v r ty th U t d State **G** g oba **H** st a See ene a Stud es p e 8

ARS 534 Studies n Modern European Art, 1850–1914. (3)
once a year
Cr t ca st dy of v sua arts u ng pr mary ource mater a from m d 19th ce tury to WW w th n ph osoph ca soc oe onom c and eco nom c contexts Lectu e tutor a Prerequ s te nstructor approva

ARS 542 Critical Issues in American Painting I. (3)
once a year
Exp ores themes and soc a ssues n Amer can art w th a t ca study of Amer can pa nt ng from the 18th century to 1850 Le ture d s s s on Prerequ s tes. ARS 101 1 2

ARS 543 Critical Issues in American Painting II. (3)
once a year
Exp ores themes and soc a ssues n Amer an art w th a r t ca study of Amer can pa t ng from 1850 to 1900. ect re ab Prerequ s te nstructor approva

ARS 544 American Modernism and Real sm, 1900–1945. (3)
once a year
Cr t ca study f the soc a po t a nd art st c hange n Amer an art dur ng the f rst a f f the 2 th century Prerequ s tes both AR 101 and 102 or on y ARS 340

ARS 562 Art of Ancient Mesoamerica. (3)
fa
Cr t ca study of art a d arch tecture of Mex co and M ya areas before Span sh c ntact Lecture conference

ARS 565 Nat've Art of North America. (3)
once a year
Cr t ca exam nat on of Nat ve Ame an art w th n c ture preh story to the present Prerequ s tes both ARS 101 and 102 or n y nstru t r approva

ARS 574 Stud es in Japanese Art. (3)
once a year
Cr t ca exam nat on f the nature a d story of Japanese art ts ch her tage and ts ndebtedness to fore gn source Lecture d scuss n Prerequ s tes. b th ARS 101 and 102 or on y nstruct r approva

ARS 575 Approaches to Chinese Painting. (3)
fa
Cr t ca h story of Ch nese pa nt ng fr m Eastern Ch u to 1911 Emphas s n master reg ona deve opments and onceptua under p nn gs Le t re d scuss on Prerequ s tes both ARS 101 and 1 2 or on y nstructor approva

ARS 591 Seminar. (1 12)
once a year
Graduate em nar Pr b ems o cr t c sm n top c that may nc ude t e fo ow ng
- Amer can Art 3–6
- Amer can nd an Art 3–6
- Anc ent Art 3–6
- Baroque Art 3–6
- Br t sh Emp re 3–6
- Ch nese Art 3–6
- Cr t ca Theor es n the V ua Arts 3–6
- Med eva Art 3–6
- Modern Art 3–6
- Nat ve Amer an Art 3–6
- Photograph c H story 3–6
- Pre Co umb an Art 3–6
- Rena ssance Art 3–6

Prerequ s te nstructor pprova

ARS 599 Thesis. (1 12)
se ected seme ters

Omnibus Courses F r an exp anat on of ourses offered but not spec f ca y sted th s cata og ee Omn bus Co rses page 56

ART (ART)

Studio Core Curriculum

ART 111 Drawing I. (3)
fa spr ng summ r
Fundamenta techn ca and per ept a sk us g common draw ng med a and the r app at on to p tor a organ z t on 6 hours a we k

ART 112 Two-Dimensional Design. (3)
fa spr ng summer
Fu damenta of p ctor a des gn 6 hours a week

ART 113 Color. (3)
fa spr ng summer
Pr nc p es of co or theory as re ated to the v sua arts 6 hours a week Prerequ te ART 111 112

ART 115 Three Dimensiona Design. (3)
fa spr ng summer
F ndamenta s f 3D fo m 6 hours a week Fee Prereq s tes ART 111 112

ART 294 Special Topics. (3)
fa and spr ng

Ceramics

ART 261 Ceramic Survey. (3)
fa spr ng summer
Handform ng methods throw ng on the whee decorat ve processes and g aze app at on 6 ho rs a week Fee Prerequ s tes ART 112 115

ART 360 Ceramic Throwing. (3)
fa and sp ng
De gn ana ys s and pr du t on of funct ona pottery Emphas s on throw ng tec n ques surface enr chment and g aze app cat on 6 hour a week May be repeated once for cred t Fee

ART 364 Ceramic Handbuilding I. (3)
fa
Search for f rm u ng handbu d ng te hn ques K f r ng and re ated pr b em Fee Prereq s te ART 261 or structor appr va

ART 365 Ceramic Handbuilding I. (3)
spr ng
C nt nuat on f ART 364 w th an add t ona f cus n arge a e works surface treatm nts and g aze decorat on w th re ated k n f r ng app cat ons Fee Prerequ s te ART 364 or n tructor approva

ART 394 Special Topics. (1–4)
se e ted semesters
Top cs may nc de the fo ow ng.
- Ce am cs
  Fee
- T rn ng
  F e

ART 460 Ceramic Clay. (3)
spr ng
Research nto var o s ay body formu at ons oca natura mater a s s g azes and eng bes Lecture ab, stud o Fee Prerequ s tes both AR 360 a d 364 or o y nstructor approva

ART 463 Ceramic Glaze (3)
fa
G aze ca cu at on and formu at on u ng var o s g aze co ors and sur faces Lecture ab, stud Fee Prerequ s te ART 460 or nstructor appr va

ART 466 Special Problems n Ceramics (3)
fa spr ng summer
Empha on pe son expre s on w th n structure of sem nars cr t que . and stud o work Profes o a methods of pre entat on docu mentat on of work 6 hours a week May be repeated for cred t Fee P erequ te ART 364 or n tructor approva

ART 494 Spec a Top cs. (1–4)
se e ted semesters
Top s may c ude t e fo ow ng
- Ceram s Pr ntmak ng
  Fee
- name ng
  Fee
- Turn ng
  Fee
- Vap r G zes
  Fee

ART 594 Conference and Workshop. (1 12)
se ected semesters
Top c may nc ude the f ow ng
- Turn ng
  Fee

ART 598 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng
- Ceram c C ay
  Fee
- Ceram c G aze
  Fee
- Ceram cs Pr ntmak g
  Fee
- Ename ng
  Fee
- Exper menta Pr ntmak ng
  Fee
- Spec a Prob ems n Ceram s
  Fee

Drawing

ART 211 Drawing II. (3)
fa spr ng summer
Cont nued deve opment of techn ca and perceptua sk s Emphas s on mater a s and p cto a content 6 h urs a week Prerequ s tes ART 113 115

ART 214 Life Drawing I. (3)
fa spr ng summer
Deve opment of k and express veness n draw ng the bas c f rm onstru t on and gesture from the human f gure 6 hours a week Fee Prerequ s tes ART 113 115.

ART 311 Drawing III. (3)
fa and spr ng
Emphas s on compos t on exp orat on of draw ng med a 6 hours a week Prerequ s tes ART 211 214 nstructor approva

ART 314 Life Draw'ng II. (3)
fa and spr ng
Draw ng from the mode w t g eater reference to structura g aph c, and compos t ona con erns 6 hours a week Fee Prerequ s te. ART 214 or nstructor approva

ART 315 Life Drawing III. (3)
fa and spr ng
The human f gure as the subject for draw ng. Emphas s on conceptua a ternat ves and management of mater a s. 6 hours a week Fee Pre requ s te ART 314 or nstructor approva

ART 411 Advanced Drawing. (3)
fa and spr ng
V sua and nte ectua concepts through prob em so v ng and ndepen- dent study Emphas s on the nd v dua creat ve statement 6 hours a week May be repeated for cred t Prerequ s tes ART 311 nstructor approva

ART 414 Advanced Life Draw ng. (3)
fa and spr ng
Var ous med a and techn ques on an advanced eve The human f g ure as an express ve veh c e n var ous contexts 6 hours a week May be repeated for cred t. Fee Prerequ s te ART 315 or nstructor approva

ART 415 Art Anatomy. (4)
se ected semesters
Study of human anatom ca structures as app ed to the pract ce of f g re or e ted art 3 hours ecture 5 hours stud o a week Fee Prereq u s te: ART 214

ART 494 Specia Topics. (1–4)
fa and spr ng
Top cs may nc ude the fo ow ng
- Draw ng 3

ART 598 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng·
- Art Anatomy
  Fee.
- L fe Draw ng
  Fee.

Fibers

ART 276 Fibers I. (3)
fa a d spr ng
Exp ores trad t ona and o temp rary mate a s and bas techn ques re ated to f bers mbro de y fe tmak ng dye ng b ock pr nt ng p t ng 3D structures Fee Prereq s tes both ART 113 and 115 or on y nstructor approva

ART 294 Special Topics. (1–4)
se ected emesters
Top cs may nc ude t e fo ow ng
- F bers for Nonmajors
  Fee

ART 376 Fibers: Loom Techniques. (3)
o ce a year
nvest gates oom techn q es and computer pattern des gn 6 h urs a week Fee Prerequ s te ART 13 or 115 or nstru tor approva

ART 377 Surface Des gn. (3)
fa and spr ng
App at on of dyes and p gments on c oth exp or ng techn ques f r ma ssues and content Cyanotype monopr nt ng pa nt ng on s k res sts sten ng Fee Prerequ s te ART 276 or nstructor approva

ART 394 Special Topics. (1–4)
se ected semesters
T p s may n ude the fo ow ng
- F bers Des gn for Nonmajors
  Fee

ART 476 Fibers: Multiple Harness Weaving. (3)
fa and spr ng
Advanced oom techn ques and omputer pattern des gn Emphas s on d v dua des gn and oom app cat on Fee Prerequ s te ART 113 or 115 or 376 or nstructor approva

ART 477 Printed Textiles. (3)
once a year
Te hn ques for screen pr nt ng on fabr c exp or ng pattern as a compo s t ona e ement Var ous stenc methods nc ud ng photograph c pro cesses May be repeated for cred t Stud o Fee Prerequ s te. ART 377 or nstructor approva

ART 478 Advanced Surface Des gn. (3)
spr ng n odd years
Emphas s on persona express on w th advanced prob ems n st tch res st arash sh bor transfers, nd go vat and d sperse dyes and p g ments Stud o Prereq s tes b th ART 377 and 477 or on y nstructor approva

ART 494 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng
- F bers and Surface
  Fee
- Pr t Text es
  Fee

ART 598 Special Topics. (1–4)
se ected semesters
Top c may nc ude the fo ow ng:
- F bers and Surface
  Fee
- Pr nt Text es
  Fee
- Pr nted Text es
  Fee

Intermedia

ART 345 Visualizat on and Prototyp ng I. (3)
spr ng n even years
Stud o sem nar ntroduces concepts of computer v sua zat on mode ng and rap d prototyp ng n an nterd sc p nary manner Lecture stu d o Prerequ s te. a Gene a Stud es CS course or nstructor approva

L teracy and cr t a nq ry **MA** athemat cs **CS** comp t stat st cs quant tat v app cat s **HU** m n t es a d f e arts **SB** a nd behav or c e ce **SG** natura sc ence gener o e our e **SQ** natura c e ce qu nt tat ve **C** t ra d er ty n the Un ted State **G** a **H** stor a See Gene a t d e page 83

ART 346 3D Computer maging and An mation. (3)
fa and spr ng
3D mode ng and an mat on Emphas on concepts and f ne arts app cat ons Stud o Fee P erequ s tes ART 113 115 jun or tand ng nstructor approv
Genera Stud e CS

ART 348 Computer Animation I (3)
fa a d spr ng
Pr c p es and app at o s of 3D an mat n for f ne arts. Emphas s n an mat on techn que for express ve effects Stud o Fee Prerequ s tes ART 346 jun r tand ng n tructor approva

ART 439 M xed Media. (3)
fa and sp g
Exp or ng v sua effect by comb n g trad t ona and nontrad t o a methods techn que and ncepts 6 h urs a week May be repeated f r cred t Stud o Prereq s tes a comb nat on of ART 113 and 115 and 6 hours add t na st d requ reme nts or n y nstru tor approva

ART 440 New Media Concepts. (3)
fa and sp ng
Cont nued exper ment w th new med a and nterd c p nary concerns n art 6 ho rs a week May be epeated for cred t Fee Prerequ s te AR 443 Coreq s te ART 441

ART 441 Video Art (1)
fa and sp ng
Ut z ng v deo a d aud o equ pme t e ent a to the pr duct on of broadca t q a ty v de art 2 ours a week May be repeated for red t orequ te ART 440

ART 442 Folk/Outsider Art. (3
fa
Exp ores deas att tude nd art of co temporary se f taug t v onary and uts der art ts Re earch and stu o pract ce Lec ture, stud o Prer qu s tes both ART 113 and 115 or on y structor approva

ART 443 Intermedia (3)
fa and spr ng
Exper menta c n eptua and terd c p na y stud o a t w th empha s s on new med a and tec no og e 6 o rs a week. May be repeated once f r red t Prerequ tes b th ART 113 and 115 or on y nstructor approva

ART 449 Computer Animat on and V deo. (3)
fa and spr g
ntegrates 3D f ne a t an mat on w th v deo and compos t ng May be rep ated for ed t St d Fee Prereq s te ART 348 or nstructor approva

ART 450 Computer Animation and Audio (3)
fa and p g
ntegrate aud w th 3D a mat on for f ne arts app cat ons c udes compos t ng nd effects May be repeated for red t Stud o Fee Pre requ s tes ART 449 nstructor approva

ART 470 Computer Animat on Portfo io. (3)
fa a d spr ng
Product on f v d otape and CD 3D a mat on p rtfo os for f e art and ndust y tegrat ng an mat o v deo and aud o May be repeated for ed t Stud o Fee Prereq s tes ART 449: n t u tor approva
Gene a Stud es S

ART 484 Internsh p. (1 12)
se ected en esters

ART 494 Special Top cs. (1–4
fa and pr ng
Top cs may nc ude the fo ow ng
- D g ta 3
- nterme d a 3
- te med a E e t v 3
- None e t on ntermed a 3

ART 499 Individualized Instruct on. (1 3)
e ected sen este s

ART 530 Two Dimensional and Three-Dimensional Computer Art (3)
o ce a year
ntegrate ⌊D and 3D computer mag ng for art Emphas ze new d rect ons for computer mag ng wh h ac ounts for med a character s t cs Stud Fee

ART 540 Advanced Computer Art. (3)
once a year
Study of mot on for 3D mode s ght source and urface effects As umes a omprehens on of omp ex mode ng mapp ng, and ght ng Stud o Fee Prerequ s te ART 346 or nstru tor app ova .

ART 598 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng
- D mens ona An mat on
  Fee
- New Med a Concepts
  Fee
- V deo Art

Metals

ART 272 Jewelry I. (3)
fa and spr ng
Emphas s on fabr cat on n jewe ry mak ng Bas c techn ques of utt g and p erc ng forg ng and so der ng and form ng 6 hou s a week Fee Pre equ s te. freshman or sophomore or un or standing

ART 372 Jewelry II. (3)
fa and spr ng
Fabr cated approach to jewe ry mak ng Techn ques n tone sett ng and urface embe shment 6 hours a week Fee Prerequ s tes a combinat on of ART 113 and 115 and 272 or on y nstructor approva

ART 373 Metalworking I. (3)
once a year
Compress on d e, and stretch form ng as app ed to ho w form c n struct on H t and c d forg ng techn ques as app ed to sm th ng 6 ours a week Fee Prerequ s tes a comb nat on of ART 113 and 115 and 272 or on y nstr ctor approva

ART 472 Advanced Jewelry. (3)
fa and spr ng
Jewe ry mak ng w th emphas s on deve op g persona tatements and craftsmanish p 6 hours a week May be repeated for c ed t Fee Prerequ s tes ART 372 nstructor approva

ART 473 Advanced Metalworking. (3)
once a year
Forg ng and form ng techn ques n nd v dua zed d rect ons 6 hours a week May be repeated for cred t Fee Prerequ s tes ART 373 structor approva

ART 494 Special Topics. (1–4)
fa and spr ng
Top cs may nc ude the fo ow ng.
- Meta s 3

ART 598 Special Topics. (1–4)
s ected semesters
Top cs may inc ude the fo ow ng
- Jewe ry Meta work ng
  Fee

Painting

ART 223 Painting I. (3)
fa spr ng summer
Fundamenta concepts and mater a s of trad t ona and exper menta pa nt ng med a Emphas s on preparat on of pa nt ng supports com pos t on and co or 6 hours a week Prereq s tes ART 113, 115

ART 227 Watercolor I. (3)
fa and spr ng
Fundamenta concepts mater a s and techn ques of waterco or Emphas s on prob em so v ng bas c sk s, composit on and c r 6 hours a week. Fee. Prerequ s tes ART 113 115

ART 323 Pa nting II. (3)
fa and sp ng
Deve opment of competency n sk s and express on As gned prob em nvo ve ght space co or form and content 6 hours a week Prerequ s te ART 223 or nstructor approva

ART 324 Pa nting III. (3)
fa and spr ng
Cont nuation f ART 323 6 hours a week Prereq s te ART 323 or nstructo approva

ART 325 Figure Painting. (3)
fa and spr ng
The human f gure c othed and nude as the sub ect f r pa nt ng n selected med a 6 hours a week Fee Prerequ s tes AR 314 323

ART 327 Watercolor II. (3)
once a year
Exp orat ons of persona express on n waterco or Cont nued deve op ment of waterco or sk s us ng trad t on and exper menta mater a s and techn ques 6 hours a week Fee Prereq s te ART 227

ART 423 Advanced Painting. (3)
fa and spr ng
Cont nuat on f ART 324 6 hours a week May be epeated for red t Prerequ s te ART 324

ART 425 Advanced Figure Painting. (3)
fa and spr ng
Cont nuat on of ART 325 6 hour a week May be repeated for red t Fee Prerequ s tes ART 315 324, 325

ART 427 Advanced Watermedia. (3)
fa and spr ng
Cont nuat on of ART 327 Advanced techn ques concepts, a d meth ods w th waterco or and other water based med a on paper 6 hours a week May be repeated f r cred t Fee Prerequ s te ART 327 or nstru tor approva

ART 494 Specia Topics. (1–4)
fa and spr ng
Top cs may nc ude the fo ow ng
- Pa nt ng. 3

ART 598 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng
- F gure Pa nt ng
  Fee
- Waterco or
  Fee

Photography

ART 201 Photography I. (3)
fa l and spr ng
Deve opment of sk s and techn ques of b ck and wh te photography Emphas s on camera work and darkroom procedures Must be taken w th ART 202

ART 202 Photography I Lab. (0)
fa and spr ng
See ART 201 Fee

ART 294 Special Topics. (1–4)
se ected semesters
Top cs may nc de the fo ow ng
- D g ta Art 3

ART 301 Photography II. (3)
fa and spr ng
Photography as an art med um w th add t ona exp orat on nto per sona photog aph c aesthet cs 6 hours a week Fee Prerequ s tes a comb nat on of ART 113 and 115 and 201 or on y nstructor approva

ART 304 Advanced Photography. (3)
fa and spr ng
nterpretat o and man pu at on of ght as a too n the performance of express ve photography 6 hours a week Fee Prerequ s te ART 301 or nstructor approva .

ART 305 Color Photography I. (3)
fa and sp ng
App cat on of co or transpare es and pr nts to photograph c art 6 hours a week Fee Prerequ s te ART 304 or nstructor approva

ART 308 Digital Photographic Images. (3)
fa and spr ng
S ann ng man pu at on ref nement and compos t ng of photograph c mages n the computer. Lab stud o Fee Prerequ s tes ART 113 115 201 jun or stand ng nstructor approva

ART 394 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng
- D g ta Art 3

ART 401 Nonsi ver Photography. (3)
fa and spr ng
Recogn t on of the n erent character st s of nons ver processes and the r use n commun cat ng deas 6 hours a week May be repeated f r cred t Fee Prerequ s te ART 304 or nstructor approva

ART 403 Senior Photographic Projects. (3)
fa and spr ng
Techn ca and ph o oph ca ref nement of persona aesthet c w th var ous photograph c med a 6 hours a week. May be repeated for cred t Fee Prerequ s te ART 304 or nstructor approva

ART 404 Portraiture Photography (3)
fa and spr ng
Ph tograph ng peop e. Cr t ca d sc ss ons and s de lectures o ss es n portra ture 6 hours a week May be repeated for cred t Fee Prerequ te AR 304 or nstructor approva

ART 405 Advanced Color Photography. (3)
fa and spr ng
ntens ve use of subtract ve co or process n photograph c pr nt ng 6 hour a week May be repeated for cred t Fee Prerequ s te ART 3 5 or nstructor approva

ART 406 Photo Techniques. (3)
fa and spr ng
Camera and darkroom te hn ques w th emphas s on creat ve contro of the b ack and wh te pr nt 6 hours a week Prerequ s te ART 301 or nstructor approva

ART 407 View Camera. (3)
fa and spr ng
V ew camera and darkroom techn ques Stud o ab Fee Prereq s te ART 301 or nstructor approva

ART 409 Photographic Exhibition. (3)
once a year
Care of photograph c pr nt pr nt presentat on and exh b t on Pract a exper ence n ga ery perat ons 6 hours a week May be repeated for red t Prerequ s te ART 304 or nstructor approva

ART 494 Special Top cs. (1–4)
fa and spr ng
Top s may nc ude the f ow ng
- Co otype
  Fee
- D g ta Phot graph c mages I 3
  Fee
- D g ta Pr nt ng
  Fee
- Documentary Ph tography
  Fee
- ssues n D g ta Photography
  Fee
- Landscape Photography
  Fee
- 19th Centu y Ph t Pr cesses 3
- Photo 3
- Photograph Fabr cat on
  Fee
- Phot gravure
  Fee
- V sua zat on and Prototyp ng I 3

ART 498 Pro-Sem nar (1–7)
se ected semesters
Top cs may nc ude the fo ow ng
- Landscape Photograp y: heory
  Fee

ART 598 Special Topics. (1–4)
se ected semesters
Top cs may nc ude t e fo ow ng
- Advanced Co or Photograp y
  Fee
- Co otype
  Fee

L tera y a d t ca y **MA** athemat s **CS** o pute stat st c quant tat ve app t o **HU** human t e and f e art **SB** o a and b hav ora sc en e **SG** natura sc en e—genera core courses **SQ** tura ce qua t tat e **C** cu t a d ve ty n the ted States **G** g ba **H** to a S e Ge e St e page 83

- Dig ta Photograph c mages
  Fee
- D g ta Pr nt ng
  Fee
- Documentary P tography
  Fee
- ssues n D g ta Ph t graphy
  Fee
- Lands ape Photography
  Fee
- Nons ver Photography
  Fee
- Photogr ph c Fabr cat on
  Fee
- Photogravure
  Fee
- Portra ture Ph tography
  Fee
- V ew Camera
  Fee

Printmaking

ART 253 Introduction to Printmaking. (3)
once a year
ntroduct on to bas c monotype ntag o re ef and re ated techn ques. Stud o Fee Prerequ s te ART 113

ART 351 Intaglio I. (3)
fa and spr ng
ntroduces contemporary and trad t o a deve opmenta techn ques for b ack and wh te pr nts 6 hours a week Fee. Prerequ s tes both ART 113 and 115 or on y nstructor approva

ART 352 Lithography I. (3)
fa and spr ng
Monochromat c and co or p anograph c pr ntmak ng ut 'z ng stone and a um num p ate processes. 6 hours a week Fee Prerequ s tes both ART 113 and 115 or on y nstructor approva

ART 354 Screen Printing I. (3)
fa and spr ng
ntroduces paper d rect and photograph stenc l techn ques 6 hours a week Fee Prerequ s tes both ART 113 and 115 or on y nstructor approva

ART 355 Photo Process for Printmaking I. (3)
fa
ntroduces photograph c pr nc p es and sk s for photomecha ca pr ntmak ng processes nc ud ng photos kscreen photo tho and photoetch ng. 6 hours a week. Fee Prerequ s te· ART 201 or ts equ va ent

ART 394 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng.
- Re ef Pr ntmak ng
  Fee

ART 451 Advanced Intaglio. (3)
fa and spr ng
Var ous contemporary and trad t ona methods of pr nt ng to ach eve co or pr nts. 6 hours a week May be repeated for cred t. Fee. Prereq u s te· ART 351 or nstructor approva .

ART 452 Advanced Lithography. (3)
fa and spr ng
Cont nuat on of ART 352 6 hours a week May be repeated for cred t. Fee Prerequ s te ART 352 or nstructor approva

ART 454 Advanced Screen Printing. (3)
once a year
Cont nuat on of ART 354 6 hours a week May be repeated for cred t. Fee. Prerequ s te ART 354 or nstructor approva

ART 455 Advanced Photo Processes for Printmaking. (3)
once a year
Cont nued study of photomechan ca tech ques and app icat ons to pr ntmak ng or photograph c processes Fee Prerequ s te ART 355 or nstructor approva

ART 456 Fine Printing and Bookmaking I. (3)
once a year
Letterpress pr nt ng and typography as f ne art Study of h story a phabets mechan c of hand typesett ng, presswork and var ous f rms of pr nted matter Fee Prerequ s te nstructor approva

ART 457 Fine Printing and Bookmaking II. (3)
once a year
Cont nuat on of ART 456 Bookb nd ng book de gn and pr nt ng advanced typ graphy theory, and pressw k. May b repeated for red t Fee Prerequ s tes ART 456; nstructor approva

ART 458 Papermaking. (3)
fa and spr ng
H story theory, demonstrat ons sheet form ng co age treatments and 3 d mens ona approaches 6 hours a week May be repeated for cred t. Fee. Prerequ s te nstructor approva

ART 459 Monoprinting. (3)
fa and spr ng
Nonmu t p e pr nted mage s ng a var ety of techn a approaches 6 hours a week May be epeated for cred t Fee Prerequ tes ART 311, 323 or any 300 eve p tmak g c as nstructor approva

ART 494 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng
- Advanced S reen Pr nt ng
  Fee
- Art sts Books
  Fee
- Exper menta Paper
  Fee
- Exper menta Pr ntmak ng
  Fee
- Re ef Pr ntmak ng
  Fee

ART 551 Intaglio Projects. (3)
fa and spr ng
Mater a s and methods of ntag o as a matr x for exp or ng var ous contemporary ssues Spec f ca y structured to accommodate the graduate eve draw ng student w th no pr ntmak ng background Stu d o Fee

ART 598 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng
- Advanced Photo Process for Pr ntmak ng
  Fee
- Art sts Books
  Fee
- Exper menta Paper
  Fee
- F ne Pr nt ng and Bookmak ng
  Fee
- F ne Pr nt ng and Bookmak ng
  Fee
- L thography
  Fee
- Monopr nt ng
  Fee
- Papermak ng
  Fee
- Photo Processes for Pr ntmak ng
  Fee
- Re ef Pr ntmak ng
  Fee
- Screen Pr nt ng
  Fee

Sculpture

ART 231 Sculpture I. (3)
fa , spr ng, summer
Exp ores scu ptura forms through concepts re ated to bas c mater a s Focus on stud o product on safety, aesthet c cr t c sm, and h story of scu pture. 6 hours a week Fee Prerequ s tes both AR 113 and 115 o on y nst ctor approva

ART 274 Wood I. (3)
fa and spr ng
Fundamenta woodw rk ng techn ques to pr duce reat ve funct ona 3D ob e ts 6 hours a week Fee

ART 331 Sculpture II. (3)
fa and spr ng
Cont nuat on of ART 231 w th an emphas s on meta fabr cat on as an express ve scu ptura pro ess Techn que n we d ng cutt ng and bend ng of meta s and the r ae thet s 6 hours a week Fee Prerequ s te ART 231 or n tructor approva

ART 332 Sculpture III (3)
fa and spr ng
Exp ores d ver e med a w th a focus on m d mak ng processes Deve opment of the scu pture portfo o 6 hour a week Fee Prerequ s te ART 331 o nstru tor approva

ART 333 Foundry Cast ng Methods. (3)
fa and spr ng
F ne art and tec n ques of meta cast ng mo d m k ng foundry afety f n sh ng techn ques app at on f pat nas, and h story of cast ng 6 ho rs a week May be repeated for red t Fee Prerequ s te ART 332 or st ucto approv

ART 374 Wood II (3)
fa a d spr ng
d v dua a d d e ted prob ems n wood re ated t the produ t on of un que funct ona art obje ts 6 ho r a week F e Prerequ tes a omb nat on f AR 113 and 115 and 274 r on y nst uctor approva

ART 394 Special Top'cs. (1–4)
se ected semesters
op cs may nc ude the f ow ng
- arv g
  Fee

ART 431 Specia Problems in Sculpture. (3)
fa a d spr ng
Deve pment f a persona appr ach t s u pture Emp as s on form nd v dua prob ems a d re ated c or te hno ogy Profess ona prac t ces and presentat on 6 hour a week May be repeated for cred t Fee Prerequ s te ART 332 nstructor approva

ART 432 Neon Scu pture. (3)
fa
Techn ques for cre t ng ne n n an art context G ass tube ben ng and fab cat on Con truct on of artw rk ut z ng ght generat ng gas se 6 hour a week May be repeated f r cred t Fee Prerequ s te nstructor approva

ART 433 Foundry Research Methods. (3)
fa and spr ng
Re earch n f u dry techn que Stud o Pre or orequ s te ART 333 or n tructor approva .

ART 436 Architectura Sculpture. (3)
se ected semesters
Scu pt ra concepts as re ated to ar h te ture and other man made env ro ments. Sca e d aw ng, mode s and re ef cu pture 6 ours a week May be repeated for ed t Fee Prerequ s te ART 332 or nstructor appr va

ART 437 Film Animation. (3)
fa
Product on of short 16mm f m that featu e art u ated scu ptura ob e ts mode d s puppets an g aph cs through the use of s n g e frame f m ng techn ques 6 hours a week May be repeated for c ed t Fee Pre equ s te nstru tor appr va

ART 438 Exper mental Systems in Sculpture. (3)
spr ng
S mp e e ectr ca a d mec an ca systems that can be ut zed n the context of stud o art and nsta at ons Requ re act ve prod t on of stud o artworks 6 hours a week May be repeated f r cred t Fee Pre requ te nstruct approva

ART 474 Advanced Wood. (3)
fa and spr ng
Exte ded exper e ce and advan ed techn q es n the use of wood to create funct ona w rk of art 6 hours a week May be repeated for red t Fee Prerequ s tes ART 374 st u tor approva

ART 494 Special Topics. (1–4)
se ected semester
Top cs may nc de t e fo ow g
- Advanced Scu pture
  Fee.
- Carv ng
  Fee
- F m Post Product on
  Fee
- Foundry Cast ng Methods
  Fee
- Foundry Research Methods
  Fee
- L ve Act on F mmak ng
  Fee

ART 594 Conference and Workshop. (1 12)
se ected semesters
Top s may nc ude the fo ow ng
- Carv ng
  Fee

ART 598 Specia Top cs. (1–4)
se ected seme ters
Top cs may nc ude the fo ow ng
- Advanced Scu pture
  Fee
- Arch tectura Scu pture
  Fee
- Exper menta Systems n Scu pture
  Fee
- F m An mat n
  Fee
- F m Post Product on
  Fee
- F undry Cast ng Methods
  Fee
- Foundry Research Methods
  Fee
- L ve Act n F mmak ng
  Fee
- Neon Scu pture
  Fee
- Spec a Prob ems n Sculpture
  Fee
- W od
  Fee

Special Studio Art

ART 582 Art Research. (1 12)
fa spr ng summer
ndependent study research us ng c assroom fac it es and supp es Stud o

ART 621 Studio Problems. (3)
fa spr ng summer
Advan ed study 6 hours a week each sect on May be repeated for cred t Top cs may nc ude the fo ow ng
- Ceram cs
  Fee
- Draw ng
- F ber Art
- nterme d a
- Jewe ry Meta work g
  Fee
- Meta
- Pa t ng
- Phot graphy
- Pr ntmak ng
  Fee
- Scu pture
- Stud o Art
- Wo d

Prerequ s te. nst uctor approva

L tera y a d r t ca qu ry **MA** athe at **CS** co puter stat st cs quant tat ve app cat ons **HU** hu an t es and f ne arts **SB** oc a a d behav ra e ce **SG** natura s e ce ge e a e ur e **SQ** natura ence qua t tat ve **C** u t a d ve ty the n ted State **G** g oba **H** h tor ca e Gene a St e page 83

ART 680 Practicum: M.F.A. Exhibition. (1 15)
fa , pr ng summer
Stud o work n preparat on for requ red M F A exh b t on Pub c exh b t to be approved by the student uperv sory mm ttee and accompa n ed by a f na ora exam nat on Photograph c documentat on and wr tten tate ent of prob em Prerequ te appr va of t e tudent s s perv sory comm ttee

ART 682 M.F.A. Exhibition Research. (1 12)
fa spr ng summer
M F A exh b t on pract cu us ng c as r m fac t es a d s pp es Can be used n p ace of ART 680 Prerequ s te approva of the tu dent s superv s ry comm ttee

Omnibus Courses. Fo an exp anat on of courses offered but not spec f a y sted n th cata og see Om bus Cour es page 56

Department of Dance

herbergercollege.asu.edu dance
480 965-5029
PEBE 107A

Claudia Murphey, Chair

Professors: Kap an, Keuter Ludw g Murphey

Associate Professors: Jackson, Matt Mooney

Assistant Professors: F tzgera d ndho m Lane Parr sh Ro n ck, Tsukayama, V ss caro

Associate Research Professional: M tche

Lecturer: Tongret

The Departn ent of Dance is con mitted to provid ng a stimulating and diverse env ronment where st dents develop as scholars, educators and artists through partic p at on in nn vative programs, residencies, perf rmances, and part nersh ps A students reg sterin in a degree pr gram enr ll th rough the Herberger College of Fine Arts Admission po cies and procedures and the specific requirements of each Bachelor of F ne Arts degree concent tratio are available from the Department of Dance Advisement Office

Admission. All new Dance majors are admitted into the preprofessional pro am. While n the preprofess ona pro gram, students enr ll in General Stud es courses, complete ower d vision dance requirements and explore academic n terests and career pt ons through advis n g and mentor ing Comp etion of preprofessional courses does not ensure accept nce nto the Bache or of Fine Arts de ree in Dance.

All students must petition for adn iss on to t e Bachelor of Fine Arts de ree in Dance by the second semester of the sophom re year. Transfer students may request adm ission to a concentratio n after one semester n residence Concentra tions are ffered n four areas ch reography, d nce educ t tion, d nce tudies, and performance. Depending upon the concentration selected, the admission process may inc ude a technique audition, submission of videotapes of cho reo graphed works, subn iss on of a w iting sa mple, and or sub mission of a written statement of ntent and research inter ests. All students are interviewed before admiss on

Specific requirements an l pol cies rel te l tc admiss on to ach of the concentrations are vail ble through the A lvise ment Office Admiss n is highly sc ective Students who are n t admitted to the Bache or of Fine Arts degree in D nce are n t dismissed from the univers ty an l may r ap ply once dur ng the follow n semester or transfer to another pro am. Students who intend to reapply or tr nsfer should meet with the departn ent dvisor Registration for most upper division dance courses is limited to students dmitted to Bachelor of Fine Arts degree n Dance concen trations.

Placement Auditions. A p acement audition n modern and ballet technique is required of all new studen ts before enrolling in the preprofessio a program. Placement audi tions are conducted for high s hoo seniors an l transfer stu den ts in November and Februa y. Scholarship aud t o ns, which are high y competit ve, are he d i tandem with t e February placement auditions. Additiona opportunities to audition for p acer ent are provided durin the August and January orientation periods To take advantage of the early registrati n process, new students are advised to audition for placement before high sch ol graduat on or transferring. Students are not allowed t register for d nce technique c asses without an assessment of their technical profic ency through audition Criter a for placen ent in dance techn que classes are pub shed n student handbooks ava lable in the Advisement Office, the placement udition process i con ducted and monitored by the Departn ent of Dance Tech nique Comm ttee Thro ugh aud tion st dents ar placed in levels based on demonstrated ab ties therefo e pr or back ground in dar ce is helpful Students unable to demonst ate proficiency for Dance ma er c asses are econ mended for p a ement in nonmajor c asses to fulfill technique deficien cies Credits in n nma or course work ordinar ly do not apply to Dance major requ rements in modern or ba let technique

Transfer students who have comp eted music theory for d nce, dance pro duction, or chore graphy courses at another institution are also r qu red to take placement examinations in these areas before en rolling in intermed ate or advanced course work. These examinat ons are offered durin the August and Jan ary orientation per ds.

DANCE—B.F.A.

The facu ty in the Department of Dance offer a Bachelor of Fine Arts (B F.A) de ree at the under raduate evel with four areas of concentration. choreography, dance educat on dance stud es and performance. All new student are admit ted int the preprofessional progr m. Students audition or petition for admission nto on e of the concen trations during the sophon ore year of study. Transfers n ay request admis sion into the B F.A. de ree after one semester n reside ce. Further detai s may be obtained from the Dep rtment of Dance.

Graduation Requirements. In addition to fulfilling the ma or requ rements, students nust n eet a un ver ity g ad uation requ rements and co ege de ree requ re nen ts. At

least 45 semester hours must be upper division courses. See "University Graduation Requirements," page 79, and "College Degree Requirements," page 276.

Preprofessional Program. First semester students in the preprofessional program should take the following courses:

DAN 134 Technique and Theory of Modern Dance	3
DAN 135 Technique and Theory of Ballet	2
ENG 101 First Year Composition	3
Dance elective*	2
General Studies courses	6
Total	16

Core Curriculum. The Dance major consists of a minimum of 59 semester hours in the dance core. All courses in the major must be completed with a grade of "C" or higher. The following areas make up the core curriculum.

Technique. Twenty-six semester hours in ballet and modern technique are required.

Performance. Two upper division courses are required.

Theory. The following dance theory courses are required.

DAH 180 Dance in World Cultures *HU, G*	3
or DAH 191 First Year Seminar 3	
DAN 221 Rhythmic Theory for Dance	2
DAN 222 Rhythmic Theory for Dance II	2
DAN 344 Dance Kinesiology	4
Total	11

Choreography and Improvisation. The following courses are required:

DAN 264 Improvisational Structures	3
DAN 265 Approaches to Choreography	3
Total	6

History. Choose two from the following three courses:

DAH 301 Philosophy and Criticism of Dance *L, HU*	3
DAH 302 Cross Cultural Dance Studies *L, HU, G*	3
DAH 411 Dance History *HU*	3

Production. For the concentration in dance studies choose one of the following two courses:

DAN 210 Dance Production I	3
DAN 211 Dance Production II	3

* Both courses are required for performance, choreography, and dance education concentrations.

Dance Concentration Curriculum. Each concentration in the dance curriculum—choreography, dance education, dance studies, and performance—is composed of 25 semester hours.

Choreography

Core Curriculum. See "Core Curriculum," on this page.

Specialization. The following courses are required for the choreography specialization:

DAN 228 Dance Notation	3
or DAN 445 Laban Movement Analysis	
DAN 321 Music Literature for Dance	3
DAN 364 Choreography and Accompaniment	3
DAN 365 Advanced Choreography	3
DAN 480 Senior Performance in Dance	4
Total	16

Production. The following two courses are required:

DAN 210 Dance Production I	3
DAN 211 Dance Production II	3

Additional requirements are listed on the check sheet available from the Department of Dance.

Dance Education

Core Curriculum. See "Core Curriculum," on this page.

Specialization. The following courses are required for the dance education specialization:

DAN 311 Methods of Teaching Children's Dance	3
or DAN 351 Methods of Teaching Contemporary Dance Technique and Composition in Secondary Education 3	
or DAN 352 Methods of Teaching Ballet 3	
DAN 321 Music Literature for Dance	3
DAN 359 Dance Education Theory	3
DAN 364 Choreography and Accompaniment	3
DAN 485 Senior Performance in Dance	4
Total	16

Production. The following two courses are required:

DAN 210 Dance Production I	3
DAN 211 Dance Production II	3

Dance Methods. The following three courses are required:

DAN 351 Methods of Teaching Contemporary Dance Technique and Composition in Secondary Education	3
DAN 352 Methods of Teaching Ballet	3

A student pursuing the dance education concentration may also choose to become certified to teach dance K-12 in Arizona public schools. Students should apply to the College of Education in the middle of the sophomore year. To be considered for admission to the teacher certification program students must complete an admission portfolio specified by the College of Education. Students should be advised that at least 20 additional semester hours are required to complete certification requirements. For more information consult the dance education advisor and College of Education Office of Student Services.

Additional requirements are listed on the check sheet available from the Department of Dance.

Dance Studies

Core Curriculum. See "Core Curriculum," on this page.

Literacy and Critical Inquiry **MA** mathematics **CS** computer science **QUANT** quantitative applications **HU** humanities, arts and design **SB** social and behavioral sciences **SG** natural sciences **SQ** natural sciences **G** global awareness **H** historical awareness See General Studies, page 83

Specialization. The following courses are required for the dance studies specialization:

DAH 495	Dance Research Sources	2
DAH 496	Senior Thesis Project	2
Total		4

Twenty additional hours approved by an advisor must be taken in no more than two related fields. Additional requirements are listed on the check sheet available from the Department of Dance.

Performance

Core Curriculum. See "Core Curriculum," page 297.

Specialization. The following courses are required for the performance specialization:

DAN 321	Music Literature for Dance	3
DAN 380	Performance Studies Practicum	3
DAN 481	Senior Performance in Dance	4
THP 151	Introduction to the Art of Acting	3
Total		13

Production. The following two courses are required:

DAN 211	Dance Production I	2
DAN 311	Dance Production II	3

Performance. Choose from the following three courses; six semester hours are required.

DAN 371	Dance Theatre Performance Production	3
DAN 471	Dance Arizona Repertory Theatre	3–4
DAN 484	Concert Dance	2

Additional requirements are listed on the check sheet available from the Department of Dance.

MINOR

The department offers a minor in Dance consisting of 18 semester hours of course work, including 12 upper division hours. A minimum grade of "C" is required in all courses. Dance minor requirements include:

Performance or choreography	3
Technique	6
Theory	6
Elective	3

Interested students should contact the Department of Dance for specific requirements and admission procedures.

GRADUATE PROGRAM

Dance—M.F.A.

The M.F.A. degree in Dance is a 60 semester hour program designed to provide opportunities for the student to continue to develop in areas of dance technique, choreography, performance, and production; to gain further understanding of the philosophy, history, theory, education, and science and somatics of dance; and to begin to chart the direction of the future through technology, media opportunities, outreach and community partnerships.

DANCE HISTORY (DAH)

DAH 100 Dance in World Cultures. (3)
fall, spring, summer
Orientation to the field of dance focusing on history, styles, cultural and theatrical aspects of the art form from a global perspective.
General Studies HU, G

DAH 190 Introduction to the Dance Profession. (3)
fall
Orientation to the dance profession introducing career options, wellness, technique, history, cultural aspects. Designed for premajors in Dance.

DAH 191 First-Year Seminar. (1–3)
selected semesters

DAH 300 Focus on Dance. (3)
fall, spring, summer
Specialized study of cultural and theatrical aspects of dance such as classical dance forms, specific genres or historical periods. May be repeated for credit, different topic.
General Studies HU

DAH 301 Philosophy and Criticism of Dance. (3)
fall, and spring
Philosophical issues in dance and dance criticism, with emphasis on written analysis and interpretation. Prerequisite: 1 semester of First Year Composition.
General Studies L, HU

DAH 302 Cross-Cultural Dance Studies. (3)
fall, and spring
Comparative analysis of dance in diverse cultural contexts. Requires ethnographic research project. Prerequisites: completion of First Year Composition requirement, junior standing.
General Studies L, HU, G

DAH 401 Dance History. (3)
fall, and spring
History of dance with a focus on Western form from the Renaissance to contemporary times.
General Studies H

DAH 495 Dance Research Sources. (2)
fall
Investigates various resources and methods for conducting research in dance. Seminar. Prerequisite: instructor approval.

DAH 496 Senior Thesis Project. (2)
spring
Culminating research project that integrates dance and area of interest. Prerequisite: DAH 495.

DAH 501 Philosophy of Dance. (3)
once a year
Analyzes traditional and contemporary theories of dance with regard to issues of expression, form and meaning.

DAH 502 Cultural Concepts of Dance. (3)
once a year
Examines the close connection between culture, dance and movement through writing in cultural theory, dance ethnology and philosophy.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog see Omnibus Courses page 56.

DANCE (DAN)

DAN 130 Dance. (2)
fall, spring, summer
Introduces styles and forms of dance: ballet, modern, jazz, tap, ballroom, ethnic. May be repeated for credit.

DAN 134 Technique and Theory of Modern Dance. (3)
fall, and spring
Elementary concepts of modern dance technique. Development of movement quality and performance skills. 6 hours weekly. May be repeated for credit. Prerequisite: Dance major placement audition.

DAN 135 Technique and Theory of Ballet (2)
fa and spr ng
E ementary ba et techn que w th emphas s on a gnment contro and deve opment of the feet w th proper awareness of sty e a d phras ng 4 hours week y May be repeated for cred t Prerequ s te p acement aud t on

DAN 164 Improvisation. (1)
fa and spr ng
mprov sat on techn ques emp oy ng the bas c e ements of space t me and energy Stud o

DAN 210 Dance Production I. (3)
fa
Theory and pract ce of ght ng scenery sound, and stage manage ment for dance product on Labs cover a areas of product on Lec ture, ab

DAN 211 Dance Product on II. (3)
spr ng
T eory and pract ce of arts management and costume des gn for dance product on Labs cover a areas f product on Lecture ab

DAN 221 Rhythmic Theory for Dance I. (2)
fa
E ements of mus c mus c structures and the r re at onsh p to dance Emp as s on rhythm c ana ys s and dance accompan me t

DAN 222 Rhythmic Theory for Dance II. (2)
spr ng
Cont nuat on of DAN 221 w th an emphas s o sma group movement projects n re at on to mus ca t me and structure CD ROM work n uded. P erequ s te DAN 221 or prof c ency exam.

DAN 228 Dance Notation. (3)
fa and spr ng
Surveys systems of dance notat on introduces effort shape ana ys s of movement. Empha zes earn ng e ementary abanotat on Lecture stud Prerequ s tes DAN 221, MUS 100

DAN 230 Dance. (2)
fa spr ng summer
Intermed ate leve s Cont nuat on of DAN 130. May be repeated for cred t

DAN 234 Technique and Theory of Modern Dance. (3)
fa and spr ng
Intermed ate concepts of modern dance techn que Deve opment of movement qual ty and performance sk s 6 hours week y May be repeated for cred t Prerequis te p acement aud t on

DAN 235 Technique and Theory of Ballet. (2)
fa and spr ng
Advanced study of e ementary ba et techn que through the trad t ona exerc ses w th proper awareness of sty e and phras ng. 4 hours week y May be repeated for cred t. Prerequ s te p acement aud t n

DAN 237 Beginning Pointe. (1)
fa and spr ng
Study of e ementary po nte te hn que through the trad t ona exer c ses 2 hours week y May be repeated for cred t Prerequ s tes bas c ba et tra n ng nstructor approva

DAN 264 Improvisational Structures. (3)
fa
ntroduces bas c mprov at ona and choreograph c pr nc p e w th emphas s on current med a and technology group structures, and movement nvent on Lecture, stud o

DAN 265 Approaches to Choreography. (3)
spr ng
ntermed ate app cat on of bas c choreograph c pr nc'p es w th emphas s on mprov sat on form content and eva uative sk s. Lec ture stud o Prerequ s te DAN 264.

DAN 311 Methods of Teaching Children s Dance. (3)
fa and spr ng
Theory and pract ce of teach ng creat ve dance to ch dren Des gned for Dance majors and re ated curr cu a, but open to a students Lec ture stud o f e d exper ence

DAN 321 Music Literature for Dance. (3)
fa and spr ng
H stor ca survey of mus c and ompos t ona e ements re at ve to dance Emphas s on ana ys s of choreography from a mus ca stand po nt Lecture ab CD ROM ab Prerequ s tes both DAN 221 and 222 or on y nstructor approva Pre or corequ s te MUS 34

DAN 330 Dance. (2)
fa spr ng summer
Advanced eve s Cont nuat on of DAN 23 May be repeated for red t

DAN 334 Technique and Theory of Modern Dance. (3)
fa and spr ng
Advanced concept of modern dance tec n que Deve opment of movement qua ty and performance sk 6 hour week y May be repeated fo cred t Prerequ s te p acement aud t on

DAN 335 Technique and Theory of Bal et. (2)
fa and spr ng
ntermed ate ba et techn que w th emphas s on strength dynam cs rhythm ca mpu ses and trans t ons w th awareness of proper sty e and phras ng 4 hours week y May be repeated for cred t Prerequ s te p acement aud t on

DAN 337 Intermediate Pointe. (1)
fa and spr ng
Study of ntermed ate and advan ed po nte techn que through t e tra d t ona exerc ses 2 hours week y May be repeated for cred t Prereq u s te DAN 237 or nstructor approva

DAN 340 Dance Kinesiology. (4)
fa and spr ng
Pr nc p es of k nes o ogy app ed to the ower extrem ty c ud ng den t f cat on of muscu ar mba ances nher ted anatom ca d fferen es, and pathomechan cs n dance movement Prerequ s tes both B O 201 and adm ss on to a Dance B F A concentrat on r on y n tructor approva

DAN 342 Ideokinesis. (2)
fa
Study of posture us ng the v ua zat on of mage goa s to fac tate mproved a gnment and movement eff c ency May be repeated for cred t Lecture stud o

DAN 350 Methods of Teaching Contemporary Dance Technique and Composition in Secondary Education. (3)
spr ng
Ana ys s and acqu s t on of sk s and mater a for teach ng contempo rary dan e techn que nd compos t on n secondary educat on Lec ture tud o f e d expe ence Pre or corequ s te DAN 359

DAN 351 Methods of Teaching Ballet. (3)
spr ng
Ana ys s and acqu s t on of teach ng techn ques and mater a s for b et jazz and mu t cu tura dan e form ecture stud o Pre or coreq u s te DAN 359

DAN 359 Dance Education Theory. (3)
fa
Mot vat on earn ng assessment h stor ca cu tura and soc a c n stru ts out each serv e advo acy curr cu um deve opment 'n dance educat on ect re, f e d exper ence

DAN 364 Choreography and Accompan'ment. (3)
fa
Exper ence n the use of trad t ona and nontrad t ona mus ca stru tures a a bas s for choreograph c pro ects ecture, stud o Prerequ s te DAN 321

DAN 365 Advanced Choreography. (3)
spr ng
nvest gat on and pract ce of ontemporary sty es f choreography Stud o Prerequ s tes DAN 264 and 265 or the r equ va ents

DAN 371 Dance Theatre Performance Production. (1 3)
fa and spr ng
Performance or techn a theatre work des gnated da e produc t ons 3 hours a week per emester hour May be repeated for cred t Prerequ s te stru tor approva

DAN 380 Performance Studies Pract cum. (3)
spr ng
Focus on deve op ng rehearsa sk s and ach ev ng performance exce e ce through the preparat on of three comp eted works Stud o, ab

L tera y and t c qu ry **MA** t emat **CS** compute stat st s quant tat ve app cat ons **HU** uman t es and f ne arts **SB** soc a and behav ora s e e **SG** atu a sc en e gene a ore ur e **SQ** natu c en e q ant tat ve **C** u tura d ve ty n the ted State **G** g oba H h tor a See Gen a St d e page 83

DAN 423 Dance, Computers, and Multimedia. (3)
fa and sp ng
ntr duces deskt mu t med a as t re ates to dance creat on educa t on product o and research Lecture ab
Genera Stud es CS

DAN 434 Technique and Theory of Modern Dance. (3)
fa and spr ng
Preparat on n the performance and comprehens on of profess ona eve modern dance te hn que 6 ho rs week y M y be repeated for cred t Prerequ s te p acement aud t on.

DAN 435 Technique and Theory of Ballet. (2)
fa and spr ng
Study of p fess ona adva ced ba et techn que w th emp as s on preparat on for performance 4 hours week y May be repeated for cred t Prerequ s te p acement aud t n

DAN 443 Bodywork for Dancers. (2)
sp ng
ntroduces var us massage the apy m da t es for dancer nc ud ng Sh atsu Swed h massage sports massage and propr cept ve neu romuscu ar fac tat techn que

DAN 445 Laban Movement Analysis. (3)
spr ng
Theory and pract ce of Laba movement ana y s and Barten eff fun dame ta s through movement nvest gat ob ervat on notat on and a a ys s Lecture, stud o Prerequ s te. adm s on t a B F A n Da ce centrat o

DAN 471 Dance Arizona Repertory Theatre. (3–4)
fa and spr ng
Preprofess ona modern dance company emphas z ng outreach and performance Opportun ty to work w th g est art sts and commun ty schoo s and organ zat ons Lecture stud o Prerequ s te n tructor approva

DAN 472 Concert Dance (2)
fa and spr ng
Extens ve preparat n of repertory or new works created by expe enced choreographers S mu ates dance compa y exper ence cu m nat ng n performan e St d Prerequ tes aud t on nstructor approval

DAN 480 Senior Performance in Dance. (2)
fa
Or g a chore graphy for group performan e w th ana ys s and r t que of prob ems encountered n product on Must be repeated for a tota of 4 cred ts Prerequ s tes DAN 364 365

DAN 484 Dance Internship. (1–3)
fa and spr ng

DAN 494 Special Topics. (1–4)
once a year
Top s may c ude the fo ow ng
• C cert Da ce 2

DAN 500 Research Methods. (1–12)
se ected semesters

DAN 510 Dance Stagecraft and Production. (1 3)
fa and spr ng
Theory of co tum ng ght ng makeup cenery and sound as re ated to dance performance May be repeated on e for red t Lectu e stu d o Prerequ s te DAN 211 or ts equ va ent

DAN 521 Sound Lab. (2)
fa
Aud o m x ng for ana og d g ta record ng and ed t ng Lecture ab Pre requ s te nstructor app va

DAN 522 Sound Design (2)
spr ng
Fo us on d g ta record ng ed t ng of a d o compos t ons f r choreo graph c and v deo projects. Lecture ab Pre or corequ s te DAN 423 or 521

DAN 523 Dance, Computers, and Multimedia. (3)
fa and sp ng
ntroduces desktop m t med a as t re ates to dance creat o prod c t on educat on a d research ect re ab

DAN 534 Technique and Theory of Modern Dance. (3)
fa and spr ng
Preparat on the performance and comprehens on of profe s ona eve modern dance for f rst year graduate students 6 ho rs week y May be repeated for red t Prerequ te p acement aud t on

DAN 535 Technique and Theory of Ballet. (2)
fa and spr ng
Graduate study f ba et techn que May be repeated for cred t Stu o. Prerequ s te p acement aud t on

DAN 540 Advanced Problems in Dance Kinesiology (3)
fa
Pr n p es of k nes o ogy app ed to the tors and shou ders Focus on dent fy ng muscu ar mba ances pat omec an cs and ana ys of dan e cond t on ng pra t ces ecture ab

DAN 542 Ideok nesis. (2)
fa
Theoret ca exam at on of deok net c method of fac tat ng postura hange and movement eff c en y

DAN 545 Laban Movement Ana ysis. (3)
spr ng
Theory and pract ce of Laban movement ana ys s and Barten eff fun damenta s through movement ntegrat o observat on cr t a resear h notat on and ana ys s Lecture tud o

DAN 550 Graduate Dance Pedagogy: Modern. (3)
spr ng
verv ew of the ro e of modern dance te h que and the ry n the un vers ty cu r u um nc ud ng current pedagog ca theory d ve s ty gen der May fo ow or precede ternsh p n pra t ca tea h ng

DAN 551 Graduate Dance Pedagogy: Ballet (3)
fa
Advanced ana ys s of teach ng techn ques for ba et Prerequ s te nstructor approva

DAN 564 Solo and Group Choreography I. (3)
fa
Or g na choreography created f r so o and group performance Stu d o Prerequ s tes DAN 364 an 365 or the r equ va e ts

DAN 565 So o and Group Choreography II. (3)
spr ng
Cont nuat n of DAN 564 Stud o Prerequ s te DAN 564

DAN 571 Dance Theatre. (1–3)
fa and spr ng
Performance n spec y horeographed dance product ons May be repeated for cred t Prerequ s te n truct r approva

DAN 580 Performance Studies Practicum. (1 3)
spr ng
Focus o deve op ng rehearsa sk s and ach ev ng performance exce ence through the prepa at on f three comp eted work Stud o ab

DAN 591 Seminar. (1–3)
fa and spr ng
Sem nar f cus ng on enr chment top c product on aspe ts of thes s projects teach ng on er s spe a ectures f ms or cr t ques

DAN 634 Technique and Theory of Modern Dance (3)
fa and spr ng
Preparat on n the perfo mance and omprehens on of profes ona eve modern dance for se ond year graduate students 6 ho rs week y May be repeated f r cred t Prerequ s te p acement aud t on

DAN 640 Paradigms for the Analysis of Dance Techn que. (3)
spr ng
Moto earn ng ogn t ve sc en e motor deve opment dance med c ne and omat cs pa ad gms app ed to t e pract ce of dance tech n q e Prerequ s te· DAN 500 or nstructor approva

DAN 664 Choreography Workshop. (1–3)
fa
Ch reograph c study n a sem nar co text w th fa u ty and gue t art st . May be repeated for cred t Stud o Prerequ s tes DAN 564 565

DAN 671 Dance Ar zona Repertory Theatre. (3–4
fa and spr ng
Preprofess ona modern dance ompany emphas z ng o treach and perform ance Oppo t n ty to work w th guest art sts a d commun ty scho s and organ zat ons Lect re stud o Prerequ s te str tor appr va

DAN 693 M.F.A. Project. (1–8)
fa spr ng summer
reparat on for requ red M F A project approved by the student s superv sory comm ttee Work s fo owed by a f na ora exam nat on and documentat on appropr ate to the project Prerequ s te· comm ttee approva

Omn bus Courses. For an exp anat on of courses offered but not spec f ca y sted n th s ata og ee Omn bus Courses page 56

School of Music

herbergercollege.asu.edu music
480 965-3371
MUSIC E185

Wayne A. Bailey, Director

Kimberly Marshall, Associate Director, Graduate Studies

Karen M. Bryan, Associate Director, Undergraduate Studies

Regents' Professors: H ckman, Pagano

Professors: Ba ey, Br tton, Cosand Crowe, Demars Doan, Dreyfoos, F em ng Hackbarth, Ham ton, H , Hoffer, Humphreys, Ki ewer Br tton, Koonce Lockwood Marohn c, Metz, Oldan Pi af an Reber Rogers, Russe Se heim Sh nn, Spr ng Stauffer, Sunkett, Swa m Thompson Umberson W amson, Wytko

Associate Professors: Bush Carpenter Haefer Ho brook Kopta Lyman Marshal May, Peterson, Rockmaker Rod and, Sm th So 's, W son

Assistant Professors: Bryan Er cson, Landschoot L ngas, McL n Me r, R o Schmidt, Schur ng Su ivan, Swartz

Senior Lecturers: Norton She ans

Lecturer: Tongret

Academic Professional: Campbel

The School of Music in the Katherine K. Herberger Col lege of F ne Arts at ASU is an accredited institutional mem ber of the National Association of Schoo s of Music. The requirements for entrance and graduation set forth in this catalog are in accordance with the published regulations of the ass ciation

The School of Mus c is committed to the growth and development of both facu ty and students so that music may be created performed, studied, and taught with excellence.

The following statement of basic musicianship is endorsed by the School of Music·

All m icians, whether performer , con p ser scholars, or tea hers, share common profes ional needs. Every mus c an must t on e extent be a performer, a l stener, a historian, a composer, a theorist and a teacher. F r th ea on certa s b ect matter a d s ar d learning proce ses a e con on to a bac alaureat degrees i music

Basic m us tansh p s deve oped n studi s that p epa e th· stu de t to fu tion n a var ety f m u ca r es that are support ve of h s/her ma or concentration A l undergradu te curricu a therefore. pros de the f ol owin ·

1 A c ceptual under tandin of such m usica properties as s u l rh tim me h tun n tex e a d f n and pp rtun ties for de elopin a comp che sive g asp of th e nterrelat o ships as the form the o t tive affectiv bas s for l stenin compos and pe f n ng
2 Repe ted pportun ties fo r enacting in a variety of ways the oles of sten r ana ys s perf rme i terpretation on poser creat on , cho ar research , and teache
3 A rep rtory for study that embraces all cult res an h st ca per od

All students registering in a School of Music major pro gram enro through the Herberger C lege of F ne Arts

Audition Admission Requirements. *All studen ts I wish to enroll in an undergraduate music degree pro ram are required to pass an entrance audi n in their primary pe forming medium instrument r voi e before being admitted t the Sch l of Mus* Audition forms and specific audition requ rements for each instrument or v ice may be obtained upon request by contacting the School of Mus c Official dates for these auditions are set for each acaden ic year.

Until the aud t on process is finished, all students inter ested in majoring in Music at ASU enter the un versity in the preprofessional program The preprofess ona program is designed to prepare students who have performance defi cienc es and or music academic deficienc es for entry into the major degree program. Upon successful comp etion of the aud tion, the student is admitted to his or her specified de ree option.

Students who wish to be Music ma ors who do not suc cessfully complete the audition are allowed to rema n in the preprofessional program for two semesters excluding sum mer and w nter sess ons They are allowed to reaudition two times in addition to the initial audition· these additional auditions may take place either dur ng or at the end of each fall or spring semester that the tudent is enrolled under this progran During these semesters, the student is allowed to enroll in music ensembles, concert attendance; and general studies courses to be chosen throu h consultation w th a School of Music academic advisor. Students are als encouraged to obta n private instruction on their major instrun ent through either the School of Music preparatory program or w th private nstructors These private nstruc t ons are not requ red and do not generate niversity course credit hours The reaudtions are hea d and eva uated by School of Music faculty

Admission to the composition concentration is subject to the approval of the composition faculty based upon an eval uation of the student's cc mpositions and or intervie s.

L teracy an r t ca nqu y **MA** mat em t **CS** p te tat t quant tat ve app c t o **HU** huma te a d f e a t **SB** o a and behav ora sc e e **SG** at ra s ence gen r c r e **SQ** a ura sc en e—quant tat ve **C** c tur d ve ty n th nted St te **G** oba H h t ca See Genera t de p ge

Diagnostic Examinations. Entering students, including all transfer students, must take a diagnostic examination in piano during orientation week of their first semester on campus regardless of previous piano course work completed. All students are required to reach a minimum level of piano proficiency.

Continuation in the composition program is subject to review in the sophomore or junior year.

All Music Education majors, including transfer and post baccalaureate students, must perform an additional audition before being admitted to the teacher education program. Normally, this audition occurs during the sophomore year.

All students majoring in Music Therapy must pass MUE 211 Music in Recreation and a music therapy faculty review and screening interview before being passed into upper division study.

MUSIC—B.A.

The Bachelor of Arts degree requires a minimum of 120 semester hours for graduation.

The Music major consists of 50 semester hours and includes the requirements that follow for each area of study.

In addition to fulfilling the major requirements, students must meet all university graduation requirements and college degree requirements. See "University Graduation Requirements," page 79, and "College Degree Requirements," page 276.

Music Theory. The following music theory courses are required:

MTC 125	Basic Music Theory [illegible] 3
MTC 221	Music Theory 18th Century [illegible] 3
MTC 222	Music Theory 19th Century [illegible] 3
MTC 223	Music Theory 20th Century [illegible] 3
MTC 321	Modal Counterpoint [illegible] 2
or MTC 321	Tonal Counterpoint 2
MTC 327	Form and Analysis I [illegible] 3
MTC 422	Musical Acoustics [illegible] 3
Total [illegible]	22

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music History are required. Nine elective upper division hours in music history and or theory are required.

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction or MUP 311 Studio Instruction are required. At least four of these hours must be at ASU.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

The remaining semester hours in music are selected by the student in consultation with an advisor. Areas of study may include ethnomusicology, music education, music history, music theory, and performance. At least 23 semester hours, 12 in the field of specialization, must be in the upper division. Students must select sufficient elective courses to complete the 120 hours required for graduation.

BACHELOR OF MUSIC DEGREE

All Bachelor of Music (B.M.) degree programs require 120 semester hours for graduation excluding Music Education (125 to 130 semester hours) and Music Therapy (129 semester hours). The B.M. curriculum offers majors in Music Education, Music Therapy, Performance, and Theory and Composition.

The curricula for the Music Education and Music Therapy majors require more than 120 semester hours. A student wishing to complete these programs in four years is required to take more than 15 semester hours per semester or to attend summer sessions.

The music curriculum for the B.M. majors on the pages which follow consists of 79 semester hours. The requirements for each major are listed on this page. In addition, the Music Education major provides certification to students interested in teaching in the public schools.

In addition to fulfilling the major requirements, students must meet all university graduation requirements and college degree requirements. See "University Graduation Requirements," page 79, and "College Degree Requirements," page 276.

MUSIC EDUCATION—B.M.

Choral-General Concentration

This degree program may include instrumental music as a minor teaching field.

Music Theory. The following music theory courses are required:

MTC 125	Basic Music Theory [illegible] 3
MTC 221	Music Theory 18th Century [illegible] 3
MTC 222	Music Theory 19th Century [illegible] 3
MTC 223	Music Theory 20th Century [illegible] 3
MTC 327	Form and Analysis I [illegible] 3
Total [illegible]	15

Music History. The following music history courses are required:

MHL 341	Music History [illegible] 3
MHL 342	Music History [illegible] 3
Total [illegible]	6

Conducting. The following conducting courses are required:

MUP 239	Beginning Choral Conducting [illegible] 1
MUP 339	Choral Conducting [illegible] 2
Total [illegible]	3

Music Education. The following music education courses are required.

MUE 110	Introduction to Music Education [illegible] 1
MUE 313	Elementary Music Methods [illegible] 3
MUE 315	General Music in the Secondary School [illegible] 2
MUE 486	Choral Methods [illegible] 3
Total [illegible]	9

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of

MUP 311 Studio Instruction are required to obtain a proficiency level necessary to meet the graduation recital requirement. MUP 495 Performance completes the requirement.

Minor Performing Medium. A proficiency equal to six semesters of study in keyboard or voice (whichever is not the major performing medium) is required. Students wishing to extend their proficiency beyond this level may continue to study in MUP 321 Studio Instruction.

Ensemble. Eight different semesters of participation, including at least six semesters of MUP 352 Concert Choir and/or MUP 353 University Choir, four of which must be at ASU, are required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Instrumental Concentration

It is strongly recommended that this degree program include courses in choral music or courses in jazz education.

Music Theory. The following music theory courses are required:

MTC 125	Basic Music Theory	3
MTC 221	Music Theory 18th Century	3
MTC 222	Music Theory 19th Century	3
MTC 223	Music Theory 20th Century	3
MTC 327	Form and Analysis I	3
Total		15

Music History. The following music history courses are required.

MHL 341	Music History	3
MHL 342	Music History	3
Total		6

Conducting. The following conducting courses are required:

MUP 210	Beginning Instrumental Conducting	1
MUP 314	Instrumental Conducting	2
Total		3

Music Education. The following music education courses are required:

MUE 111	Introduction to Music Education	1
MUE 315	General Music in the Secondary Schools	2
MUE 317	Educational Methods for Violin and Viola	1
MUE 318	Educational Methods for Cello and String Bass	1
MUE 327	Educational Methods for Trumpet and Horn	1
MUE 328	Educational Methods for Trombone, Euphonium, and Tuba	1
MUE 336	Educational Methods for Percussion	1
MUE 337	Educational Methods for Flute, Clarinet, and Saxophone	1
MUE 338	Educational Methods for Double Reed Instruments	
MUE 481	Instrumental Practicum/Methods	5
MUE 482	Instrumental Practicum/Methods	5
Total		20

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruction are required to obtain a proficiency level necessary to meet the graduation recital requirement. MUP 495 Performance completes the requirement.

Ensemble. Eight different semesters of participation in an ensemble are required, four of which must be at ASU. Two of the four ASU semesters must be in marching band. Wind and percussion players must have a minimum of six semesters of MUP 361 Marching and Concert Bands or equivalent large ensemble.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

String Concentration

Music Theory. The following music theory courses are required.

MTC 125	Basic Music Theory	3
MTC 221	Music Theory 18th Century	3
MTC 222	Music Theory 19th Century	3
MTC 223	Music Theory 20th Century	3
MTC 327	Form and Analysis I	3
Total		15

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music History are required.

Conducting. The following conducting courses are required:

MUP 210	Beginning Instrumental Conducting	1
MUP 314	Instrumental Conducting	2
Total		3

Music Education. The following music education courses are required.

MUE 111	Introduction to Music Education	1
MUE 315	General Music in the Secondary Schools	2
MUE 317	Educational Methods for Violin and Viola or MUE 318 Educational Methods for Cello and String Bass	1
MUE 327	Educational Methods for Trumpet and Horn or MUE 328 Educational Methods for Trombone, Euphonium, and Tuba	1
MUE 335	Educational Methods for Guitar	1
MUE 336	Educational Methods for Percussion	1
MUE 337	Educational Methods for Flute, Clarinet, and Saxophone or MUE 338 Educational Methods for Double Reed Instruments	1
MUE 482	Instrumental Practicum/Methods	5

Literacy and critical inquiry (MA) Mathematics (CS) Computer and statistics (QA) Quantitative application (HU) Humanities and fine arts (SB) Social and behavioral sciences (SG) Natural science—general course (SQ) Natural science—quantitative course (C) Cultural diversity in the United States (G) Global awareness (H) Historical perspectives. See General Studies page 83

MUE 485 String Practicum Methods 3

Total 18

Also required are three semesters of MUP 121 Studio Instruction and one semester in each of the three stringed instruments other than the major instrument.

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruction are required to obtain a proficiency level necessary to meet the graduation recital requirement. MUP 495 Performance completes the requirement.

Ensemble. Eight different semesters of participation in an ensemble are required, four of which must be at ASU. Six semesters of MUP 345 Symphony Orchestra or equivalent are required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Recommended Elective. MUE 313 Elementary Music Methods

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232, unless waived by a diagnostic examination at the time of entrance, are required.

MUSIC THERAPY—B.M.

Students are eligible to apply for the Certification Exam offered by the Certification Board for Music Therapists upon completion of the requirements for graduation.

Music Theory. The following music theory courses are required:

MTC 125 Basic Music Theory 3
MTC 221 Music Theory: 18th Century 3
MTC 222 Music Theory: 19th Century 3
MTC 223 Music Theory: 20th Century 3
MTC 321 Form and Analysis I 3
MTC 422 Musical Acoustics 3

Total 18

Music History. The following music history courses are required:

MHL 341 Music History 3
MHL 342 Music History 3

Total 6

Conducting. One of the following two courses is required.

MUP 209 Beginning Choral Conducting 1
MUP 210 Beginning Instrumental Conducting . . . .

Music Education. The following music education courses are required:

MUE 211 Music in Recreation . . . 3
MUE 313 Elementary Music Methods . . 3
MUE 335 Educational Methods for Guitar . . . . . .
MUE 336 Educational Methods for Percussion . . .
MUE 389 Repertoire for Music Therapy 3

Total . . . . . .

Music Therapy. The following music therapy courses are required:

MUE 216 Introduction to Music Therapy 2
MUE 296 Music Therapy as a Behavioral Science 2
MUE 336 Music Therapy Theory and Practice I (Psychopathology) 3
MUE 362 Music Therapy Techniques 3
MUE 388 Music Therapy Research I 3
MUE 394 Therapy Preclinical . . . . . .
MUE 395 Therapy Practical I . . . . . .
MUE 396 Therapy Practical III . . . . . .
MUE 397 Therapy Practical V . . . . . .
MUE 398 Therapy Preclinical Elective . . . . . .
MUE 441 Psychology of Music 3
MUE 475 Group Process and Music Therapy . . . . . .
MUE 476 Internship in Music Therapy . . . . . .

Total 3

Major Performing Medium. A minimum of twelve semester hours are required in the major performing medium, which must include at least four semester hours of MUP 311 Studio Instruction.

Voice. Two semesters of study in voice are required.

Ensembles. Six semesters of ensemble participation are required with at least four semesters in large groups.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Additional Requirements. These courses are also required:

BIO 201 Human Anatomy and Physiology I *SG* 4
PGS 111 Introduction to Psychology *SB* 3
PGS 466 Abnormal Psychology *S* 3
PSY 230 Introduction to Statistics *CS* 3
(or STP 226 Elements of Statistics *CS* 3)
SOC 101 Introductory Sociology *SB* . . . 3
Four semesters of dance (DAN only) 4

Total 32

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232, unless waived by a diagnostic examination at the time of entrance, are required.

PERFORMANCE—B.M.

Guitar Concentration

Music Theory. The following music theory courses are required:

MTC 125 Basic Music Theory 3
MTC 221 Music Theory: 18th Century 3
MTC 222 Music Theory: 19th Century 3
MTC 223 Music Theory: 20th Century 3
MTC 320 Modal Counterpoint 3
(or MTC 321 Tonal Counterpoint 2)
MTC 327 Form and Analysis I 3

Total 18

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music History are required.

Repertoire and Pedagogy. wo semester hours of MUP 45 Repertoire and two semester hours of MUP 481 Perfor mance Pedagogy and Materials are required.

Conducting. MUP 21) Beginning Instrumental Conducting is required

Major Performing Medium. Sixteen semester hours of MUP 127 Studio Instruction and 16 semester hours of MUP 327 Studio Instruction are required to attain a proficiency level necessary to meet the graduation recital requirements. A half recital MUP 495 Performance and a full recital MUP 496 Performance are also required.

Ensemble. Eight semester hours of ensemble are required within a minimum of six different semesters Four of the eight semester hours must be MUP 3 9 Chamber Music Ensembles: Guitar

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required

Jazz Concentration

Music Theory. The following music theory courses are required·

MTC 125	Basic Music Theory	3
MTC 21	Music Theory 18th Century	3
MTC 22	Music Theory 19th Century	3
MTC 23	Music Theory 20th Century	3
MTC 315	Modern Arranging	2
MTC 316	Modern Arranging	2
MTC 321	Modal Counterpoint	2
	or MTC 321 Tonal Counterpoint	
MTC 327	Form and Analysis I	3
MTC 44	Jazz Theory and Ear Training	2
MTC 441	Jazz Composition	2
Total		23

Music History. The following music history courses are required.

MHL 34	Music History	3
MHL 342	Music History	3
MHL 352	The Evolution of Jazz *H*	
Total		9

Conducting. MUP 210 Beginning Instrumental Conducting is required.

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruction are required to obtain a proficiency level necessary to meet the graduation recital requirements. Two half recitals MUP 495 Performance are required, with one in the jazz diction .

Improvisation. The following courses are required:

MUP 141	Jazz Fundamentals	1
MUP 142	Jazz Fundamental	1
MUP 217	Improvisation Workshop	2
MUP 241	Advanced Improvisation	2
MUP 415	Advanced Improvisation	2
Total		8

Workshops. The following courses are required:

MUP 219	Recording Studio Techniques	2
MUP 235	Jazz Piano	1
MUP 236	Jazz Piano	
Total		4

Ensemble. Eight semesters of ensemble are required. including six semesters of MUP 379 Chamber Music Ensembles and two semesters of MUP 356 Jazz Band

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano MUP 131, 132, 231, 232 , unless waived by a diagnostic examination at the time of entrance, are required.

Keyboard Concentration

Music Theory. The following music theory courses are required

MTC 125	Basic Music Theory	3
MTC 22	Music Theory: 18th Century	3
MTC 222	Music Theory: 19th Century	3
MTC 223	Music Theory: 20th Century	3
MTC 32	Modal Counterpoint	2
	or MTC 321 Tonal Counterpoint	
MTC 327	Form and Analysis I	3
MTC 425	Studies 20th Century Theory	3
	or MTC 428 Form and Analysis II	3
Total		22

Music History. The following music history courses are required:

MH 34	Music History	3
MHL 342	Music History	3
Total		6

Repertoire and Pedagogy. The following courses are required

MUP 451	Repertoire	2
MUP 481	Performance Pedagogy and Materials	2
	or MUP 482 Piano Pedagogy	2
Total		4

Conducting. One of the following two courses is required

MUP 210	Beginning Choral Conducting	1
MUP 210	Beginning Instrumental Conducting	1

Harpsichord. One semester hour of harpsichord is required

Literacy **Artistic** **Inquiry** **MA**thematical **C**omputer **S**tatistical quantitative applications **HU** humanities **SB**s and behavioral **SG** transcendence general core **SQ** atural new quantitative **C**ultural diversity in the United States **G**lobal **H**istorical See General Studies page 83

Major Performing Medium. Sixteen semester hours of MUP 127 Studio nstructio and 16 semester hours of MUP 327 Studio Instruction are required to attain a proficiency level necessary to meet the graduation rec tal requirements A half recita MUP 495 Perf rm ance) and a full recital MUP 496 Performance are required

Ensemble. Eight semester hours of ensemble within a min mum of six different semesters are required t cluding two semesters of accompanying and two semesters of chamber music.

Recital Attendance. Six semesters of MUP 10(Concert Attendance are required.

Music Theatre Concentration

Music Theory. The following music theory courses are required:

MTC 125 Basic Music Theor	3
MTC 221 Music Theory: 18th Century	3
MTC 222 Music Theory 19th Century	3
MTC 223 Music Theory 20th Century	3
MTC 327 Form and Analysis I	3
Total	5

Music History. The following music history courses are required.

MHL 341 Music Histo y	3
MHL 342 Music History	3
Total	6

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruct on are required to attain a proficiency level necessary to meet the graduation requirement of a public performance of two roles, both of which must be of major proportion

Music Theatre. Five semesters of MUP 370 Music Theatre: Techniques; four semesters of MUP 371 Music Theatre: Workshops; eight semesters of MUP 373 Music Theatre: Performance, two semesters of MUP 374 Music Theatre. Production, and one semester of MUP 451 Repertoire Broadway Musicals are required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required

Additional Requirements. Nine semester hours in theatre and 11 semester hours in dance are required.

Diagnostic Examination. Four semesters of class piano MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Opera Option. For those students whose goal is opera performance, the following substitutions to the course of study may be made: MUP 451 Repertoire: Opera nstead of MUP 451 Repertoire: Broadway Musicals, and two semesters of MUP 371 Music Theatre workshops (Aria Preparation and three semesters of MUP 250 Diction for Singers instead of five semester hours of dance Permission of the director of the music theatre program is required.

Orchestral Instrument Concentration

Music Theory. The following music theory courses are required

MTC 125 Basic Music Theory	3
MTC 221 Music Theory: 18th Century	3
MTC 222 Music Theory: 19th Century	3
MTC 223 Music Theory 20th Century	3
MTC 320 Modal Counterpoint or MTC 321 Tonal Counterpoint 2	2
MTC 327 Form and Analysis I	3
MTC 425 Studies in 20th Century Theory	3
Total	20

Music History. The following courses are required:

MHL 34 Music History	3
MHL 342 Music History	3
Total	6

Repertoire and Pedagogy. One of the following two courses is required:

MUP 451 Repertoire	2
MUP 481 Performance Pedagogy and Materials	2

Conducting. The following courses are required

MUP 2 Beginning Instrumental Conducting	1
MUP 340 Instrumental Conducting	2
Total	3

Major Performing Medium. Sixteen semester hours of MUP 127 Studio Instruction and 16 semester hours of MUP 327 Studio Instruction are required to attain a proficiency level necessary to meet the graduation recital requirements. A half recital MUP 495 Performance and a full recital (MUP 496 Performance are required.

Ensemble. Eight semester hours of large ensembles within a minimum of six different semesters are required plus four semester hours of small ensembles within a minimum of four different semesters.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required

Diagnostic Examination. Four semesters of class piano MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Piano Accompanying Concentration

Music Theory. The following music theory courses are required:

MTC 125 Basic Music Theory	3
MTC 221 Music Theory: 18th Century	3
MTC 222 Music Theory: 19th Century	3
MTC 223 Music Theory: 20th Century	3
MTC 320 Modal Counterpoint or MTC 321 Tonal Counterpoint	2
MTC 327 Form and Analysis I	3
MTC 425 Form and Analysis II	3
Total	20

Music History. The following courses are required:

MHL 341 Music History	3
MHL 342 Music History	3
Total	6

Diction and Repertoire. The following courses are required.

MUP 250 Diction for Singers	1
MUP 451 Repertoire	2
MUP 453 Sung Literature	2
MUP 454 Song Literature	2
Total	7

Conducting. One of the following two courses is required:

MUP 209 Beginning Choral Conducting	1
MUP 211 Beginning Instrumental Conducting	1

Major Performing Medium. The following courses are required:

MUP 127 Studio Instruction	16
MUP 311 Studio Instruction	8
MUP 337 Studio Instruction: Piano Accompanying	8
Total	32

In addition, each student accompanies two half recitals (MUP 495 Performance), one for a singer and one for an instrumentalist, during his or her junior year. (A half solo recital may be substituted for either of the above.) During the senior year, the student accompanies two full recitals (MUP 496 Performance), one vocal and one instrumental.

Ensemble. Two semesters of MUP 379 Chamber Music Ensembles, one semester of MUP 379 Chamber Music Ensembles: Piano, four semesters of MUP 388 Piano Accompanying, one semester of MUP 487 Piano Accompanying, and two semesters of ensemble elective (minimum of six different semesters) are required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Voice Concentration

Music Theory. The following music theory courses are required.

MTC 125 Basic Music Theory	3
MTC 221 Music Theory: 18th Century	3
MTC 222 Music Theory: 19th Century	3
MTC 223 Music Theory: 20th Century	3
MTC 320 Modal Counterpoint (or MTC 321 Tonal Counterpoint 2)	2
MTC 327 Form and Analysis I	3
Total	17

Music History. The following music history courses are required:

MHL 341 Music History	3
MHL 342 Music History	3
Total	6

Repertoire and Pedagogy. Two semester hours of MUP 451 Repertoire and two semester hours of MUP 481 Performance Pedagogy and Materials are required.

Also required are two semester hours selected from MUP 453 Song Literature or 454 Song Literature or a repeated enrollment of MUP 451 Repertoire.

Diction. Three semester hours of MUP 250 Diction for Singers is required, which includes one hour each of Italian, German, and French.

Conducting. MUP 209 Beginning Choral Conducting is required.

Major Performing Medium. Sixteen semester hours of MUP 127 Studio Instruction and 16 semester hours of MUP 327 Studio Instruction are required to attain a proficiency level necessary to meet the graduation recital requirements. A half recital (MUP 495 Performance) and a full recital (MUP 496 Performance) are required.

Ensemble. Four different semesters of large vocal ensembles are required plus five semester hours of ensembles within five different semesters to be selected from large and/or small ensembles.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Language. Sixteen semester hours are required in more than one foreign language, chosen from French, German, and Italian. A student may select one year of one language and one semester of the others, chosen in conference with the advisor.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

THEORY AND COMPOSITION—B.M.

Composition Concentration

Music Theory. The following music theory courses are required:

MTC 125 Basic Music Theory	3
MTC 221 Music Theory: 18th Century	3
MTC 222 Music Theory: 19th Century	3
MTC 223 Music Theory: 20th Century	3
MTC 320 Modal Counterpoint	2
MTC 321 Tonal Counterpoint	2
MTC 327 Form and Analysis	3
MTC 432 Instrumentation	2
MTC 433 Orchestration	2
MTC 436 Electronic Studio Techniques I	2
Total	25

An additional five hours, to be selected from MTC 422, 425, 428, 429, 430, 437, and 441 are required.

Literary and critical inquiry **MA** mathematics **CS** computer/statistical/quantitative applications **HU** humanities and fine arts **SB** social and behavioral sciences **SG** natural science—general core courses **SQ** natural science—quantitative **C** cultural diversity in the United States **G** global **H** historical See General Studies page 83

Three semesters of MTC 123 Beginning Composition and four semesters of MTC 323 Composition are also required. At least three semesters of MTC 323 Composition must be taken at ASU.

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music History are required.

Also required are three upper-division elective semester hours in music history.

Conducting. Choose between the two combinations of courses: MUP 209 Beginning Choral Conducting and MUP 339 Choral Conducting *or* MUP 210 Beginning Instrumental Conducting and MUP 340 Instrumental Conducting.

Applied Music. Ten semester hours of study in applied music are required, at least eight of which must be in MUP 111 Studio Instruction.

Ensemble. Six semesters of participation in an ensemble are required.

Final Project. MTC 495 Final Project is required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

John Metz, professor of music, collaborates with Barbara Bailey.

Tim Trumble photo

Additional Requirements. At least four hours of electives to be chosen from MTC, MHL, or MUP (excluding courses taken to meet Class Piano proficiency) are required. MHL 447 Music Since 1900 may be used to satisfy the General Studies L requirement.

Theory Concentration

Music Theory. The following music theory courses are required:

MTC 125 Basic Music Theory	3
MTC 221 Music Theory: 18th Century	3
MTC 222 Music Theory: 19th Century	3
MTC 223 Music Theory: 20th Century	3
MTC 320 Modal Counterpoint	2
MTC 321 Tonal Counterpoint	2
MTC 323 Composition	2–3
MTC 327 Form and Analysis I	3
MTC 422 Musical Acoustics	3
MTC 425 Studies in 20th-Century Theory	3
MTC 428 Form and Analysis II	3
MTC 496 Theory Project	3
Total	33–34

Also required are 10 semester hours of electives in MTC courses at the 300 level or above, to be chosen in consultation with advisor.

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music History are required.

Also required are three upper-division elective semester hours in music history.

Conducting. Choose between the two combinations of courses: MUP 209 Beginning Choral Conducting and MUP 339 Choral Conducting *or* MUP 210 Beginning Instrumental Conducting and MUP 340 Instrumental Conducting.

Applied Music. Twelve semester hours of study in applied music are required, eight of which must be in MUP 111 Studio Instruction.

Ensemble. Eight semesters of participation in an ensemble are required.

Final Project. MTC 496 Theory Project is required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Additional Requirements. MHL 447 Music Since 1900 may be used to satisfy the General Studies L requirement.

MUSIC MINOR

The School of Music offers a minor in Music consisting of 20 semester hours of course work. A minimum grade of "C" is required in all courses.

MHL 341 Music History	3
MHL 342 Music History	3
MTC 125 Basic Music Theory	3

MTC 221 Music Theory 5th Century 3
Elect ve 8

Tota 2

E e t ves m y be cho en fro n MUS, MHL MTC, and selected MUP courses The minor doe not nclude Studio In tructi n

Diagnostic Examination. Students pursuing a minor in music must first take a Theory Diagnostic Exam. This exam may be taken in the Music Build ng's E ectronic Classroom, room W 225.

Interested students should contact the School of Music for specific requirements and admission procedures.

GRADUATE PROGRAMS

The faculty in the School of Music offer graduate programs leading to the following degrees: Master of Arts, Master of Music, and Doctor of Musical Arts. Refer to the "Herberger College of Fine Arts Graduate Degrees and Majors" table, page 278, for a list of majors and concentrations. A document on graduate degree programs in music may be obtained by contacting the School of Music. See the *Graduate Catalog* for information on all graduate degrees.

MUSIC HISTORY LITERATURE (MHL)

MHL 201 MacLiteracy for Music ans. (3)
fa spr ng summer
nstr ct on n bas c Mac ntosh computer teracy nclud ng gener c app at ons and mus c spec f c programs w th hand on exper ence Lecture ab
Genera Stud es CS

MHL 341 Music History. (3)
fa and spr ng
Western mus c from the Greeks t the present day Need ot be taken n sequence w th MHL 342 Prerequ s te MTC 221

MHL 342 Music History. (3)
fa and spr ng
See MHL 341 Prerequ s te MTC 221

MHL 344 Music in World Cultures. (3)
spr ng
Exam nes the re at ons among mus c dance theatre re g on and soc a status As a Af ca O ean a Europe and the Un ted States
Genera Stud es HU G

MHL 352 The Evolution of Jazz. (3)
se ected semesters
Or g n, deve opment and sty es of azz mus c and ts exponents Pre requ s te MTC 223
Genera Stud es H

MHL 363 Survey of Russian Music. (3)
fa n odd years
Exam es mus c and m s ca fe n R s a the Sov et n on and the post S v et C I S from the M dd e Ages to the present Le ture d s cuss on Prerequ s te MHL 342 o structor approva
Genera Stud es HU

MHL 438 Music in the C assic Era. (3)
fa n even years
Deve pment of the c ass c ty e of the 18th century ma or works of Haydn Mozart and Beethoven Prerequ s tes MHL 341 342 MTC 327
Genera Stud es H

MHL 439 Music in the 19th Century. (3)
spr ng
European art mus c after Beethoven Prerequ s tes MHL 341 342 MTC 327
Genera Stud es L H

MHL 441 Music of the Baroque Era. (3)
fa n odd years
Works of major compo ers and sty st c tendenc es of the per od Pre requ s tes MHL 341 342 MTC 327
Genera Stud es L

MHL 447 Music S nce 1900. (3)
fa and summer
Survey of the works by major composers and ty st c trends Prereq s tes MHL 341 342, MTC 327
Genera Stud es L

MHL 456 History of Opera. (3)
spr ng n odd years
Deve pment of opera from ts creat on ca 1600 to present Emphas s p aced on major sty st c deve opments and representat ve works. Pre requ s tes MHL 341 342, MTC 222.

MHL 466 North American Ind'an Music. (3)
spr ng n odd years
Var ous sty e of nd an mus c n the Un ted States, Canada and Mex co Open to Mus c majors and nonmajors
Genera Stud es L HU C

MHL 532 Music B'b iography. (3)
fa
Ma r stor ca and a a yt ca wr t'ngs systemat c a d h stor ca co ect ons of mus c. Prerequ site read ng know edge of a fore gn an guage recommended

MHL 535 Medieval Music. (3)
spr ng n odd years
Mus c f E rope n the M dd e Ages Gregor an chant re g ou and secu ar mo ophony and polyphony to 1400

MHL 536 Music of the Renaissance. (3)
spr ng n even years
Mus c n Europe w th emphas s on sty st c concepts and hanges, ca 1400–1580

MHL 544 World Music I. (3)
fa odd years
Mus c of trad t ona and fo k cu tures of Afr ca Europe and the Amer cas

MHL 545 World Music II. (3)
fa n even years
Trad t ona fo k and art mus c of the Pac f c Near East and As a

MHL 547 Topics in American Music. (3)
se ected emesters
Se ected top cs n the h story of m s c Composers work ng n the Amer cas w th emphas s upon mus c s nce 1900

MHL 557 Topics in Symphonic L'terature. (3)
spr ng n even years
Exam nes the evo ut on of the symphony and symphon c poem from the ear y c ass c era through the 19th century w th emphas s on the ana ys s of se ected works

MHL 564 History of Music Instruments. (3)
fa n even years
Survey of the h story and deve opment of mus c nstruments n trad t ona fo k and art cu tures

MHL 566 Area Studies in Ethnomusicology. (3)
sp ng
Study of the mus c of a part cu ar cu ture country or area e g mus c of Mex co Lat n Amer ca, Ch na Afr ca May be repeated for cred t

MHL 568 Introduction to Ethnomusicology. (3)
fa n odd years
ntrodu es the theory and methodo ogy of the d sc p ne nc ud ng b b ography, f e dwork transcr pt on ana ys s, a d organo ogy

MHL 575 H story of Choral Mus c. (3)
fa
Major chora works

MHL 591 Sem'nar. (1–12)
fa and spr ng

L teracy and cr t a nqu y **MA** mat e at c **CS** co pute stat st cs quant tat ve app cat o s **HU** human t e a d f e a t **SB** a nd be av ora sc e ces **SG** t ra c en e—gene a c e se **SQ** natura sc e ce—quant tat ve **C** u tura d ver ty n the ted State **G** g oba **H** h t r a See Genera Stud e page 83

MHL 592 Research. (1–12)
fa and spr ng

MHL 599 Thesis. (1–12)
fa and spr ng

MHL 644 Notation of Polyphonic Music (3)
spr ng n even years
Mus notat on from the 15th through 17th centur es n ud ng prob ems of transcr pt on nto modern notat on

Omnibus Courses For an exp anat on of courses offered but n t spe f ca y sted n th s cata og, see Omn bus Co r es page 56

MUSIC THEORY AND COMPOSITION (MTC)

MTC 123 Beginning Composition. (2)
fa and spr ng
ntended for freshmen and sophomores n the compos t on concentra t on. ntroduces compos ng May be repeated fo cred t Prerequ s te n tructor appr va

MTC 125 Basic Music Theory. (3)
fa and spr ng
Notat on sca es keys modes terva s chords bas c part wr t ng Deve opment of re ated aura sk s throug s ghts ng ng and d ctat on Prerequ te Mus c ma or or nstructor approva

MTC 221 Mus'c Theory: 18th Century. (3)
fa and spr ng
Sty e techn ques and d oms of 18th century mus c emphas zes a a ys s ompos t on part wr t ng and re ated aura sk s w th app cat ons for performance Prerequ s'te MTC 125

MTC 222 Music Theory: 19th Century. (3)
fa and spr ng
Sty es techn ques and d oms of 19th century mus c emphas zes ana ys s ompos t on part wr t ng and re ated aura sk s w th app cat ons for performance Prerequ s te MTC 221

MTC 223 Music Theory: 20th Century. (3)
fa and spr ng
Sty es techn ques and d oms of 20th century mus c emphas zes nnovat ve treatments of mus ca e eme ts re ated aura sk s Prereq u s te MTC 222

MTC 315 Modern Arranging. (2)
fa
Techn ques n arrang ng f r t e ontemporary azz rad o te ev s on and stud o orche tra Prerequ s te MT 223

MTC 316 Modern Arranging. (2)
spr ng
Co t nuat on of MTC 315 Prerequ s te MTC 315

MTC 320 Modal Counterpoint. (2)
fa
Counterpo nt based on 16th entu y voca po ypho c sty e Prerequ s te MTC 221

MTC 321 Tonal Counterpoint. (2)
spr ng
Counterpo nt based o 18th century po yphon c sty e Prerequ te MTC 221

MTC 323 Composition. (2 3)
fa and spr ng
Wr t ng mus c compos t ons, w th emphas s on bas c techn q es and sma er structures May be repeated for cred t Prerequ s te 3 semes ters of MT 123 o nst uctor approva

MTC 327 Form and Analysis I. (3)
fa and spr ng
Organ z ng e ements n the most mportant contrapunta and homo phon c mus ca forms from the Rena ssance thr ugh the 19t century Prerequ s te· MTC 222

MTC 422 Musica Acoustics. (3)
fa l
Propert es of sound and tone Harmon c ser es nstruments the ear aud tor um acoust cs and the reprod ct on of sound As umes a thor ough know edge of mus ca notat on nterva s sca es an harmony or 2 years of m s c theory

MTC 425 Studies in 20th-Century Theory. (3)
fa
Cont nued deve opment of ana yt ca tech ques and aura sk w th an exam nat on of theoret ca systems app cab e to 20th ce tury mus c Prerequ s te MTC 223

MTC 428 Form and Analysis II. (3)
spr ng
Orga z g pr nc p es of the arge forms of mus ca compos t on n the 19th and 20th centuries Prerequ s te MTC 327

MTC 429 Canon and Fugue. (2)
fa n odd years
Wr t ng of canons and fugues n tona sty e Prerequ s te MTC 321

MTC 430 20th-Century Counterpoint. (2)
spr ng n even years
Counterpo nt st d es ut z ng 20th century d oms. Prerequ te MTC 223

MTC 432 Instrumentation. (2)
fa n even years
Study of the character st cs and performance techn ques of nd v dua or hestra nstruments Prerequ s te· MTC 223

MTC 433 Orchestration. (2)
spr ng n odd years
Theoret ca and pract ca study of scor ng mus c for orchestra Prereq u s te MTC 432

MTC 436 Electronic Studio Techniques I. (2)
fa
Pr nc p es of ana og e ectron c mus c systems and the r app cat on n the compos t on of e ect on c mus c Assumes a thorough know edge of mus c notat on and nterva s

MTC 437 Electronic Studio Techniques II. (2)
spr ng
Pr nc p es of d g ta e ectron c mus c systems and the r app cat ons n the compos t on of e ectron c mus c. Prerequ s te MTC 436

MTC 440 Jazz Theory and Ear Train ng. (2)
fa
Advanced study of azz harmon c systems Da y ora dr s Prerequi te MTC 223

MTC 441 Jazz Composition. (2)
fa
Creat ve wr t ng n the sma er forms and n the d om of azz Prerequ s te MTC 321

MTC 495 F nal Project. (0)
fa and spr ng
Ha f rec ta of compos t ons or approval of a arge sca e compos t on or a resear h paper

MTC 496 Theory Project. (3)
fa and spr ng
Superv sed nd v dual wr t ng proje t dea ng w th mus c theory.

MTC 516 Baroque Music. (3)
spr ng n even years
Deta ed ana ys s of se ected examples of mus c from the Baroque per od

MTC 517 Classic Music. (3)
spr ng n odd years
Deta ed ana ys s of se ected examples of mus c from the C ass c per od

MTC 518 Romantic Music. (3)
fa n even years
Deta ed ana ys s of se ected examp es of mus c from the Romant c per od.

MTC 519 Late 19th- Early 20th-Century Music. (3)
fa odd years
Deta ed ana ys s of se ected examp es of mus c from the ate 19th and ear y 20th centur es

MTC 520 Analytical Techniques. (3)
spr ng and summer
Ana yt ca techn ques systemat ca y app ed to mus c Concentrat on on structura and compos t ona procedures

MTC 523 Advanced Compos tion. (2–3)
fa and spr ng
Advanced mus composit on, inc ud ng comp ex techn ques and arger structure May be repeated for cred t Prerequ site nstructor approval

MTC 525 Pedagogy of Theory. (3)
fa n even years
Pract ces and pr nc p es f teaching mus c theory Emphas zes mo t des rab e and pract ca offer ngs poss b e. Comparat ve stud es of ex st ng pract ces

MTC 527 History of Music Theory. (3)
se ected semesters
Theory from Pyt agoras to the 16th century Need not be take n sequence w th MTC 528

MTC 528 History of Music Theory. (3)
se ected semeste s
Theory from the 17th century to the present Need not be taken n sequence w th MTC 527

MTC 555 Computer Music Notation. (2)
se ected semesters
nstruct on n preparing score and parts of mus c compos t ons s ng var ous music notat on software packages Cred t cannot be app ed toward the graduate theory requ rement Lecture ab Prerequ s te nstructor approva

MTC 591 Sem nar. (1 12)
fa and spr ng

MTC 592 Research. (1 12)
fa and spr ng

MTC 599 Thesis. (1 12)
fa and spr ng

MTC 647 Directions n New Music. (3)
se ected semesters
Stud es n contemporary d oms and aesthet cs drawn from recent works of v s t ng comp sers; nvo ves ana yt ca d scourse cr t ca wr t ng and app ed concepts n compos t on Lecture d scuss on exer c se Prerequ s te nstructor approva

MTC 723 Advanced Composition. (3)
fa and spr ng
Spec a prob ems n wr t ng n comp ex forms and textures May be repeated for cred t Stud o

MTC 755 Music Composition Technology. (3)
se ected semesters
Advanced study n d g ta samp ng synthes s sequenc ng computer generated sound and computer performer nterfa es. May be repeated for cred t ecture ab Prerequ s tes MTC 436 and 437 or the r equ va ents

Omnibus Courses. For an exp anat on of courses offered but not spec f ca y sted n th s cata og see Omn bus Courses page 56.

MUSIC EDUCATION (MUE)

MUE 110 Introduction to Music Education. (1)
spr ng
Overv ew of mus c educat on Or entat on to student character st cs teacher ro es and foundat ons of ph osophy and h story Requ res schoo observat ons

MUE 161 Introduction to Mus'c Therapy. (2)
fa
Overv ew of the profess on of m s c therapy and ts app cat ons n menta hea th rehab tat on and spec a educat on

MUE 211 Music in Recreation. (2)
fa
Mater a s methods, and organ zat ona structures appropr ate for rec reat ona mus c Prerequ s te· ab ty to read mus c as determ ned by the nstructor

MUE 261 Music Therapy as a Behavioral Science. (2)
fa
Or entat on to prec n ca exper ence w th emphas s on observat on sk s assessment goa sett ng and profess ona eth cs. Requ res off camp s observat ons Prerequ s te MUE 161

MUE 310 Music in Early Childhood Educat on. (3)
spr ng
dent fy ng and u dersta d ng mus ca needs of young ch dren Meth ods and mater a s for program deve opment for c assroom teachers

MUE 311 Music for the Classroom Teacher. (3)
fa and spr ng
Deve opment of the c assr om mu c program n the e ementary choo Requ res no prev ous mus exper ence or course work Pre requ te no Mu c major or m nor

MUE 313 Elementary Music Methods (3)
fa
Methods of nstruct on p a ng and presentat on of appropr ate con tent n mus c For mus c educators and mus c therap sts Prerequ s te Mus c ma or

MUE 315 General Music in the Secondary Schools. (2)
fa and spr ng
Curr cu um student character st c and teach ng strateg es for gen era mus c Prerequ s te Mus c ma or

MUE 317 Educational Methods for V'olin and Viola. (1)
fa and spr ng
Teach ng and p ay g sk s for mus c teacher 3 hours per week

MUE 318 Educational Methods for Cel o and String Bass. (1)
fa and spr ng
Teach ng and p ay ng sk s for mus c teachers 3 hours per week

MUE 327 Educational Methods for Trumpet and Horn. (1)
fa and spr ng
Teach ng and p ay ng sk s for mus c teachers 3 hours per week

MUE 328 Educational Methods for Trombone, Euphon'um, and Tuba. (1)
fa and spr ng
Teach ng and p ay ng sk s for mus c teachers 3 hours per week

MUE 335 Educational Methods for Guitar. (1)
fa and spr ng
Teach ng and p ay ng sk s for mus c teachers 3 hours per week

MUE 336 Educational Methods for Percussion. (1)
fa and spr ng
Teach ng and p ay ng sk s for mus c teachers 3 hours per week

MUE 337 Educational Methods for F ute, Clarinet, and Saxophone. (1)
fa and spr ng
Teach ng and p ay ng sk s for mus c teachers 3 hours per week

MUE 338 Educational Methods for Double Reed Instruments. (1)
fa and spr g
Teach ng and p ay ng sk s for mus c teachers 3 hours per week.

MUE 361 Music Therapy Theory and Pract'ce in Psychopathology. (3)
fa
nf uence of mus c on behav or pr n p es and pract ces of mus c ther apy and psych atr c c ents Prerequ s tes. M E 211 261; Mus c Ther apy major

MUE 362 Music Therapy Techniques. (3)
spr ng
Organ zat'o adm n strat on and use of mus c n rehab tat on w th var ous c ent popu at ons Prerequ s tes MUE 361 Mus c Therapy ma or

MUE 381 Music Therapy Research. (3)
spr ng
Stat st cs and research des gn appropr ate for nvest gat ons n mus c therapy
Genera Stud es. L

MUE 384 Therapy Precl nical I. (1)
fa and spr ng
Pa red st dents prov de mus c therapy for sma groups at a commu n ty agency for menta y retarded ger atr c or phys ca y d sab ed c ents for a m n mum of 10 c ock h urs Prerequ s tes MUE 211, 261.

L teracy and cr t a nqu ry **MA** mat emat cs **CS** computer stat st cs quant tat ve app cat on **HU** human t es and f ne arts **SB** s c a a d behav ora sc en es **SG** natura s e ce genera core cour es **SQ** atura c ence—quant tat ve **C** c tura ver ty the Un ted State **G** g oba **H** h st r a See Genera Stud es page 83

MUE 385 Therapy Precl nica Il. (1)
fa and spr ng
nd v dua p acement n ASU Mus c Therapy C n c

MUE 386 Therapy Precl nical lll (1)
fa and sp g
See MUE 385

MUE 387 Therapy Preclinica IV. (1)
fa and spr ng
nd v dua c n ca work n a c mu ty menta hea th fac ty

MUE 388 Therapy Preclin cal V. (1)
fa and spr nq
See MUE 387

MUE 389 Repertoire for Music Therapy. (3)
spr ng
Mus c sk repert re for mus c therapy nc ud ng un t on bras str ngs, woodw nds e ectron c n truments computer mus c and mprov sat on techn q es Lab Prereq s tes MUE 211 Mus c Ther apy major

MUE 441 Psychology of Music. (3)
spr ng
Psycho og ca and phy o og ca a pect of mus c emphas z ng mus ca behav or funct on percept on and earn ng Prerequ s tes un or stand ng Mus Therapy ma or or nstructor approva

MUE 475 Group Process and Music Therapy. (1)
fa
Pr nc p es f group pro ess, verba coun e ng profess ona wr t ng as re ated to mus c therapy pract ce Prerequ s tes MUE 362 Mus c Therapy major

MUE 476 Internship in Music Therapy. (1)
fa and spr g
Fu t me 6 month off campus res dency n an approved c n a st tut on

MUE 480 Chora Methods. (3)
spr ng
Methods of nstruct on organ zat on and presentat n of appropr ate content n chora mus c asses Prerequ s te Secondary Edu at on ma or

MUE 481 Instrumental Pract cum Methods. (5)
fa
nstrumenta mus c s a means of deve op ng mu c sk s nder stand ngs, and att tudes n e ementary and seconda y sch o stu dents Prereq s te Secondary Educat on maj

MUE 482 Instrumental Pract cum Methods. (5)
spr ng
See MUE 481 Pre equ te MUE 481 or 485 Secondary Educa t on major

MUE 485 String Practicum Methods. (5)
fa
For tude ts prepar ng to adm n ter a str ng program and teach str ngs at the e ementary eve Le ture ab

MUE 548 Introduction to Research in Music Education. (3)
fa and summer
troduces h stor a , quant tat ve a d q a tat ve re earch methods and sources as t ey app y t resea ch n mu c educat on

MUE 549 Foundations of Mus c Education. (3)
once a yea
H stor a soc o og ca survey of forma and nforma mu c teach ng and earn ng pra t ces from the an ent Greeks t the pre ent nc ud ng the evo ut on of ph osoph es and earn ng theor es

MUE 550 Studies in Music Curr cu a. (3)
once a year
Scope and s quence of m s ca exper en es Deve opment of cr ter a f r the eva uat on of mus c curr cu a

MUE 551 Advanced Studies in Elementary Schoo Music. (3)
on e a yea
For exper enced te chers, rgan zat on and o te t of K–6 genera mus c asses Emphas zes teach g mus c read ng and ear tra n ng to yo ng ch dren

MUE 552 Advanced Studies in Secondary General Mus c. (3)
on e a year
Organ zat on and content f hoo n us c c asse that are not perfor man e o e ted

MUE 553 Contemporary Elementary Music. (3)
se ected semesters
dent f cat on and deve opment of mater a s and te h que for teach ng spe a un t of mu c tudy to e ementary K–8 ch dren

MUE 560 Jazz Pedagogy. (3)
pr ng n odd years
Study f pedagogy reperto re a d techn que of n tru t o n jazz sty es ensemb e techn ques a d performance pract ce for hoo ensemb es Lecture ab d cuss on observat Prerequ s te M M Mus Ed cat on major

MUE 562 Jazz Ensemble Rehearsa Techniques. (1)
fa and spr ng
Conduct ng a d rehearsa techn ques for s hoo jazz ensemb es ab P erequ s te M M Mus c Educat on ma or

MUE 564 Instrumental Music, Advanced Rehearsal Techniques. (3)
once a yea
n depth a a ys s of n trumenta techn ques preparat on for a tho ough d scu s on of band tun ng prob em and ut ons D sc ss on of product ve ndu t ng and ehearsa techn ques for s hoo mus c teachers

MUE 566 Instrumental Literature for Schools. (3)
on e a year
C mprehens ve st dy a d ana ys s of types f strumenta mus c.

MUE 568 Choral Music, Advanced Rehearsa Techniques. (3)
once a year
Mus ca an voca techn ques ece ary for prese tat n of chora t erature Ana ys s and exper mentat on w th p y ho og a acoust ca nd ther prob ems f rehearsa and perfo mance

MUE 570 Chora Literature for Schools. (3)
on e a yea
Comprehe ve study and ana ys s of chora mus c for the h gh schoo w th spec a emphas on octavo te at re

MUE 579 Psychology of Music. (3)
once a yea
Nature of mus ca ty and t eva uat on Rev w of re ent research

MUE 585 Voca Acoustics and Production (3)
once a year
n depth approach to the psycho og ca phys o og ca work ngs of the voca mecha m

MUE 733 Contemporary Issues and Research in Mus c Educa t on. (3)
once a yea
Emphas ze recent resea ch re at ng to mus c n t ct on at a eve s curre t and h stor c ssues chora genera and nstrumenta mu c

MUE 744 Higher Education Instruction. (3)
once a year
Ph soph ca a d psyc o og ca pr nc p es of c ege un vers ty teach ng Patterns f mus c teacher educat n a d a pro ect on of co rse ut nes

MUE 755 Historical Research in Mus c Education. (3)
sun mer
Know edge and ns ght re ated to conduct n t stor ca re ear h n mus c educat on n udes deve opment of a m n propo a for a d s ertat on on the h story of mus c edu at on

Omnibus Courses. F r an e p anat on f courses offered but not spe f ca y ted n th s cata og see Om bu Cour es page 56

MUSIC PERFORMANCE (MUP)

MUP 100 Concert Attendance. (0)
fa and spr ng
Requ red of a mu c majors for 6 emesters n ea h degree program w th a m n mum of 4 nvocat ons atte ded ea semester

MUP 111 Studio Instruction. (2)
fa and sp ng
Basso e o c ar net c ntraba s co net e p on um f ute gu tar harp harps hord hor oboe organ percus on p a o saxophone trombone trumpet tuba v o a v n vo ce M n m m ontact of 1 hour p u stud o c a week y May be repeated for cred t May not be taken for aud t Fee Prereq tes mus c ma o p aceme t exam na t on aud t on

MUP 121 Studio Instruction. (1)
fa , spr ng summer
Secondary or m nor nstrume t struct on Bassoon ce o c ar net contraba s cornet euphon um f ute gu tar, harp harps chord horn oboe organ percu s on p ano, saxophone trombone trumpet tuba v ola v n vo e M n mum ontact of 1 2 hour per week May be repeated f r cred t May not be taken f r aud t Fee Prerequ s tes mus ma or nstructor approva

MUP 127 Studio Instruction. (4)
fa and pr g
Bassoon e cla net contraba s cornet euphon um f ute gu tar harp harps chord horn oboe orga percuss on p an sax phone trombone trumpet tuba v a v o n v e M n mum contact of 1 hour plus stud o c ass weekly May be repeated for cred t May not be taken for aud t Fee Prerequ s tes Performance ma or p acement exam nat on aud t on

MUP 130 Beginning Group Piano. (1)
fa and sp ng
Prov des a bas c ntrodu t o to p ay g p a o through mus c read ng ho ds rhythm and wr tte act v t e Prerequ s te non mus c major

MUP 131 Class Piano. (1)
fa and spr ng
4 semeste sequence w th M P 132 231 a d 232 des gned for those w th tt e o n p ano exper e ce Emphas zes keyboard tech n que s ght read g s mp e accompan ments and mpr v sat on 2 hours pe week May ot be taken for aud t Prerequ te mus c maj r

MUP 132 Class Piano. (1)
spr ng
See MUP 131

MUP 133 Class Voice. (1)
fa and spr ng
4 semester sequen e M P 134 233 and 234 open to al students 2 hours pe week May t be taken f r aud t

MUP 134 Class Voice. (1)
fa and spr ng
See M P 133 Prerequ s te MUP 133 or n tructor approva

MUP 141 Jazz Fundamentals. (1)
fa
Pr nc p es methods and theory of azz perf rmance espec a y des gned for the sma azz ensemb e 2 hour per week

MUP 142 Jazz Fundamentals. (1)
spr ng
Cont nuat on of MUP 141 2 hou s per week

MUP 209 Begnn ng Choral Conductng. (1)
fa and spr ng
Essent a s of chor conduct ng techn q es 2 hours per week

MUP 210 Beginning Instrumental Conducting. (1)
spr ng
Essent a s of nstrumenta conduct ng te hn ques 2 h u s per week

MUP 217 Improvisation Workshop. (2)
fa and spr ng
Emphas zes ba c jazz terature chord symbo read ng me od c pat terns ear tra n ng me od con epts and ana y s of mprov sed so os Must be taken n sequence w th MUP 218 M y not be taken for aud t Prereq s tes MTC 125 MUP 111 1 semester

MUP 218 Improvisation Workshop. (2)
fa and pr ng
Cont nuat on of MUP 217 P erequ s te MUP 217

MUP 231 Class P ano. (1)
fa
See MUP 131

MUP 232 Class Piano. (1)
spr ng
See MUP 131

MUP 233 Class Voice. (1)
fa and spr ng
See MUP 133 Prerequ s te MUP 134 or nstructor approva

MUP 234 Class Vo'ce. (1)
fa and pr ng
See M P 133 Prerequ s te MUP 233 or nstructor approva

MUP 235 Jazz Piano. (1)
fa
2 semester sequen e w th MUP 236 des gned for azz keyboard exper ence Empha zes hord symbo read ng s mp e mp v at on and vo c ng 2 h urs per week Prerequ s te MUP 132

MUP 236 Jazz Piano. (1)
spr ng
See M P 235 Prerequ s te MUP 132

MUP 237 Fretboard Harmony. (1)
fa and spr ng
Sca e chords harmo y ba c mprov sat on for the gu ta 2 ho rs per week

MUP 250 D'ction for Singers. (1)
fa a d spr ng
Use of p onet cs n the study of song and opera terature Language emphas s d ffers each semester May be repeated f r cred t

MUP 301 Advanced Class Piano (1)
fa
Requ red for the cho a gene a c ncentrat on of the Mu c Educat on ma r Open to othe mus c majo s wh have c mp eted MUP 232 Emphas zes accompan ments en emb e p ay ng score read ng, advan ed harmon zat ons reperto re techn que and mpr v at on 2 hours per week May not be take for aud t Prerequ tes MUP 232 or prof c e y mu major p acement exam nat on

MUP 302 Advanced Class Piano. (1)
spr ng
Requ ed f the hora genera concentrat on of the Mu c Edu at on ma or Open to other mus c major who have comp eted MUP 301 A sequent a nt nuat on of MUP 01 sk s that n ude both group and stud o nstr ct on 2 hours per week May ot be taken for aud t Pre requ s tes MUP 301 o prof c ency mus c ma or p a ement ex m at on

MUP 311 Studio Instruction. (2)
fa and spr ng
See MUP 111 Fee.

MUP 319 Record ng Studio Techniques. (2)
spr ng
Study f b th ana og and d g ta record ng methods nc ude ab t me o re ord ng conso e and tape ma h nes Lab

MUP 320 MIDI Workshop. (2)
fa
Presents ardware and software app cat ns for equen ng and mus c pr nt ng Lab

MUP 321 Studio Instruction. (1)
fa spr ng, summer
See MUP 21 Fee

MUP 327 Studio Instruction. (4)
fa and spr ng
See MUP 27 Fee

MUP 337 Studio Instruction: Piano Accompanying. (2)
spr g
Repert re to be se e ted from voca and nstr menta terature 1 hour esson per week May be repeated f r cred t. Prerequ s tes Per formance ma r w th a on entrat on n p ano accompany ng p ace ment exam nat on

MUP 339 Choral Conduct'ng. (2)
fa and spr ng
E ements of chora conduct ng techn que and nterpretat on 3 hours per week Prerequ s te MUP 209

MUP 340 Instrumental Conduct ng. (2)
fa
Fundamenta s of score read ng and nterpretat on of nstrumenta mu c 3 ours per week Prerequ s te M P 210

L te a y and t ca nqu y **MA** mathe at **CS** omputer tat t quant tat ve pp cat n **HU** huma te a d fine a t **SB** a and behav r c ences **SG** nat ra enc gen ra core o es **SQ** nat ra en e q ant tat ve **C** u tura d vers ty n th Un ted States **G** g ba H h t r c ee Genera St d e pag 8

MUP 344 Chamber Orchestra. (1)
fa and spr ng
mport nt masterp eces from a per d of mus are perfo med through ut the year May be repeated for cred t P erequ te aud t on w th d re tor

MUP 345 Symphony Orchestra. (1)
fa and spr ng
Over a 4 year per d the st dent s ntroduced to the masterp eces of symp ony o hestra te ature 3 t mes per week May be repeated for red t Prerequ s te a t wt dre t r

MUP 346 S'nfonietta. 1)
fa and spr ng
Symph n c orche tra that pre ents approx mate y s x concerts annu a y perform ng ma terp eces of the c a s a repertore 3 t mes per week May be repeated for cred t Prerequ te aud t on w th d re t r

MUP 350 Choral Union (1)
fa and spr ng
Open to a stude ts n the u vers ty an to nterested s ngers the commun ty by a to Preparat on an perf rma ce of the arger chora work 2 hour per week May be repeated for cred t Prerequ s te aud t w th d re tor

MUP 352 Concert Choir. (1
fa and spr ng
mportant ma terp eces from a per ods of mu c are performed May be repeated for cred t Prerequ s te nstructor approva

MUP 353 University Cho r. (1)
fa and spr ng
4 hours per week May be repeated f r cred t Prerequ s te nstruct r approva

MUP 355 Men's Chorus. (1)
fa and spr ng
Rehearsa and performance of mus c for ma e vo ces 3 hours per week May be repeat d for c ed t Prerequ s tes a d t n w th d recto · nstructor approva

MUP 357 Women's Chorus. (1)
fa and spr ng
2 hours per week May be repeated for cred t Prerequ te n tructor approva

MUP 361 Marching and Concert Bands. (1)
fa and spr ng
Stag ng of format ons a d dr s for footba games and other events fa ma terp eces of symphon c band terature pr ng Meets da y May be repeated for cred t Prerequ te aud t on w th d rector

MUP 362 Wind Ensemble. (1)
fa and spr ng
Rehearsa and performance of terature for w nd ensemb e 2 hours per week n fa 4 hours n spr ng Perform ng ensemb e May be repeated for cred t Prerequ s te nstructor appr va

MUP 363 Chamber W'nds. (1)
fa and spr ng
Rehearsa and performa ce of advanced terature for ch mber w nds 2 hours per week Perform ng ensemb e May be repeated for cred t Prerequ s te n tructor approva

MUP 370 Music Theatre: Techniques. (1)
fa and spr ng
Exerc ses and mprov s t ons for the s nge a tor emphas z ng body awarene s bas c mus c theater performance sk s and freedom of the vo a and breath mechan sms Se t on 1 Movement for S ngers Sect on 2 Express o Se t on 3 terpretat on · Sect n 4 Advanced Express on Sect 5 Adva ced nterpretat on Sect ons 2 through 5 must be take n sequence Each sect on 3 hours per week May be repeated for cred t

MUP 371 Mus'c Theatre: Workshops. (1)
fa and pr ng
Deve opment of spec f c k s for m s ca dramat c nterpretat on Sec t on 1 Ar a Preparat on · Sect n 2 Broadway Sect on 3 Broadway Ea h sect on 1 hour ecture demonstrat on 1 ab per week May be repeated for cred t

MUP 372 Music Theatre: Orchestras (1)
fa and spr g
Part c pat on n Lyr Opera Theatre product on Se t on Orches tra Sect on 2 Chamber Orchestra e t on 3 Chamber Ensemb e May be repeated f r cred t Prerequ s tes aud t on w th d rector nstructor approva

MUP 373 Music Theatre: Performance. (1)
fa a d spr ng
Part c pat n n Lyr c Opera Theat e pro uct s Sect n 1 Pr n pa R e Sect on 2 Chor s May be repeated for cred t Prerequ s tes d t on w th d ector structor appr va

MUP 374 Music Theatre: Product on. (1)
fa and spr ng
Part pat on Ly Opera T eatre product ons S ct o 1 Vo a Per formance Sect on 2 Tech a Mus Theatre Sect o 3 Prob ems n Produ t on to be taken concurrent y w th M P 3~3 Sect on 2 May be repeated for cred t

MUP 376 New Music Ensemble (1)
fa and spr ng
Rehearsa and performance f mus c wr tten the ast 20 years May be repeated for red t Prerequ s te. structor approva

MUP 377 Brass Choir. (1)
fa and sp ng
Spec a z ng n pub c performance of mus c wr tten for brass nstr ments 2 ours per week May be epeated for cred t Prerequ s te: nstructor approva

MUP 379 Chamber Music Ensembles (1)
fa and sp ng
Bra s gu tar keyboard m xed percus on tr ng voca and wood w nds ensemb es 2 hours per week May be repeated for cred t Pre requ s te n tructor approva

MUP 382 Collegium Musicum. (1)
se ected semester
S ngers and nstrumenta t spec a z ng n the performance of ear y and nusua m s c 2 hour per week May be epeated for red t Pre requ s te nstructor approva

MUP 385 Percussion Ensemble. (1)
fa and spr ng
Rehear a and performan e of standard and or g na reperto re for the percu s on ensemb e and re ated nst uments 2 hours per week. May be repeated for cred t Prereq s te nstructor approva

MUP 386 Jazz Band. (1)
fa and spr ng
Rehear a and performance of new trad t ona and Lat n terat re for azz bands 4 hours per week May be repeated for cred t Prerequ s te nstru tor approva

MUP 387 Ethnomusicology Ensembles. (1)
fa and spr ng
Performance earn g exper en e for the m s c f var ous cu tures of the wor d May be repeated for cred t Prerequ s te know edge of strument or n tructor approva .

MUP 388 Piano Accompanying. (1)
fa and spr ng
P ano accompan ments f und voca and nstrumenta terature d s cuss on of sty es a d perf rman e pract ces exper ence n pub c per f rmance 2 hours per week May be repeated for cred t Prerequ s te Performan e ma or w th a concentrat n n p ano ac ompany ng or nstructor approva .

MUP 417 Advanced Improvisation. (2)
fa and spr ng
Emphas zes ana ys s and performance of advanced azz terature compos t on n contempo ary sty es Must be taken n sequence w th MUP 418 May not be taken for aud t Prerequ te MUP 218

MUP 418 Advanced Improvisation. (2)
fa and spr ng
Cont nuat on of M P 417 Prerequ s te MUP 417

MUP 440 Keyboard Harmony. (1)
fa
Performance or ented c ass emphas z ng chord progres on harmo zat on f gured bass rea zat on sty st c mprov sat on transpos t on open core read ng and s ght read ng Prerequ s te Performance ma or w th a con entrat on n keyboard or nstru tor approva

MUP 451 Repertoire. (2)
fa and spr ng
L terature av ab e for performan e n a perform ng med a May be repeated for ed t Prerequ te un or stand ng n ma or performance f e d

MUP 453 Song Literature. (2)
once a year
Ear y ta an Eng sh Germa and French art song

MUP 454 Song Literature. (2)
once a year
Amer can, Russ an Span sh S and nav an and contemporary song

MUP 481 Performance Pedagogy and Materials (2)
fa and spr ng
Pr nc p es and met od of performan e te hn ques f r ea h perfor mance f e d May be repeated for cred t Prerequ s'te sen or stand ng or nstructor approva

MUP 482 Piano Pedagogy. (2)
se ected semesters
Cont nuat on of MUP 481 P ano Prob ems and techn ques of teach ng ntermed ate to advanced p ano students Prerequ tes un or stand ng n Performance keyboard or p ano accompany ng concen trat on ; nstructor approva

MUP 487 P ano Accompany ng. (1)
fa and spr ng
P ano accompan ments found n voca and nstrumenta terature d s cuss on of sty es and performance pract ces experience n pub c per formance 2 hours per week May be repeated for cred t May not be taken for aud t Prerequ s te Performance major w th a c ncentrat on n keyboard or p ano accompany ng

MUP 495 Performance. (0)
fa
For ca d dates of a B M degree n wh ch 1 2 rec ta s a requ rement Prerequ s te· B M degree cand date

MUP 496 Performance. (0)
fa
For cand dates of a B.M degre n wh ch a fu rec ta s a requ rement. Prerequ s tes B M degree cand date· MUP 495

MUP 507 Group Piano Practicum. (2)
fa
Curr cu a mater a and teach ng tec n ques for group teach ng at the un vers ty and commun ty c ege eve s Observat on superv sed teach ng n group p ano

MUP 508 Studio Observation. (1)
fa and spr ng
Week y observat on of stud o teach ng by var ous p ano facu ty Paper as f na requirement Prerequ s te M M p ano student n Performan e major performance pedagogy or so o performance concentrat on

MUP 509 Jazz Keyboard Harmony. (1)
fa
Emphas zes azz chords and hord progress ons harmon zat on vo c ng and ana ys s of transcr pt n Lab Prerequ s te M M Mus c Educat on student

MUP 510 Jazz Keyboard Harmony. (1)
spr ng
Cont nuation of MUP 509 Lab Prerequ s te MUP 509

MUP 511 Studio Instruction. (2)
fa and spr ng
Bassoon, ce o, c ar net contr bass, cornet euphon um, f ute gu tar harp harps chord horn oboe, organ percuss on p ano saxophone, trombone trumpet tuba v o a v o n vo ce M n mum contact of 1 hour plus stud o ass week y May be repeated for cred t May not be taken for aud t Fee Prerequ s tes graduate mus c major p acement exam nat on aud t on

MUP 517 Advanced Improvisation. (1)
fa
mprov sat on techn ques w th n the context of advanced azz tera ture Must be taken n sequence w th MUP 518. Lab Prerequ s tes p acement exam nat on aud t on

MUP 518 Advanced Improvisat'on. (1)
spr ng
Cont nuat on of MUP 517. Lab Prerequ s te. MUP 517

MUP 521 Studio Instruct on. (1)
fa spr ng summer
Secondary or m nor nstrument nstruct on Bassoon ce o c ar net contrabass cornet euphon um f ute, gu tar harp, harps chord horn oboe, orga percuss on p ano saxophone trombone, trumpet, tuba v o a v o n, vo ce M n mum contact of 1 2 hour per week May be repeated for cred t May not be taken for a d t Fee Prerequ s tes graduate mus c major nstructor app va

MUP 527 Stud o Instruction. (2 or 4)
fa and spr ng
Basso n ce o ar net contrabass cornet euphon um f ute gu tar harp harps chord horn oboe, organ percuss on, p ano saxophone trombone trumpet tuba v o a v o n vo ce M n mum contact of 1 2 hour per week May be repeated for red t May not be taken for aud t Fee Prerequ tes M M Performance ma or p acement exam nat on aud t on

MUP 540 Advanced Conducting. (3)
fa
Sc re preparat on and conduct ng techn ques for nstrumenta mus c Concentrat on on study of h stor ca sty es Requ red of D M A stu dents n nstrumenta Mus c

MUP 541 The Art Song. (3)
se ected semesters
Seminar on so o song fr m ts beg nn ng to the present day

MUP 544 Chamber Orchestra. (1)
fa and spr ng
mportant masterp eces from a per ods of mus c are performed throughout the year May be repeated for cred t Prerequ s te nstruc tor approva

MUP 545 Symphony Orchestra. (1)
fa and spr ng
Masterp eces of symphony orchestra terature 3 t mes per week May be repeated for cred t Prerequ s te aud t on w th d rector

MUP 546 SInfon etta. (1)
fa and spr ng
Symphon c orchestra that presents approx mate y s x concerts annu a y perform ng masterp eces of the c ass ca reperto re 3 t mes per week May be repeated for cred t Prerequ s te aud t on w th d re tor

MUP 550 Chora Union. (1)
fa and spr ng
Open to a students n the un vers ty and t nterested s ngers n the commu ty by aud t on Preparat on and performance of the arger chora works 2 hours per week May be repeated for cred t Prerequ s te aud t on w th d rector

MUP 551 Repertoire. (2)
fa and spr ng
terature ava ab e for performance n a perform ng med a May be repeated for cred t

MUP 552 Concert Choir. (1)
fa and spr ng
mportant masterp eces from a per ods of mus c are performed May be repeated for cred t Prerequ s te n tructor approva

MUP 553 University Choir. (1)
fa and sp ng
4 hours per week May be repeated for cred t Prerequ te nstructor approva

MUP 555 Men's Chorus. (1)
fa and spr ng
Rehearsa and performance of mus c for ma e vo ces 3 hours per week May be repeated for cred t Prerequ s tes aud t on w th d rector nstructor approval

MUP 557 Women s Chorus. (1)
fa and spr ng
2 hour per week May be repeated for cred t Prerequ s te nstructor approva

MUP 561 March ng and Concert Bands. (1)
fa and spr ng
Stag ng of format ons and dr s for footba games and other events fa masterp eces of symphon c band terature spr ng Meets da y May be repeated for cred t Prerequ s te aud t on w th d rector

L tera y and cr t ca nqu ry **MA** mathemat cs **CS** computer stat st cs q a t tat ve app cat ons **HU** human t es and f ne arts **SB** so a and behav ora sc en es **SG** nat ra s ence genera core courses **SQ** natura sc en e quant tat ve **C** tura d vers ty n the Un ted States **G** g oba **H** h sto a See Ge era Stud es page 83

MUP 562 Wind Ensemble. (1)
fa and spr ng
Rehea sa and performance of terature for w nd e semb e 2 h urs per week n fa 4 hours n spr ng May be repeated f r cred t Perform ng ensemb e Prerequ s te nstru tor approva

MUP 563 Chamber Winds. (1)
fa and spr ng
Rehearsa and performa ce of advanced terature for chamber w nd 2 hours per week May be repeated for cred t Perform g en emb e Prerequ s te nstru tor appr va

MUP 570 Music Theatre: Techniques. (1)
fa and spr ng
Exerc ses and mp ov sat ons for the s ng ng actor em has z ng body awareness, o at ons and freedom f the v ca and b eath mecha n sms Se t on 1 nte pretat on Sect on 2 Express on Sect on 3 Movement for S ngers Each Sect o 3 hours pe week May be repeated for cred t

MUP 571 Music Theatre: Workshops. (1)
fa and spr ng
Deve opment of spec f sk s for the mus a dramat nte p etat on Sect on 1 Ro e Preparat on Se t on 2 Sty es · Sect on 3 Opera Sce es Se t on 4 Mus ca Comedy ect on 5 Revue Ensemb es Each sect on 1 h ur ecture demonstrat on 1 ab per week May be repeated for cred t

MUP 572 Music Theatre: Orchestras. (1)
fa and spr ng
Part c pat on n Lyr c Opera Theatre product ons Sect on 1 Orches tra Sect on 2 Chamber Orchestra Sect on 3 Chamber Ensemb e May be repeated for cred t Prerequ s tes aud t on w th d rector nstructor approva

MUP 573 Music Theatre: Performance. (1)
fa and spr ng
Part pat on n Lyr c Opera Theatre pr du t ons Sect on 1 Pr nc pa Ro es , Sect on 2 Chor s May be repeated for cred t Prerequ s tes aud t on w th d rector nstructor appr va

MUP 574 Music Theatre· Product on. (1)
fa and spr ng
Part c pat on n yr Opera Theatre pr duct ons. Sect on 1 Voca Per formance Sectio 2 Techn ca Mus c Theatre Sect n 3 Prob ems n Prod t on to be taken c ncurrent y w th M P 573 Sect on 2 May be repeated for cred t

MUP 576 New Music Ensemble (1)
fa and spr ng
Rehearsa and performance of mus c wr tten n the ast 20 years May be repeated for cred t Prerequ s te nstructor approva

MUP 579 Chamber Music Ensembles. (1)
fa a d spr ng
Str ng, brass woodw d percus on keyboard voca and m xed ensemb es 2 ho rs per week May be repeated for cred t Prereq s te nstructor approva

MUP 581 Performance Pedagogy and Materials. (2)
fa and spr ng
Pr nc p es and methods of performance techn ques for each perfor mance f eld May be epeated for red t

MUP 582 Collegium Musicum (1)
se e ted semesters
S gers and n trumenta ts spe a z ng the performance of ear y and u sua mus c 2 hour per week May be epeated for re t Pre requ s te nstructor approva

MUP 585 Percussion Ensemble. (1)
fa and spr ng
Rehearsa a d performance of standard and or g na repert re for the percuss on ensemb e and re ated n trument 2 h urs per week May be repeated for cred t Prerequ s te nstr ctor approva

MUP 586 Jazz Band. (1)
fa and spr ng
Rehea sa and performance f new trad t ona a d Lat n te ature for jazz bands 4 hours per week May be epeated f r cred t Prerequ s te. stru tor appr va

MUP 587 Ethnomusicology Ensembles. (1)
fa and spr g
Performance earn g exper en e for the mus c of var ous cu tures of the wor d May be repeated for cred t Prerequ s te know edge of nstrument or nstructor approva

MUP 588 Piano Accompanying. (1)
fa and spr ng
P ano accompan ments found n voca and nstrumenta terature, d s cuss on of sty es and performance pract ces exper ence n pub per formance 2 h ur per week May be repeated for cred t Prerequ s te Performance major w th a con e trat on n p ano accompany g or n tructor approva

MUP 591 Seminar. (1 12)
se ected semesters

MUP 595 Continuing Registration. (1)
fa and spr ng

MUP 596 Solo Performance (1)
fa
May be fu rec ta ma or operat c ro e so o performan e w th orches tra ensemb e or ecture rec ta Prerequ s te: M M and ate n app ed mu c

MUP 597 Solo Performance. (1)
fa
See MUP 596

MUP 671 Choral Repertoire. (3)
se ected semesters
Exam nes arge chora or hestra works to determ ne the r mus ca and textua aracter st s from a conductor s po nt of v ew

MUP 727 Studio Instruction. (2 or 4)
fa and spr ng
M n mum contact of 1 hour per week May be repeated for cred t Fee Prerequ te D M A cand date

MUP 751 Sem nar n Piano Literature. (2)
fa n odd years
n epth tudy of se ected top cs re ated to the sta dard p ano tera tu e Requ res research paper b b graphy c ass pre entat on. Sem nar

MUP 792 Research. (1 12)
fa spr ng summer

MUP 796 So o Performance. (1 15)
fa and pr ng
May be repeated for cred t Prerequ s te D M A cand date

MUP 799 Dissertation. (1 15)
fa and spr ng

Omnibus Courses. For an exp anat on of courses offered but not spec f ca y sted n t s cata og, see Omn bus Courses page 56

MUSIC (MUS)

MUS 100 Fundamentals of Music Notation. (3)
fa and spr ng
Prov des non Mus c majo w th suff c ent symbo ltera y to beg n work n the f e d of mus ca ear g Cred t ot app icab e toward any mus c degree

MUS 340 Survey of Music History. (3)
fa spr ng summer
Major composer compos t ons and per ods the h story of mus c Cred t not app ab e toward any mus c degree.
Ge era Stud s HU H

MUS 347 Jazz in America. (3)
fa spr ng summer
Current pract ces emp yed by c ntemporary jazz mus c ans the h s tor ca deve opment of jazz techn ques Cred t not app cab e toward any m s c degree e ture d s uss on. Cross sted as AFH 347 Cred t s a owed for on y AFH 347 or MUS 347
Genera Stud es HU

MUS 354 Popular Music. (3)
fa spr ng summer
Emphas zes h stor ca cu tura and performan e patterns n a var ety of popu ar d oms such as but not m ted to rock fo k jazz a d Afro Amer can mus c May be repeated for cred t Cred t not app cab e toward any mus c degree
Genera Stud es HU

MUS 355 Survey of American Music. (3)
fa spr ng summer
Gr wth and deve opment of Amer an mus c Cred t not app cab e toward any mu c degree
Genera Stud es HU H

MUS 356 Survey of the Musical Theatre. (3)
once a year
Mu cs p ace n t e theatre v ewed n terms of h stor ca mportance and re at ve funct n Cred t not app cab e toward any mus c degree
Genera Stud es H

Omnibus Courses. F r an exp anat on of courses offered but not s ec f ca y sted n th s cata og see Omn bus Courses, page 56

Department of Theatre

herbergercollege.asu.edu theatre
480 965-5337
GHALL 232

Johnny Saldana, Interim Chair

Professors: Barker Bedard Eckard Gmer Knapp, Mason, Sa dana Thomson, W s

Associate Professors: Acker, Edwards, Ho oway, R ske Vin ng

Assistant Professors: Furr Soloman, Gharav Reyes Steenerson Ster ng Under ner Woodson

Senior Lecturer: McMahon

Lecturers: rv ne Tongret

The Department of Theatre is a member of the National Association of Schools of Theatre, and the requirements set forth in this catalog are in accordance with the published regulations of the association For advising purposes, a l students registering in a Theatre degree program enroll through the Herberger College of Fine Arts. Special adv s ing check sheets, providing complete information regarding requirements and suggested electives, are available in the Department of The atre office for the B.A. degree program.

Freshman and sophomores who meet university and departmental standards must receive a grade of "C" or higher in all major courses and a 2 50 cumulative GPA dur ing their first semester to continue in the B A Theatre pro gram Students failing to meet these requirements will have one semester of departmenta probation to receive a "C" or higher in major courses and raise their cumulative GPA to 2 50 Students failing to meet the above requirements by the end of the first year (two semesters) are asked to seek advis ing regarding other majors.

THEATRE—B.A.

The major in Theatre consists of 57 semeste hours The following 33 semester hours of core courses are required of all B.A. degree candidates:

THE 12 Or entatio to The t	1
THE 22 Prin ples of D ma c Ar ly s L	3
THE 32 H story of the heatre I HU H	3
THE 321 History of the T eatre II HU H	3
THE 440 Theatre F n s a l C s ts	3
THP 1 2 Fundamental f A tr	3
THP 215 The Directo s Visi	3
THP 30 Theatre P duct on. Runn g Crew	
THP 3 1 Theatre P duct	1
THP 3 5 Sceno raphy	3
THP 425 Theat e and the Fut re	3
To ta	27

* One s mester hou r different p r luct on optio n is r equir d.

One of the follow in two c urses thre semester ho rs is required:

THP 213 Introdu tio to Tec r cal Th eatre	4
THP 214 Intr du tion t C t m	3

Three semester hours of departmental appr ved c urse work *in developing ne work s a so required* e p ay wr ting, solo performan ce theatre for socia change Ch eck the department advis ng office fo a list of eli ible courses

Twenty four sen ester h ours of THE an d THP electives are selected by the student an d advisor to complete the 57 semester hours required in the ma or. These 24 semester hours can constitute an optiona focus area for the student, which involves enrolling in re ated course work from one of seven specialty areas in Th eatre acting, direct ng and st ge management; play writing; sceno raph y history theory, and criticism; film; and theatre for youth. A list of recommended courses appropr ate to each are is avai ab e from the department advising office Undergraduate students inter ested in pursuing Arizona teacher certification or endorse ment for Theatre are encour ag ed to pursue the fo us area in theatre for youth, then obtain po tbaccalaureate teacher cer tification through the ASU Colle e of Education or at oth er Arizona educational institution. General Studies courses make up 45–48 semester hours of the total cour es required. A ditional elect ve courses are selected with an adv so to meet the tota 120 semester hours required for the de ree

Within the ma or only courses with a grade of "C" or higher may be app ied toward graduation.

Students who transfer 55 semester h ours or m or are required to enter with an d retain a 2.50 GPA in the atre courses and a 2 00 cumulative GPA.

GRADUATION REQUIREMENTS

In addition to fulfilling the major requirements, students must meet all university graduation requirements See "U ni versity Graduatio Requirements," page 79

L teracy a d cr t u y **MA** mat emat c **CS** co p te tat c qu nt tat v p at ns **HU** human te a d f e at **SB** so a and behav ora c e e **SG** at ra en e gene a e u e **SQ** atura s ce qu t tat ve **C** t a d ver ty the ted States **G** g oba H h stor ca See Ge e a Stud e pag 83

MINOR

The department offers a minor in Theatre consisting of 22 semester hours of course work. The following courses are required.

THE	Introduction to Theatre *HU*	3
THE 320	History of the Theatre I *HU H*	3
THE 321	History of the Theatre II *H H*	3
THP 101	Introduction to the Art of Acting	3
THP 213	Introduction to Technical Theatre	4
THP 311	Theatre Production	1
Concentration area*		6
Total		25

*Also required: Select three hours in the same area of concentration. Contact the department for optional course requirements.

Courses ordinarily limited to majors only are available to minors on a second priority basis; that is, minors may not preregister for these courses, but are allowed to register after all majors' needs have been met. All prerequisites for the minor courses must be met (see course listings). Transfer students may transfer up to nine semester hours toward their minor.

GRADUATE PROGRAMS

The faculty in the Department of Theatre offer programs leading to the M.A. degree in Theatre; the Master of Fine Arts degree in Theatre with concentrations in performance, scenography, and theatre for youth; the Ph.D. degree in Theatre with a concentration in theatre for youth; and, in conjunction with the Department of English, an interdisciplinary Master of Fine Arts degree in Creative Writing/playwriting option. See the *Graduate Catalog* for details.

THEATRE (THE)

THE 100 Introduction to Theatre. (3)
fall spring summer
Surveys theatre production from the Greek to contemporary theatre. Taught in conjunction with guest artists. Prerequisite: non-major.
General Studies H

THE 125 Orientation to Theatre. (1)
fall
Orientation to university and department resources and procedures. Career planning and guidance. Attendance and written responses to theatre productions. Required for B.A. Theatre majors. Prerequisite: Theatre major.

THE 220 Principles of Dramatic Analysis. (3)
fall and spring
Analysis, evaluation, and interpretation of dramatic literature for theatrical production. Emphasizes the traditional canon of dramatic literature and traditional structures and forms of drama. Prerequisites: ENG 101 or 105. Theatre major.
General Studies

THE 300 Film: The Creative Process I. (3)
fall spring summer
Elements of theatrical film, cinematography, sound, editing, directing, acting, scriptwriting, producing, and criticism. 3 hours lecture, demonstration, and videotape.
General Studies HU

THE 301 Film: The Creative Process II. (3)
fall and spring
Advanced study of selected films, analyzing cinematography, sound editing, directing, acting, screenwriting, producing, and criticism. Prerequisite: THE 300.
General Studies HU

THE 320 History of the Theatre I. (3)
fall
Traces major developments in theatre production and dramatic literature from their beginnings to the mid 17th century. Lecture, student presentations.
General Studies HU H

THE 321 History of the Theatre II. (3)
spring
Traces major developments in theatre production and dramatic literature from the mid 17th century to the 20th century. Lecture, student presentations.
General Studies HU, H

THE 325 Play Reading for Educational Theatre. (1)
fall and spring
Assigned independent readings in play for secondary school play production. Prerequisite: theatre education concentration or written instructor approval.

THE 400 Focus on Film. (3)
fall spring summer
Specialized study of prominent film artists, techniques and genres. Emphasizes the creative process. May be repeated for credit. Prerequisite: ENG 101 or 105.

THE 402 Gender Identity in Film. (3)
selected semesters
Examines the representation of gender in Hollywood cinema with particular focus on films from 1970 to the present. Prerequisite: THE 300.

THE 403 Independent Film. (3)
once a year
Examines independent films and filmmakers in the United States 1968 to the present.
General Studies HU

THE 404 Foreign Films and Filmmakers. (3)
once a year
Films and filmmakers from Europe, Asia, Australia, Far East, South America, and Caribbean. Emphasizes cultural content and filmmaking topics.
General Studies G

THE 405 Film. Great Performers and Directors. (3)
fall spring summer
Examines processes and influences of one or more great film performers and/or directors. May be repeated for credit. Prerequisite: THE 300.
General Studies H

THE 421 History of the English Theatre. (3)
selected semesters
History of the art, events and plays in the development of English theatre from medieval times to the present. Lecture, group and independent work. Prerequisite: THE 100 or 220.
General Studies L HU

THE 422 Latino and Latina Theatre. (3)
selected semesters
Readings, discussion, video of dramatic literature and production styles of Latino/Latina playwrights and theatre companies in the United States. Prerequisites: both ENG 101 and 102 or only ENG 105.

THE 424 Trends in Theatre for Youth. (3)
selected semesters
Surveys the history, literature, and contemporary practices in theatre for youth.

THE 430 History of Costume: Western Tradition. (3)
selected semesters
Studies major costume styles throughout history of Western civilization and how these fashions reflected society. Explores how styles can be used by theatrical costumers.

THE 440 Theatre Forms and Contexts. (3)
fa and spr ng
Exp o es 20th century moder t theatr ca f rms a d m vement and deve opment of a ternat ve strateg es for ana yz ng contempo a y the atre a d performance Prerequ s tes THE 220 32 321 Theat e maj r

THE 480 Methods of Teaching Theatre. (4)
spr ng
App es mater a s te hn ques and t e r es fo theatre w th 9th through 12th grade students Empha zes curr u um deve opment and prax s Prerequ s te· theat e educat on conce trat o or wr tten nstructor approva

THE 500 Research Methods (1 3)
fa
ntroduces grad ate study theatre

THE 504 Studies in Dramatic Theory and Criticism. (3)
fa
Dramat c theory cr t c sm and aesthet cs from t e c ass ca per od to t e 19th century. Re ated read ngs n dramat c terature P erequ s te Theatre major

THE 505 Studies in Dramatic Theory and Criticism. (3)
spr ng
Dramat c theory cr t c sm and aesthet cs from the 19th century to the present Re ated read ngs n dramat c terature Prerequ s te Theatre major

THE 510 Studies in L terature. (1)
fa and sp ng
Ass gned nd v dua read ng program n standard sources and master p eces n theatre terat re May be repeated fo cred t

THE 520 Theatre H story and Literature I. (3)
fa
Surveys h stor ograph ca ssues h stor ca per ods and theatre tera ture t rough the 17th century

THE 521 Theatre History and Literature II. (3)
spr ng
Surveys h stor ograph ca ssues h stor ca per ods and theatre tera ture from the 17th century to present

THE 524 Advanced Studies n Theatre for Youth. (3)
fa
In depth study of the h story terature and contemporary pract ce of theatre for youth Prerequ s te. wr tten nstructor approva

THE 562 Literary Management Workshop. (3)
once a year
Advanced terary management for the contemporary theatre n ud ng trends n new p ay deve opment fest va s and product ons through out the Un ted States Part c pat on n Ar zona P aywr t ng Compet t on Prerequ s te THP 56 or wr tten nstructor approva .

THE 591 Seminar. (3)
se ected semesters
Se ected top cs n ch d drama commu ty theatre and theatre h story Prerequ s te wr tten nstructor approva

THE 598 Special Topics. (1–4)
fa and spr ng
Top cs may nc ude the fo ow ng
• Co ege Teach ng Dramat c Ana ys s

THE 692 Research. (1–12)
se ected semesters

THE 700 Advanced Research Methods. (3)
fa
Cr t ca rev ew of research deve opment and des gn of research n theatre and theatre for youth

THE 791 Seminar. (3)
se ected semesters
Se ected top cs offered on a revo v ng ba s May be repeated for cred t when topics vary

Omnibus Courses. For an exp anat on of courses offered but not spec f ca y sted n th s cata og, see Omn bus Courses page 56

THEATRE PERFORMANCE AND PRODUCTION (THP)

THP 101 Introduction to the Art of Acting. (3)
fa pr ng umme
Bas pr n p e of a t g Top cs nc ude term no ogy exer ses, mprov at n a d pr je ts n act ng Prerequ te nonma r

THP 102 Fundamentals of Acting. (3)
fa and spr ng
A t r awarene mag nat ve phy a and vo a preparat on s ene and haracter ana yse te m no ogy app cat on of truthfu act ng techn ques a d mono ogue preparat on Stud o P e equ te Theatre m or

THP 113 Techniques of Theatrical Makeup. (3)
se ected semesters
Tech que of theatr a makeup age correct ve masks and pec a effe ts 1 hour ectu ho rs ab Fee

THP 207 Acting: The Creative Imaginat on (3)
fa
Deve ops the acto as an art t tr du ng the se of the creat ve mag at on through sen ory exper en e as ed by Stan s av k Stu d o. Prerequ te nstructor app ova by nterv ew Prerequ s te w th a grade f C or h gher THP 102 Pre or orequ te THE 220

THP 208 Acting: The Reality of Doing. (3)
spr ng
Cont nuat on of t e nner pro ess, app y ng the te hn que of Me sner to d s over the creat v ty n the sp ntaneous exper en e Prerequ s te wr tten nstructor approva Prerequ s te w th a grade of B or h gher THP 207

THP 213 Introduction to Technical Theatre. (4)
fa and spr ng
Procedures of techn ca theatre produ t on and demon trat on Top cs nc ude des g a d constru t on of scenery ght ng, and propert es 2 hours ecture 3 hours ab Fee Prerequ s te Theatre major or m nor

THP 214 Introduction to Costuming. (3)
fa and spr ng
Bas c pr nc p es of costume des gn construct on and urvey of se ected h stor ca per ods nc ud ng makeup sty es. Costume des gn pro e t and product on exper ence 3 hours ecture, 2 hours ab Pre or coreq u s tes THE 220· Theatre major

THP 218 The Director's Vis on. (3)
fa and spr ng
H tory theory and pr nc p es of d rect g Exam nes d rector s ro e and respons b t es p ay se ect on conceptua z ng ground p ans b ock ng Prerequ s tes THE 220; THP 102

THP 260 Introduction to P aywriting. (3)
fa and spr g
Bas sk s of p aywr t ng nc ud ng exerc ses n mono ogues scenes and conf ct and reso ut on ead ng to omp et on of a one act p ay Prerequ te ENG 101 or 105 or 107

THP 261 Introduction to Screenwr'ting. (3)
once a year
Bas c sk of sc eenwr t ng nc ud ng exerc ses n conf ct and reso u t on, p ot po nts and the r es of three act structure and des gn Pre requ s te ENG 101 or 105 or 107

THP 272 Introduction to Stage Movement. (3)
fa and spr ng
Movement vocabu ary and phys ca tra n ng n re axat on, a gnment cond t on ng rhythm a d po se Prerequ s te THP 101 or wr tten structor approva Pre or coreq u s te THP 102

THP 277 Introduct on to Vo ce for the Actor. (3)
fa and spr ng
Exerc ses and techn ques to free the vo ce and mprove pro e t on Prerequ s tes both THP 101 or 1 2 and 272 or on y wr tten nstructor approva Prerequ s te w th a grade of C or h gher THE 220

L te a y a d r t ca q y **MA** mathemat cs **CS** computer stat st cs quant t t ve a p at ons **HU** h man t e a d f ne art **SB** oc a and beha ra c en e **SG** atura c en e—ge era e urses **SQ** natura en e qua t tat ve **C** tur d ve t n t e nted State **G** g oba H h sto a See Ge e a St d es page 8

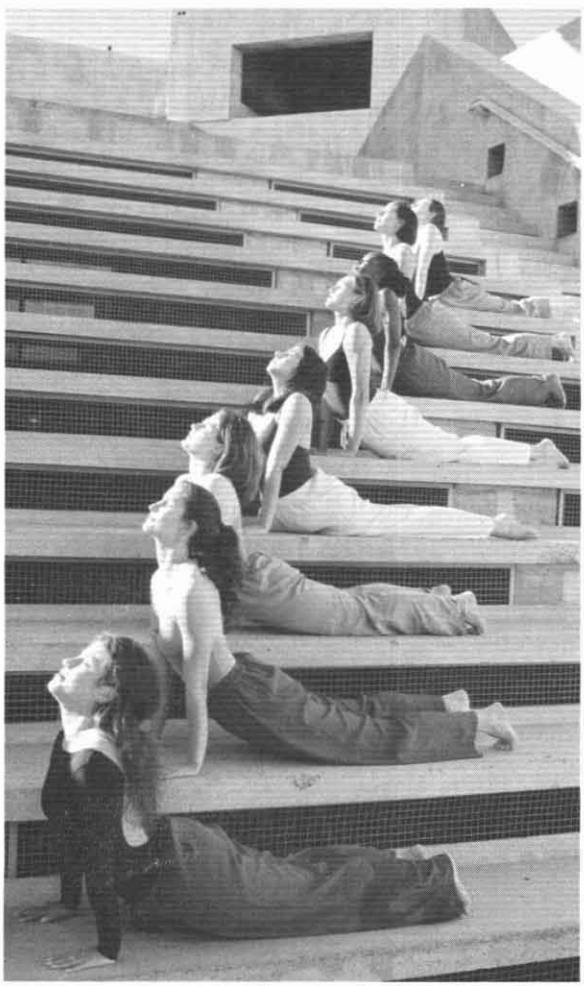
THP 285 Acting: Beginning Scene Study. (3)
fall and spring
Character analysis, rehearsal, and performance of modern plays. Prerequisite with a grade of "C" or higher: THP 102 or instructor approval. Pre- or corequisite: THE 220.

THP 301 Theatre Production. (1–4)
fall, spring, summer
Participation in university mainstage theatre productions (acting, running crew, etc.). May be repeated for credit. Prerequisites: application; written instructor approval.

THP 307 Acting: Research and Performance. (1–3)
once a year
Acting in theatre projects, productions, or collaborative performances in directing classes. May be repeated for credit. Prerequisite: instructor approval.

THP 311 Improvisation with Youth. (3)
fall, spring, summer
Basic materials, techniques, and theories for facilitating improvisational drama with children and youth. Not open to freshmen.

THP 312 Puppetry and Children. (3)
fall, spring, summer
Construction and manipulation of puppets; practice in performance skills. Emphasizes educational and recreational uses of puppetry by and with children. Fee. Prerequisite: junior standing or above.



Dancers on the steps of the Nelson Fine Arts Center

THP 313 Scenography. (3)
fall and spring
Art and practice of scenic, costume, and lighting design for the theatre and the media. Prerequisite: THP 213 or 214.

THP 317 Stage Management. (3)
fall and spring
Readings in stage management and participation as a stage manager in a university theatre production. Prerequisite: written instructor approval. Prerequisite with a grade of "C" or higher: THE 220.

THP 318 Directing for the Stage. (3)
fall and spring
Director's approach to text analysis and articulation of ideas. Basic tools, rehearsal schedules, staging, rehearsal and audition techniques, scene work. Prerequisites: THP 213, 218; instructor approval.

THP 331 Costume Construction. (3)
selected semesters
Uses of materials and techniques for stage costumes with actual construction of period apparel. Prerequisite: THP 214 or instructor approval.

THP 340 Scene Design. (3)
once a year
Studio projects in designing realistic scenery for the contemporary proscenium stage. Fee. Prerequisite: THP 213 or written instructor approval. Prerequisite with a grade of "C" or higher: THE 220.

THP 345 Lighting Design. (3)
once a year
Principles and theory of stage lighting design, including design process and execution, equipment, and light plots. Lecture, lab. Fee. Prerequisite: THP 213 or written instructor approval. Prerequisite with a grade of "C" or higher: THE 220.

THP 350 Sound Design. (3)
once a year
Introduces the equipment, process, and recording techniques used in sound design for the theatre. Lecture, studio. Fee. Prerequisite with a grade of "C" or higher: THE 220.

THP 360 Intermediate Playwriting. (3)
once a year
Continued development of skills in playwriting through specific exercises and completion of a full-length play. Prerequisite: ENG 210 Introduction to Creative Writing (drama) or THP 260.

THP 377 Stage Speech. (3)
once a year
Introduces phonetic alphabet and standard speech and diction. Prerequisite: THP 277.

THP 385 Acting: Intermediate Scene Study. (3)
once a year
Script analysis and performance of modern classics. Prerequisite: THP 377 or instructor approval.

THP 394 Special Topics. (1–4)
fall and spring

THP 401 Theatre Practicum. (1–3)
fall and spring
Production assignments for advanced students of technical production, stage and business management, and design. May be repeated for credit. Prerequisites: THP 301; written instructor approval.

THP 406 Advanced Scenography. (3)
selected semesters
Process of production collaboration among scenographers, directors, and playwrights. Taught in conjunction with THP 519. Prerequisites: a combination of THP 214 and 340 and 345 or both THP 313 and 340.

THP 411 Methods of Teaching Drama. (3)
fall
Applies materials, techniques, and theories with grades K–8 youth. Regular participation with children. Prerequisite: THP 311 or written instructor approval.

THP 418 Directing the Actor. (3)
once a year
Practical applications of directing for the stage. Rehearsal and presentation of scenes and short plays. Prerequisites: THP 318; instructor approval

THP 428 Theatre and the Future. (3)
fa and spr ng
Capstone course exp or ng v ns f the futu e of theatre Resu ts n a pro ect creat ve or s ho ar y form Prerequ te TH 440 sen r status heatre ma o

THP 430 Costume Des'gn. (3)
se ected semesters
Pr nc p es of costume des gn w th projects n bot modern and pe od sty es n udes budgets and fab c pattern est mates Le t re stu P erequ s te THP 214

THP 431 Advanced Costume Construction. (3)
se e ted semeste s
Spec a zed tra n ng n c stume nst uct on prob ems and cr fts w th pro ects n ta or ng m ne y a d per od ac e s r es Prereq s tes both THP 214 and 331 or on y nstructor approva

THP 435 Advanced Technical Theatre (3)
se ected sem sters
Se ect on of mater a draft ng f work ng draw ngs too operat on and construct on tec n que 2 hour ecture 2 h u s ab Prereq s tes both THP 40 and 45 or o y wr tte n tru to ap va .

THP 440 Advanced Scene Design (3)
se ected s mesters
Advanced stud o projects des gn g scenery for a var ty of sta e forms Fee Prerequ s te THP 340 or wr tte nstru tor app va

THP 441 Scene Painting. (3)
se ected seme ters
Stud o p o ect n pa nt ng tage cenery Fee Prerequ te HP 4 or wr tten nstr ct r approva

THP 442 Draw ng. (3)
se ected semesters
Techn que n draw n and render ng for scen c cost me and ght ng des gn Prerequ te wr tte n tructor approva

THP 444 Drafting for the Stage. (3)
se ected semest rs
Fundamenta s of and pract e n graph c techn que f r the stage ntrod e comp ter a ded des gn f r the stage 2 hours ecture ours stud o Fee Pre equ s tes THP 213 wr tten n tru tor approva

THP 445 Advanced Lighting Design. (3)
se e ted semesters
Spec a zed techn ques stage ght ng Adva e app at on of des gn pr ss, grap c techn que of des gn prese tat on and se f qua t es of ght Le ture c a work hops Fee P equ s te THP 345 or wr tten nstru tor pprova

THP 450 Theatre Organization and Management. (3)
once a year
Overv ew of nonprof t arts rgan zat ona des gn trateg c p ann ng f nan a management and eader h p Prerequ s te THE 2

THP 460 Playwright's Workshop. (3)
fa and spr ng
Pra t ce and study f creat g haracters d a gue s enes p ays and m no ogues f r the stage May be repeated for cred t tud o ec ture Prerequ s te wr tten nstru t r approva

THP 461 Scripts in Progress. (3)
fa and spr g
tud wo k w th the nstructor, centered on rev s n of or g na p ay May be repeated for cred t St d o Prerequ te THP 460 or wr tten nstructor appr va

THP 472 Advanced Movement for the Stage. (3)
once a year
Movement te hn ques for the ass ca and nonrea t c theatre stage ombat a d spec a sk Prereq s te THP 2 2 or nstructor appr va

THP 477 Advanced Speech for the Stage (3)
onc a year
Exerc es to deve p voca f ex b ty and power maste y of e evate Amer can d ct on and anguage sk s app ed to c a s a and n rea st c drama stage d a e ts Prerequ s te THP 3?7

THP 481 Secondary Schoo Play Product on. (3)
fa
Methods of rect ng de g ng and o d nat n p y product on exper ences at the se o da y c oo ev e Off campus pract cum Prerequ tes both THP 318 and theatre edu at on con e t at on or on y nstructor pprova

THP 482 Theatre for Socia Change (3)
fa and pr ng
nteract e theatre te h que e g Boa drama t erapy p ayba k theatre to exan n and combat nst t t on so a . cu t ra nterper ona and per on oppress ns ct re ab
Ge era Stud es

THP 484 Internsh p. (1–4)
se ected sen e ters

THP 485 Acting: Advanced Classical Scene Study. (3)
once a year
Re earsa a d performan e f per od a s ca and n nrea t c p ays Emphas ze u dersta d g poet angua e and stro g voca and phy ca k Prerequ s te THP 5 or n truct r appro a

THP 486 The Meisner Approach to Act ng. (3
once a year
mprov sat on and e erc ses de e ped by anford Me sner app ed t ene w rk fr m e e ted texts tud o Pre qu s te ntr duct ry act g as es

THP 487 Acting for TV and Film. 3)
once a year
Profe ona te ev n nd f m a t g techn que term gy, and on camer exper ence Stud o Pre equ s te THP 207 or 285

THP 488 Audition Techniques. (3)
on e a year
Te n q es and preparat n f r tage ommer a a d TV f m a d t ons t z ng mono es, o d ead ng and persona ty e Stud o P e e s te ntrod t y act g a es

THP 489 Actor Career Development. (3)
on a year
Fam ar zat o w t th bus e of a t ng se f promot na t o s a d te hn q e m rket ng trateg e f ances nterv ew k s a d act r un ons tud o Prerequ te ntroduct ry a t ng c a e

THP 494 Specia Top cs (1–4)
o e a year
p may nc ude the f ow n
- A vanced reenwr t ng
- erfor an e a d e o ogy
- r b em D rect ng
- o o and Co ab rat ve Performance
- So o Perf mance
- tage D a e ts
- St ryte ng
- The ry a d Pra t ce of Performance

THP 498 Pro-Seminar. (1–7)
nce a y ar
Top ay nc ude the f ow n
- D rect ng –6
- Theatre f r Y ut T ur 1–6
- Theatre n Edu at on 1–6

Prerequ te wr tten n truct r approva

THP 501 Performance: Solo Performance. (1–8)
o ce a year
St dent beg n to def ne the r m s on n art Emp a ze the a t r a a o storyte er, speak ng as herse f o h m e f Stud Prerequ s te n tructo approva

THP 502 Performance: Aesthetics of Theatre Art. 1–8)
once a yea
nder ta d ng and a a yz ng s pts and performance n order to be a eff ct ve acto storyte er who peaks a a character Pro ect focu o s duet perfor ances Stud o Prerequ te nstr ctor approva

THP 503 Performance: The Ensemble (1–8)
on e a y a
En emb e w rk ng w th a p aywr g t creates a ay that ad resses soc a ssue thr ugh mprov sat on a d m un ty nput Stud Pre re u s te st ctor approva

L tera y a d t u y **MA** athen at **CS** compute stat t quan t t v pp nat on **HU** un a t an f e rt **SB** a a eh v r e **SG** t r e ge era core cou s **SQ** tura en e u nt t t v **C** u tu e ty th e ted tate **G** g ba **H** t ee G er St d page 3

THP 504 Act ng: Transformation. (1–8)
once a year
Fundamenta s n ud ng c mbat scans on, poet c anguage a t ng sty e. Scene study ensemb e perf rmance pro ects focused on Shakespea e new scr pts Stud o Prereq s te THP 503 or wr tten nstructor approva

THP 506 Scenography. (3)
se ected semesters
Proce s of pr duct on o aborat on aught n co u t o w th HP 519 Fee Prerequ s te t eatre graduate stand ng r wr tten nstr ctor approva

THP 507 Acting: Advanced Research and Performance. (1 3)
once a year
Act ng n dvanced theatre pr ects produ t ons, or co aborat ve per form nce n d re t ng c as e May be repe ted f r cred t Stud o Pre requ s te nstructor approva

THP 509 Singing for Actors (1)
fa and spr ng
ntroduces the bas c of ng ng te hn que Breath ontro resonance art cu at on exp orat n and expan on of s ng ng range May be repeated for red t Stud o Prereq s te adm ss on to M F A perfor mance ncentrat on or wr tten nstructor approva

THP 511 Improvisation w th Youth Workshop. (3)
spr ng
Theor es and techn ques of drama w th var o s p pu at ons f y uth Empha zes how resea ch nfo ms pra t ce n udes p act cum P e requ s tes on y THP 41 or b th graduate sta d g and wr tten nstr ctor approv

THP 512 Puppetry Workshop. (3)
fa pr ng mmer
Survey of puppetry n educat n p pet y as an a t form n des gn and performa ce Fee Prerequ te g aduate sta d ng or wr tten nstructor approva

THP 517 Stage Management Practicum. (3)
once a yea
Read ngs a d esearch stage ma ageme t and part at on as a stage ma ager n a un /ers ty theatre prod t on Pr re u s te wr tte nstructor appro /a

THP 518 Advanced Direct ng Lab. (3
once a year
Act ve d scovery f d rect ng c n epts th oug pr ct c exerc ses a d co ab rat on deconstruct on of contemporary ass c terat e Exp es d ector as pr mary art st Lab Prereq s te wr tten nst t r approva

THP 519 Directing: Works in Progress. (3)
once a year
Advanced projects n d re t ng con entrat ng on a o a o at ve pro cess betwee d re tor p aywr ght actors a d de gner Focu es pr mar y on new scr pts or adaptat on of terature May be repeated for cred t Stud o on te pract cum Prerequ te THP 418 nstructor approva

THP 530 Advanced Costume Design. (3)
se ected semesters
Advanced st d o pro ect n costume des gn for a var ety of p oduct n forms Prerequ s te wr tten nst uctor pp ova

THP 540 Scene Design Applications. (3)
se ected semesters
Conceptua and pract ca app at on of the des gn proces n d ng graph and scu ptu a projects. P act ca des gn prob ems nve t gated n aborat ry Le t re a Lab fee Prerequ s te wr tten nstru tor approva

THP 545 Lighting Design Applications. (3)
se ected semesters
Advanced stud o projects n stage ght ng des gn P erequ s te wr tten n tru tor appr va

THP 560 Playwright's Workshop. (3)
fa and spr ng
Pract ce and tudy of creat ng characters d a ogue scenes p ays, and mono ogues for the tage May be repeated fo cred t Stud o Pre requ s te wr tte nstru tor approva

THP 561 Scr pts n Progress. (3)
fa and spr ng
St d o wo k w th the nstructor centered on rev s ons of or g na p ays May be repeated for cred t Stud Prereq s te THP 560 or wr tten nstru tor approva

THP 584 Internship. (1 3)
se ected semesters
F e d re earch and on s te tra n ng n theatre f r yout ommun ty the atre and product on techn ques Prerequ s te wr tten nstructor approva

THP 592 Research. (1–12)
se ected semesters

THP 593 Applied Project. (1–12)
se ected semesters
Prerequ s te wr tten nstructor approva .

THP 594 Conference and Workshop in Child Drama. (3)
on e a year
Prerequ s te wr tten nstructor approva

THP 598 Spec al Top cs. (1–4)
on e a yea
Le ture stud o op s may nc ude the fo w ng
- Advanced Screenwr t ng
- Co ege Teach ng
  Act ng
  mprov sat on w th Yout
  Movement
  Puppetry
  Theatre for So a Change
  V e
- Performan e a d Techno gy
- S o a d C ab rat ve Performance
- S o Performan e
- Stage D a ects
- Storyte ng

THP 599 Thesis. (1 12)
se ected semesters

THP 611 Improvisation with Youth Seminar. (3)
nce a year
Exam es urrent research theory and pract es n drama w th yo th Deve opment and execut n of rese rch projects Prerequ s te wr tten n t u tor approva

THP 618 Directing Practicum. (3)
fa and spr ng
ract ca exper ence n d rect ng and prod ng a ent re p ay or mus a f r you g aud en es Prereq s te wr tte nstru tor approva .

THP 649 Design Studio. (3)
fa and spr ng
Projects c ude des gn of scenery costume ght ng or so nd for ab oratory or ma nstage prod t ons May be repeated for cred t Prereq u s te wr tten nstructo approva

THP 684 Internship (1–6)
fa spr ng, summer
F e d research n performance mprov sat on w th youth theatre for y uth puppetry and scenography Prerequ s te wr tte n tru tor approva

THP 691 Seminar: Scenography. (3)
se ected semesters
Exam es and researche modern con epts and pract ce f scenog rap y Prerequ s te wr tten nstr t r approva

THP 693 Applied Project. (1 12)
fa spr ng summer
F na pro ect for M F A Theatre cand dates n performance s enog raphy and theatre for youth Prerequ s te wr tten nstructor approva

THP 783 Field Work. (1 12)
se ected emesters
T p s may c ude t e fo w ng
- T eatre E ucat on

Omn bus Courses. Fo an exp anat on of courses offered but ot spec f a y sted n th cata og, see Omn bus Co rse page 56

College of Law

www.law.asu.edu

Patricia D. White, J.D., Dean

PURPOSE

The prime function of the College of Law is to train men and women for the practicing legal profession and related professional assignments. In addition, the college has the responsibility to contribute to the quality of justice administered in our society.

ORGANIZATION

Law Building and Law Library

The John S. Armstrong Law Building is located near other colleges on the university's main campus. The Law Building provides every modern facility for legal education and has been described by experts involved in the planning of law buildings as setting a new standard in functional design.

The award-winning John J. Ross–William C. Blakley Law Library, named in memory of two prominent Phoenix attorneys, is one of the finest law libraries in the Southwest. The library houses a collection of more than 351,000 volumes and microform volume equivalents. The collection includes a broad selection of Anglo-American case reports and statutes as well as legal treatises, periodicals, encyclopedias, digests, citators, and administrative materials. The collection also includes a growing selection of special materials dealing with international law, Indian law, Mexican law, and law and technology.

The College of Law Great Hall

Jeff Hav / photo

The library housed in a dramatic and functional building that opened in August 1995 is also a selective U.S. government depository. The building provides accessible shelving for the expanding collections and comfortable study space at carrels, tables, and lounge seating located throughout the library. Additionally, the law library has a workstation computer lab as well as LEXIS and WESTLAW terminals which contain 10 stations each, 27 meeting and study rooms, a moot courtroom facility, and lounge areas.

Students also have ready access to the other campus libraries, including the Charles Trumbull Hayden Library, the Daniel E. Noble Science and Engineering Library, the Architecture and Environmental Design Library, and the Music Library. The collections maintained in all university libraries comprise more than 3 million volumes.

Special Programs

Center for the Study of Law, Science, and Technology. The ASU Center for the Study of Law, Science, and Technology is a multidisciplinary research center founded by the Arizona Board of Regents in 1984. The center publishes research studies, sponsors seminars and symposia, and houses visiting scholars and teachers. Through these programs, the center seeks to contribute to

1. the formulation and improvement of law and public policy affecting science and technology, and
2. the wise application of science and technology in the legal system.

The College of Law offers a substantial number of courses in the law, science, and technology area including bioethics, law and psychiatry, environmental law, health care law, intellectual property, land use regulation, law and evolutionary biology, law and medicine, law and social science, mass communication, natural resources law, patent law, regulatory problems in law, science and technology, and water law. Each semester the center publishes a student guide to other less obvious courses that contain science and technology issues. In recent semesters this guide has listed courses in AIDS and the law, commercial law, employment law, law and the handicapped, antitrust statistical proof in employment discrimination litigation, and several courses offered by other departments on campus available for registration by law students. In addition to regular course offerings, students can arrange independent studies with supervising faculty on topics of special interest to them. The center also invites guest speakers from each of the scientific fields to visit with interested law students, generally during the noon hour.

In cooperation with the American Bar Association Section on Science and Technology and under the leadership of a faculty editor, second and third year students edit *Jurimetrics: The Journal of Law, Science and Technology*. Student editors both edit submitted works and write original articles for publication in the journal.

Clinical Programs. The College of Law's Clinical Program is a rigorous in-house program that provides third year students, under the close supervision of an ASU faculty member, the opportunity to represent clients in court. Four live-client clinics, the Civil Practice Clinic, the Criminal Practice Clinic, the Public Defender Clinic, and the Mediation Clinic, provide students with an opportunity to choose from civil or criminal representation or to serve as mediators in disputes that are resolved outside the court system.

The Civil Practice Clinic operates as a functional law firm within the college, while Criminal Practice and Public Defender Clinic students work in offices located within agencies or courthouses. Second year students are offered "simulation based" courses in Lawyering Theory and Practice in preparation for enrollment in a live client clinic. Other simulation courses include Trial Advocacy, Pre-Trial Practice, and Negotiation.

Indian Legal Program. The College of Law offers an Indian Legal Program intended to serve tribal courts and governments by providing information on legal issues. The program also provides education and generates scholarship on Indian law. Through a Certificate in Indian Law, the college provides its students with a quality legal education and an opportunity to gain specific knowledge and expertise in Indian law.

Students at the College of Law have the opportunity to participate in all phases of the Indian Legal Program and gain an in-depth understanding of the legal issues affecting Indian tribes and people. Courses on Federal Indian Law and seminars on advanced Indian law topics such as tribal law, economic development, American Indian cultural resources protection, and tribal environmental law are part of the curriculum. Students also have the opportunity to participate in internships with local tribal courts, the Native American Rights Fund, the U.S. Department of the Interior, or the Senate Committee on Indian Affairs in Washington, D.C. This variety of academic and work experience provides the students with an outstanding legal education and a firm grounding in both the theoretical and practical aspects of Indian law.

ADMISSION

First year students are admitted only for the fall semester. The formal requirements for admission to the College of Law are 1) an undergraduate degree from an accredited four year college or university and (2) a score on the Law School Admission Test (LSAT), administered by Law Services, Box 2000, Newtown, Pennsylvania 18940, in centers throughout the country.

For more information regarding admission, call 480 965 1474 or write

ADMISSIONS OFFICE
COLLEGE OF LAW
ARIZONA STATE UNIVERSITY
PO BOX 877906
TEMPE AZ 85287 7906

Retention Standards

To be eligible to continue in the College of Law, students must maintain a cumulative weighted GPA of 70 or higher at the end of each semester or summer session. Any student who fails to achieve a 70 GPA in any one semester regardless of the cumulative GPA, is automatically placed on probation. Continuation of enrollment by probationary students

is upon such terms and conditions as the college may impose.

A student whose cumulative GPA falls below the required level or whose semester GPA is less than 70 in two consecutive semesters is dismissed but may apply to the Office of the Dean for readmission. The Office of the Dean refers the application to a faculty Committee on Readmission. Cases in which the GPA deficiency is slight and evidence of extenuating circumstances is convincing, readmission may be granted on a probationary status after a review of the reasons contributing to unsatisfactory performance and a finding that there is substantial prospect for acceptable academic performance. Continuation in school thereafter may be conditioned on achieving a level of performance higher than the overall 70 GPA. Further detailed information concerning the college's retention standards can be found in the *Bulletin of the College of Law*.

Honor Code. The legal profession, a self regulating association, depends on the integrity, honor, and personal morality of each member. Similarly, the integrity and value of an ASU College of Law degree depends on a reputation for fair competition. The college's *Honor Code* is intended as a measure to preserve the integrity of the school's diploma and to create an arena in which students can compete fairly and confidently. Copies of the *Honor Code* are available from the assistant dean in the college's Student Services Office.

ACCREDITATION

The college is fully accredited by the American Bar Association and is a member of the Association of American Law Schools.

JURIS DOCTOR DEGREE

The College of Law offers a three year program of professional studies at the graduate level leading to the degree of Juris Doctor.

For more information on the degree and courses, see the *Graduate Catalog*.

Course of Study

The program of study in the College of Law is designed for full time students. In the first year of the three year program, the course of study is prescribed and incorporates the time proven techniques of legal education. This first year gives students by the "case method," by the "problem method," by "moot court," and through other techniques an intensive exposure to the basic legal processes.

As a part of the program, first year students are assigned to small sections. In the Legal Research and Writing program, first year students prepare legal briefs and memoranda and receive feedback through the use of practice examinations. The program focuses on the development of writing and organizational skills necessary for success in law school and in the practice of law. The second and third years cover a wide range of courses varying in format as well as subject matter, allowing students to pursue both the basic subjects of law study and more specialized interests. By offering great freedom in the selection of subjects, the educational experience of the second and third years is in sharp contrast to the curriculum of the first year. In addition, the college offers a number of faculty supervised clinical education programs and a program of supervised externships.

MORE INFORMATION

Further detailed information concerning the course of study, admission practices, expenses, and financial assistance can be found in the *Bulletin of the College of Law*. To request the bulletin or application forms, call 480 965 7207 or write

ADMISSIONS OFFICE
COLLEGE OF LAW
ARIZONA STATE UNIVERSITY
PO BOX 877906
TEMPE AZ 85287 7906

For general information about the College of Law, call 480 965 1474 or access the college's Web site at www.law.asu.edu.

Law

law.asu.edu
480 965-6181
LAW 201

Patricia D. White, Dean

Regents' Professors: Kaye, Murphy

Professors: Arterian, Bartels, Bender, Berch, Brennan, Calleros, Clinton, Eisman, Feerer, Furnish, Gorman, Grey, Guerin, Jones, Kader, Karjala, Leshy, Lowenthal, Lynk, Matheson, O'Grady, Rose, Saks, Schatzki, Schroeder, Stanton, Strouse, Tesón, Tsosie, Tucker, Weinstein, White, Winer, Woodley

Associate Professor: Marchant

Senior Clinical Professional: Dauber

Clinical Professional: Dalyn

DIRECTORS

Center for the Study of Law, Science, and Technology: Marchant

Clinical Programs: O'Grady

Indian Legal Program: Tsosie

Legal Research and Writing and Academic Support: Stinson

LAW (LAW)

See the *Graduate Catalog* for the LAW courses.

College of Liberal Arts and Sciences

www.asu.edu clas

David A. Young, Ph.D., Dean

PURPOSE

Like all major research universities, Arizona State University provides the means for undergraduates to acquire a liberal education, an education that broadens students' understanding in the major areas of human knowledge while providing students with in depth knowledge in their chosen areas of focus. While the professional schools and colleges can and do provide for important dimensions of a liberal education, the central academic setting for accomplishing this basic university purpose is the College of Liberal Arts and Sciences (CLAS). The college provides a particularly rich and varied set of opportunities for students to gain the kind of liberal education that helps to prepare them for a lifetime of continued learning and application of knowledge in a diverse and ever changing world.

As a consequence of the wide range of subjects CLAS offers in the humanities, the natural sciences and mathematics, and the social and behavioral sciences, instruction is provided in a number of core areas for undergraduate students from all of the other colleges. Students with majors in business, education, engineering, nursing, and other professional colleges rely on CLAS for basic foundation courses. CLAS also offers the majority of courses meeting the General Studies requirement.

CLAS initiated and continues to participate actively with the Barrett Honors College. It also offers advising to undergraduates who are working out their undergraduate programs or are planning for graduate studies.

Most of the university faculty's engagement in the discovery and creation of knowledge and its dissemination occurs in CLAS. As an integral part of this activity, CLAS offers a wide range of graduate training programs leading to a master's or doctoral degree. For graduate degree application information see the *Graduate Catalog* and contact either the Graduate College or the academic unit in which the degree of interest would be earned, the latter in order to receive detailed information on particular degree requirements.

ORGANIZATION

CLAS consists of 23 academic departments, several interdisciplinary programs, seven centers, and several research institutes and laboratories. The college offers 37 programs leading to a bachelor's degree, 31 programs leading to a master's degree, 21 programs leading to a doctoral degree, and interdisciplinary graduate programs in cooperation with other colleges. Undergraduate customized interdisciplinary degrees are also available in the college.

For more information, access the college's Web site at www.asu.edu clas.

ADMISSION

Any entering ASU student who has met the minimum university entrance requirements can be admitted to CLAS. Students with fewer than 50 earned hours of credit can, if they wish, be admitted as "no preference" students. Students with 50 or more hours must declare a major to be accepted into the college.

Any student with a cumulative GPA of at least 2.00 who is currently registered in good standing in another college at ASU and who wishes to major in a subject offered by CLAS and to follow a program of study in the major may transfer into the college. (Students wishing to transfer into the major of Economics must have an ASU cumulative GPA of at least 2.50.) The student transfers by applying and being initially advised in the Office for Academic Programs in SS 111. Students admitted from other ASU colleges are under mandatory advising during the first semester and must take courses leading directly to a degree in CLAS. Failure to follow mandated advice on course selection can result in enrollment and registration problems, including cancellation and holds.

Transfer Students. The university standards for evaluation of transfer credit are listed under "Transfer Credit," page 61. All students who meet the university standards are admissible to CLAS, but students desiring to major in Economics must have transfer GPAs of at least 2.50. Transfer students are urged to contact the relevant academic department or the Office for Academic Programs in SS 111, to ensure a smooth transition to CLAS. Students who have transferred courses from institutions other than Arizona community colleges must have their transcripts evaluated by an advisor in SS 111. Students who have attended only Arizona community colleges have evaluations performed in the department of the major.

Courses transferred from two year community colleges are accepted as lower division credit only. Students are urged to choose their community college courses carefully, in view of the fact that a minimum of 45 semester hours of work taken at the university must be upper division credit (see "Community Colleges," page 62).

"Undecided" or "Undeclared" Majors. Students in CLAS are not required to select a major upon entering the college as freshmen or at any time thereafter until the semester in which 60 semester hours are earned. Until such "no preference" students have chosen a major, they are advised through Academic Advising Services II in the Undergraduate Academic Services Building. It is important to consult an academic advisor before any enrollment activity. Before or during the semester in which they earn 60 semester hours, students *must* select their major and transfer into the appropriate department.

Note. Students who wish to enter a program of study that has a rigidly structured curriculum should be aware that delay in choosing a major could result in added time and cost in the completion of requirements.

ADVISING

All students are urged to seek advising in the appropriate college unit before registration. Students must follow the calendar published in the *Schedule of Classes* each semester for information regarding enrollment, adding, dropping classes, and withdrawals.

In addition to information provided by an advisor, students must read the requirements for university General Studies, college graduation, and major degree requirements in this edition of the ASU *General Catalog*. See "General Studies," page 83, "University Graduation Requirements," page 79, "CLAS Graduation Requirements," page 331, and the section of the department offering the major. The ASU *General Catalog* is the governing source for all degree requirements.

Regular Advising. All students are strongly urged to seek advising in the appropriate college unit before registration.

Advising Locations. CLAS students should seek routine advising at the locations shown in the "Advising Locations" table, on this page.

The Office for Academic Programs, in SS 111, is the central resource center for academic information in the college. Requests from students, departmental advisors, and faculty for clarification of rules, procedures, and advising needs of the college and university should be directed to that office.

Advising Locations

Student	Location
Declared majors	Department of major
No preference; no preference, prelaw	Academic Advising Services, LASB 480 965-4464
No preference, premedical	Pre Health Professions, LSC 206C (480) 965-2365

Mandatory Advising. The following categories of Liberal Arts and Sciences students *must* receive advising and *must* be cleared on the Mandatory Advising Computer System (MACS) before their classes are scheduled:

1. students in their first semester at ASU;
2. students on probation;
3. students with a cumulative GPA of less than 2.00;
4. students who have admissions deficiencies;
5. other students with "special admissions" status; and
6. students who have been disqualified; these students are allowed to attend ASU summer and winter sessions only and must be advised in the Office for Academic Programs in SS 111.

Students in the above mandatory advising categories should consult an advisor in the appropriate advising location listed in the previous section. Students with admission deficiencies are carefully monitored to ensure that they take courses that eliminate their deficiencies. Students are encouraged to check their mandatory advising status each semester before attempting registration transactions.

Literacy and critical inquiry **MA** Mathematics **CS** Computer science **C** Cultural diversity in the United States **G** Global awareness **H** Historical awareness **L** Humanities, arts and design **SB** Social and behavioral sciences **SG** Statistical reasoning **SQ** Natural sciences **T** Technology and its impact **QA** Quantitative analysis **QB** Quantitative applications **HU** Humanities, arts and design **SB** Social and behavioral sciences **SG** Statistical reasoning **SQ** Natural sciences **T** Technology and its impact **C** Cultural diversity in the United States **G** Global awareness **H** Historical awareness See "General Studies," page 83.

Advising for Preprofessional Programs. Special advising is available for students planning to enter the fields listed in the "Advising for Preprofessional Programs" table, on this page. The professional programs shown in the table are not majors in themselves; that is, there are no majors called "premedical," "prelaw," etc. In each program, the student must eventually select an established major in CLAS or in one of the other colleges.

Advising for Preprofessional Programs

Professional Field	Office Where Advisor Is Located
Dentistry	Pre Health Professions, LSC 206C
Foreign service	Department of chosen major
Health physics	Pre Health Professions, LSC 206C
Law	Office for Academic Programs, SS 111
Medicine	Pre Health Professions, LSC 206C
Ministry	Department of Religious Studies, LL 641
Occupational therapy	Pre Health Professions, LSC 206C
Optometry	Pre Health Professions, LSC 206C
Osteopathy	Pre Health Professions, LSC 206C
Pharmacy	Pre Health Professions, LSC 206C
Physical therapy	Pre Health Professions, LSC 206C
Podiatry	Pre Health Professions, LSC 206C

Students preparing for careers in these areas should register in the Pre Health Professions office, 480 965-2365.

Nonschooling in Arizona for the programs in dentistry, optometry or podiatry: Students interested in pursuing these professional should confer with the Pre Health Professions advisor concerning out of state schools where they may complete their training.

Pre-Health Professions. Students pursuing professional schools in the health professions must choose a major offered by ASU. However, certain specific courses must be taken to prepare the student to take the MCAT or other entrance examinations and to succeed in postbaccalaureate training. Therefore, students who plan to pursue a health profession should meet regularly with the Pre Health Professions office for guidance. While this guidance does not replace the need to meet with an advisor in the department of the student's major, pre-health advising is a necessary supplement. To schedule a meeting with Pre Health Professions, located in LSC 206, call 480 965-2365.

Prelaw. The American Bar Association does not recommend any specific major for students who wish to apply to law school upon graduation. ASU does not have a "prelaw" degree program. Therefore, students should select a major that interests them. Recent surveys of law school graduates indicate that students would be well advised to take one or two semesters of accounting as a supplement to their major curriculum. In addition, the American Bar Association recommends a variety of courses—the classics, in economics, and in mathematical reasoning. Courses that engage the student in intense critical analysis and a substantial amount of writing are also recommended. As the student approaches the second semester of his or her junior year, the student should contact the prelaw advisor in the college or department of his or her major to obtain information regarding the procedure to apply to law school.

DEGREES

Majors. Programs leading to the B.A. and B.S. degrees are offered by CLAS, with majors in the subjects listed in the "College of Liberal Arts and Sciences Baccalaureate Degrees and Majors" table, page 329. Each major is administered by the academic department indicated.

Minors. Although not required for graduation, special college approved minors are available in most departments. Check department program descriptions for details. Minors offered by departments must have at least 18 hours of designated courses, including at least 9 hours of upper division work. The college requires a grade of at least "C" in all upper division courses in the minor. Some departments have stricter requirements. A minimum of six upper division hours in the minor must be taken in residence at ASU Main.

University policies prohibit the "double counting" of courses from the major for the minor. Specific questions concerning double counting, as well as general questions about the approval processes for minors, should be taken up with an academic advisor in the department offering the minor or the Office for Academic Programs in SS 111.

Refer to the CLAS portion of the "ASU Minors" table, page 109.

ASU EXTENDED CAMPUS

The College of Extended Education was created in 1990 to extend the resources of ASU throughout Maricopa County, the state, and the region. The College of Extended Education is a university wide college that oversees the ASU Extended Campus and forms partnerships with other ASU colleges and the College of Liberal Arts and Sciences to meet the instructional and informational needs of a diverse community.

The ASU Extended Campus goes beyond the boundaries of the university's three physical campuses to provide access to quality academic credit and degree programs for working adults through flexible schedules; a vast network of off-campus sites, classes scheduled days, evenings, and weekends; and innovative delivery technologies including television, the Internet, and Independent Learning. The Extended Campus also offers a variety of professional continuing education and community outreach programs.

For more information, see "ASU Extended Campus," page 703, or access the Web site at www.asu.edu/xed.

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students must meet all university graduation requirements. For complete information, see "University Graduation Requirements," page 79.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy a university requirement of a minimum of 35 hours of approved course work in General Studies, as described in "General Studies," page 83. Note that all three

College of Liberal Arts and Sciences Baccalaureate Degrees and Majors

Major	Degree	Concentration	Administered By
African American Studies	B A	Humanities arts, politics and society, social and behavioral sciences	African American Studies Program
Anthropology	B.A.		Department of Anthropology
Asian Languages (Chinese Japanese	B.A.		Department of Languages and Literatures
Biochemistry	B.S.		Department of Chemistry and Biochemistry
Biology	B S	Biology and society	Department of Biology
Chemistry	B.A., B.S.		Department of Chemistry and Biochemistry
Chicana and Chicano Studies	B A.	Humanities cultural sciences, social sciences policy	Department of Chicana and Chicano Studies
Clinical Laboratory Sciences	B.S.		Department of Microbiology
Computational Mathematical Sciences	B S		Department of Mathematics and Statistics
Conservation Biology	B.S.		Department of Biology
Economics	B A., B.S		Department of Economics
English	B.A.	Linguistics, literature	Department of English
Exercise Science Physical Education	B.S	Exercise science, physical education	Department of Exercise Science and Physical Education
Family and Human Development	B.S.	Family studies child development	Department of Family and Human Development
French	B.A.		Department of Languages and Literatures
Geography	B.A , B.S	Meteorology-climatology, urban studies	Department of Geography
Geological Sciences	B.S.		Department of Geological Sciences
German	B.A.		Department of Languages and Literatures
History	B A		Department of History
Humanities	B.A.		Interdisciplinary Humanities Program
Integrated Studies	B.A., B.S.		College of Liberal Arts and Sciences
Italian	B.A.		Department of Languages and Literatures
Mathematics	B.A.		Department of Mathematics and Statistics
	B S	Statistics	Department of Mathematics and Statistics
Microbiology	B.S.		Department of Microbiology
Molecular Biosciences Biotechnology	B.S		Departments of Microbiology and Plant Biology
Philosophy	B A.		Department of Philosophy
Physics	B.S.		Department of Physics and Astronomy
Plant Biology	B.S.	Environmental science and ecology, plant biochemistry and molecular biology, urban horticulture	Department of Plant Biology
Political Science	B.A.		Department of Political Science
	B.S.	Public policy advocacy and lobbying, public policy analysis	Department of Political Science
Psychology	B.A., B.S.		Department of Psychology
Religious Studies	B A		Department of Religious Studies
Russian	B.A.		Department of Languages and Literatures

[r] The department in the College of Business which also offers this major, with different requirements

College of Liberal Arts and Sciences Baccalaureate Degrees and Majors (continued

Major	Degree	Concentration	Administered By
Sociology	B A		Department of Socio ogy
Spanish	B.A.		Department of Languages and Literatures
Speech and Hearing Science	B S		Department of Speech and Hear ng Science
Women's Studies	B.A.		Women's Studies Program

The department s in the College of Bus nes shic a s offers this n aj r s th d fferent req rei e ts

Gener a Studies awaren ss areas are required. C nsult y ur adv sor for an approved list of courses.

General Studies courses are listed in the "General Studies Courses" table, page 56, in the course descript ons, ir the *Schedule f C asses*, an l in the *Summer Sess ns Bu letin*

COLLEGE DEGREE REQUIREMENTS

CLAS degree requirements are more extensive th in the Ceneral Studies equirement. Additional course work in th e humanities, natural sc ences and n athen at cs and soc a and bel avi ra sc ences is required. Studer ts ue encou aged to consu t w th an acaden ic adv sor in planning a pro gran to ensure that thev t neet all necessarv requi e ents

To graduate from CLAS, a student must satisfy co lege requirements in addition to univers ty General Studies requirements These requ rements cons st of *ma c r equire ments* which involve concentrated course w ork in a select d field: and CLAS g *a luati n re juirements* wl ch ensure tl at the student demonstrates proficier y in a second anguage whi e exposin_ the student to other liberal arts and s ences outside the n ajor field

I. Major Requirements. Each student is require l to select a major from amon_ the fields of study offered by CLAS. The requirements for comp et on of the major are desci bed under departmental l stings

A. Th e maj r department may require up to 45 sen s ter hours of course work The n in mur n is 30 hours A maximum of 15 add t ona hou s may be required in related courses and prerequisites No more thai 60 semester hours of course work may be required to complete the ma or. elated courses, and pre eq uisites Some departments req ire ca culus eve mathen atics up to five of these semester hours may be excluded from the 60 hour maximun bec ause they satisfy th e mathen at cs profic ency requiremel t A minimun of 1? upper d vision hours n th e m ajor must be taken in reside ce at ASL Ma n

B. No c edit s granted toward fulfil ng major or minor requirements in any upper d v sion course in that sub e ct fiel l unless the grade in that ourse s at least a C." In CLAS, the assignment of a gr id of "Y" indicates a level of perform ance th at would have resu ted in a grade of at le ast "C" had the r or mal gradin_ scheme been used

See the indiv idual dep artments f or ther r mini mum grade requirements.

C. Ma or fields of study are c assified into the fo lo s ing three divisions

1. Humanities
   - African American Studies AFH
   - Asiat Languages (Chinese Japanese CHI JPN
   - Chic ana and Chican c Studies CSH
   - En_lish (Linguistics students must take tw o upper division lit erature or filn courses to n eet CLAS graduation requirements in human ties. ENG)
   - French (FRE
   - German (GER
   - Humanities HUM
   - Italian ITA
   - Philosophy HPS, PHI
   - Relig ous Studies REL
   - Russian Only meets CLAS graduation require ments in humanities if at least two upper d vision iterature r civil zation courses are taken. RUS
   - Spanish SPA)
   - Won en's Studies WSH
2. Natural sciences and mathen atics
   - Biochemistry (BCH
   - Biology (BIO
   - Chemistry CHM
   - Clin ca Laboratory Sciences CLS
   - Con putatior al Mathematical Sc ences (MAT)
   - Conservati n Biology B O
   - Geological Sciences GLG
   - Mathematics MAT
   - Microb ology MIC
   - Molecu ar Biosciences Biotechn ology MBB
   - Physics AST, PHS, PHY
   - Plai t B ology PLB
3. Social and behavioral sciences
   - African American Studies AFS
   - Anthropology ASB, ASM
   - Ch cana and Chic nc Studies (CSS
   - Economics ECN
   - Exercise Scie ce/Physical Education Students .na oring n this field must satisfy the CLAS

graduation requirements in all three divi sions. EPE

Family and Human Development Students majoring in this field must satisfy the CLAS graduation requirements in all three divisions. CDE, FAS

Geography GCU

History HST

Political Science POS

Psychology (PGS, PSY)

Sociology (SOC

Speech and Hearing Science Students major ing in this field must satisfy the CLAS grad uation requirements in a three divisions.) SHS

Women's Studies WST)

II. CLAS Graduation Requirements. The purpose of the CLAS graduat on requiren ents is to ensure that the student is introduced to disciplines outside the division of the ma or. A list of major fields and their respective divisions is given under I.C.

Unless the major field notes otherwise in I C . students are considered to have fulfil ed the CLAS graduation requirements in the division of the n a or.

Students ma oring in Exercise Science/Physical Education, Family and Human Development, and Speech and Hearing Science must satisfy CLAS graduation requirements in social behavioral sc ences as well as in the other two divis ons. Students majoring in African American Studies or Chicana and Chicano Studies sat sfy e ther the CLAS graduation requirements in the humanities or the social and behavioral sciences, depending upon their concentrations

Students ma oring in Anthropology, Geography, or Psychology may not use ASM courses in the case of Anthropo ogy majors, GPH courses in the case of Geography n a ors, or PSY courses in the case of Psychology majors to satisfy the CLAS graduation requiren ents in the natural sciences and n athen atics

Vote. Courses used to f ll the university General Studies requirement in Humar t es and Fine Arts (HU), Social and Behavioral Sciences SB , or laboratory sciences (SQ or SG) may not be used to fill CLAS graduation requirements in the hun anit es, social and behavioral sciences and the natural sciences and mathemat cs

A. Humanities six semester hours) Each student is required to complete two upper div s on courses of at least three semester hours each. Course prefixes are identified in the following section.

Course prefixes for the CLAS graduation requirement n the Humanities·

1. AFH African American Studies Program
2. CSH (Department of Chicana and Chican Stud es
3. ENG (Department of English, any literature course, including ENG 200 and 218
4. CHI, FLA, FRE, GER, GRK, HEB, ITA, JPN, LAT, POR, RUS, SCA, SPA (Department of Languages and Literatures, FLA 150 or any lit erature or "civilization" course at the 200 level or above that is not also used to meet the lan guage proficiency requirement)
5. HUM (Interdisciplinary Humanities Program)
6. HPS, PHI Department of Philosophy
7. REL (Department of Rel gious Studies) reli gion, Bible, or theology courses from sectarian institutions may not be used to fill any CLAS Humanities requirement. Such courses may be used only for elective credit toward a student's graduation.
8. WSH Women's Studies Program)

B Natural sciences and mathematics (six semester hours . Each student is required to complete two courses of at east three semester hours each.

Course prefixes for the CLAS graduation requirements in the natural sciences and mathe n atics.

1. ASM Department of Anthropology)
2. BIO Department of Bio ogy
3. BCH, CHM (Department of Chemistry and Biochemistry
4. CSE Department of Computer Science and Eng neering
5. CPH Department of Geo graphy
6. GLG Department of Geolog cal Sciences
7. MAT, STP Department of Mathematics and Statistics)

N te On y n athemat cs courses for which MAT 117 c r a higher level mathematics course is a prerequisite may be used to satisfy the CLAS graduat on req irements in Natural Sci ences and Mathematics.

8. MIC (Department of Microbiology
9. AST, PHS PHY (Department of Phy sics and Astr nomy
10. PLB, MBB Department of Plant Biology
11. PSY (Department of Psychology

C Social and behavioral sciences six semester hours . Each tudent is required to complete two upp r division cour es of at least three semester hours each Course prefixes of approved courses are iden tified in the fol owing section.

Course pref xes for the CLAS graduation req iren ents n the social and behavioral sciences:

1. AFS African American Studies Program)
2. ASB Departn ent of Anthropolo_y

L te a y nd t nqu y **MA** mat e at **CS** omputer stat st cs qua t tat ve app at n **HU** uman t es an f e art **SB** o a a d be av o a e ces **SG** natura s en e ge e a o e urse **SQ** natura e e qua t tat ve **C** u t ra d v r ty the ted State **G** g oba H h to ca See Ge era Stud e pa 8

3. CSS Department of Chicana and Chicano Stud es
4. ECN (Department of Economics)
5. GCL Department of Geography
6. HST (Department of History
7. PGS Department of Psychology)
8. POS Department of Political Science)
9. SOC Department of Sociology)
10. W ST (Women's Studies Program)
Nc te Before the 1999 2000 edition of the *Gener al Catalog*, all Women's Studies courses were listed as WST. Consult an advisor to verify if an earlier WST course should be considered WSH or WST.

D. Bridge course requirement (three semester hours . Each student s requ red to complete one CLAS bridge course of at least three semester hours. Bridge courses contain substantial content that br dges at least two of the areas of inquiry noted in sections *A* , *B* , and *C* Bridge courses cannot be double-counted to fill any other CLAS graduation requirement or the HL , SB, SQ, or SG portions of the General Studies requirement. Bridge courses may be double counted with the major or Literacy and Critical Inquiry, Mathematical Studies, or any of the awareness areas when applicable.

The following courses have been approved as CLAS bridge courses (see an advisor for any add tional bridge courses approved after the *General Catalog* was published)·

ASB 240 Introduction to Southeast Asia
Cross listed as GCU 240
HST 240/POS 240/REL 240)
ASB 326 Human Impacts on Ancient Environments
ASB 350 Anthropology and Art
ASB 353 Death and Dying n Cross Cultural Perspective
ASB 462 Medical Anthropology: Culture and Health
ASM 248 Bioarchaeology of Cannibalism, Violence, and Social Pathology
ASM 345 Disease and Human Evolution
BIO 311 Biology and Society
Cross listed as HPS 340
BIO 316 History of Biology Conflicts and Controversies
Cross l sted as HPS 330
BIO 427 Fire
ENG 312 English in Its Soc al Setting
ENG 494 ST. Science and Literature Across the Cultural D vide
EPE 452 Exercise Psycho ogy
GCU 344 Geography of Hispanic Americans
GPH 314 Global Change
GPH 405 Energy and Environment
GPH 422 Plant Geography
(Cross listed as PLB 422
HPS 322 History of Science
HPS 330 History of Biology. Conflicts and Controversies
Cross listed as BIO 316)
HPS 331 History of Medicine
Cross l sted as BIO 318
HST 460 History of Fire
HUM 294 ST· Introduction to Southeast Asia
HUM 420 Interpreting Latin America
MIC 394 ST: D sease and AIDS in America
PGS 394 ST: Disease and AIDS in America
PLB 320 Environmenta Science
Cross listed as BIO 319)
PSY 424 Genetic Psychology
PSY 425 Biological Bases of Behavior
PSY 426 Neuroanatomy
PSY 470 Psychopharmacology
REL 379 Religion, Nationalism, and Ethnic Conflict
REL 382 Relig on, Magic, and Science
REL 390 Women and Rel gion
REL 480 Religion and Global Politics
SCA 250 Introduction to Scandinavian Culture
SHS 394 ST· Brain, Memory, and Language
SOC 334 Technology and Society
SOC 390 Social Statistics I
SOC 470 Sociology of Relig on
SOC 451 Comparative Sociology
SOC 483 History of Social Thought
WST 394 ST: Women and Religion

E. Each student is required to demonstrate proficiency by completing courses in a second language Each student must demonstrate proficiency by complet ing the courses specified below with a grade of "C" or higher in each course. Second language course requirements consist of

1. completion of second language course work at the intermediate level (202 or equivalent, though some languages require both semesters at the ntermediate level to be taken to demon strate proficiency; see the Department of Lan guages and Literatures listings for greater spec ification ;
2. a foreign language course at the 300 level or higher taught in the foreign language and hav ing 202 or its equivalent as a prerequisite;
3. completion of secondary education at a school in which the language of instruction is not English, or
4. completion of SHS 202 American Sign Lan guage IV or its equ valent.

F. Students are required to take a minimum of MAT 114 or higher. A grade of "C" or higher must be earned in the chosen Mathematics course

III. General Electives. Most CLAS majors can meet all of the above requirements with fewer than 120 semester hours required for graduation. The remaining hours are general electives that may be selected from any of the

departments of CLAS and from the offerings of the other colleges.

Declaration of Graduation. The declaration of graduation, which is required by university regulations during the semester in which an undergraduate earns the 87th hour, must be filed and approved at least two weeks before the preregistration period for the subsequent semester. Students should run a new DARS report every semester to gauge how well they are meeting all requirements for graduation. Students should contact the Office for Academic Programs, in SS 111, regarding college graduation rules and deadlines. Deadlines for filing the declaration of graduation after enrolling in the 87th hour are March 1 and October 1 of each year. Students with 87 hours must have a college-approved declaration of graduation before registering for the next semester.

Credit Requirement. All candidates for graduation in the B.A. and B.S. degree curricula are required to complete at least 120 semester hours, of which at least 45 hours must consist of upper division courses. A minimum ASU cumulative GPA of 2.00 is required for graduation.

Concurrent Degrees. Students who wish to obtain concurrent degrees must realize that there are certain combinations that would not be approved because there is too great an overlap between the courses required for each major. For example, students may not obtain concurrent degrees in two life sciences. Students who wish to obtain concurrent degrees may not double count courses from one major to the next, but must have at least 30 different semester hours in each major.

Course Load. The normal course load is 15–16 semester hours. First semester freshmen and entering transfer students are not permitted to register for more than 18 semester hours in the initial semester. Other students who wish to register for more than 18 hours must have a GPA of at least 3.00 and must file a petition in the Office for Academic Programs, in SS 111, before registration. Any petition for an overload in excess of 21 hours must be presented to the Standards Committee of the college. No student should assume that his or her petition will be granted for overload.

SPECIAL CREDIT OPTIONS

Pass Fail Grade Option. The pass fail grade option is intended to broaden the education of Liberal Arts and Sciences undergraduates by encouraging them to take advanced courses outside their specialization. A mark of "P" contributes to the student's earned hours but does not affect the GPA. A failing grade is computed into the GPA.

Only CLAS students with at least 60 semester hours may take courses under the pass/fail option. The option may be used under the following conditions:

1. enrollment for pass fail needs the approval of the instructor and the college;
2. enrollment under this option must be indicated during registration and may not be changed after the late registration period, and
3. a maximum of 12 hours taken for pass fail may be counted toward graduation.

Students may not enroll under the pass fail option in the following courses:

1. those taken to satisfy the second language or First Year Composition requirements,
2. those in the student's major, minor, or certificate program;
3. those counted toward or required to supplement the major;
4. those counted as 499 Individualized Instruction;
5. those taken for honors credits; or
6. those counted toward satisfying the CLAS graduation requirements or the General Studies requirement.

Audit Grade Option. A student may choose to audit a course in which he or she attends regularly scheduled class sessions but earns no credit. The student should obtain the instructor's approval before registering for the course. For more information, see "Grading System," page 72.

Note: This grade option may not be changed after the drop add period.

Independent Learning. Study by Independent Learning is not a normal part of a degree program; special circumstances must exist for a degree seeking student to take Independent Learning courses. Any enrollment in such courses must have the prior approval of the college.

ACADEMIC STANDARDS

The standards for GPA and the terms of probation, disqualification, reinstatement, and appeal are identical to those of the university as set forth under "Retention and Academic Standards," page 75, except that the disqualified student in CLAS is suspended for at least two regular semesters at the university. When students are placed on probation, one of three things can happen:

1. the student may raise his or her cumulative GPA to a 2.00 or better by taking new classes and be removed from probation after the fall or spring semester,
2. the student may receive the required semester GPA, but not raise the cumulative GPA to the 2.00 level in which case, the student may continue on probation, earning the required semester GPA, for as many semesters as it takes to raise the cumulative GPA above 2.00; or
3. the student may fail to achieve the required semester GPA and be disqualified.

Students with cumulative GPAs of less than 2.00 who leave the university for a semester or more are not automatically readmitted. Such students, as well as all disqualified students, should contact the Office for Academic Programs in SS 111, regarding procedures and guidance for

L te y nd tca qu **MA** mat e at **CS** puter t t tc q a t tat ve app cat o **HU** human te a d f e arts **SB** o a a d beh v or sc en es **SG** at ra ence ge e ore cour e **SQ** natura c ence qua t tat ve **C** u tura d r ty n the n ted State **G** g oba **H** h tor a See Ge era Stud e p e 8

College of Liberal Arts and Sciences Graduate Degrees and Majors

Major	Degree	Concentration	Administered By
Anthropology	M.A.[1]	Archaeology, bioarchaeology, linguistics, medical anthropology, museum studies, physical anthropology, social-cultural anthropology	Department of Anthropology
	Ph.D.	Archaeology, physical anthropology, social-cultural anthropology	Department of Anthropology
Asian Languages and Civilizations—Chinese/Japanese	M.A.	—	Department of Languages and Literatures
Biology[2]	M.S., Ph.D.	Ecology	Department of Biology
Chemistry	M.S., Ph.D.	Analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, solid-state chemistry	Department of Chemistry and Biochemistry
Communication Disorders	M.S.	—	Department of Speech and Hearing Science
Computational Biosciences	M.S.	—	College of Liberal Arts and Sciences
Creative Writing	M.F.A.[3]	—	Creative Writing Committee
English	M.A.	Comparative literature, English linguistics, literature and language, rhetoric and composition	Department of English
	Ph.D.	Literature, rhetoric/composition and linguistics	Department of English
Exercise Science	Ph.D.[3]	Biomechanics, motor behavior/sport psychology, physiology of exercise	Committee on Exercise Science
Exercise Science/Physical Education	M.S.	—	Department of Exercise Science and Physical Education
Family and Human Development	M.S.	Family studies	Department of Family and Human Development
Family Science[2]	Ph.D.	Marriage and family therapy	Department of Family and Human Development
French	M.A.	Comparative literature, linguistics, literature	Department of Languages and Literatures
Geography	M.A., Ph.D.	—	Department of Geography
Geological Sciences	M.S., Ph.D.	—	Department of Geological Sciences
German	M.A.	Comparative literature, language and culture, literature	Department of Languages and Literatures
History	M.A.	Asian history, British history, European history, Latin American history, public history, U.S. history, U.S. Western history	Department of History
	Ph.D.	Asian history, British history, European history, Latin American history, U.S. history	Department of History
Humanities	M.A.	—	Graduate Committee on Humanities
Materials Science[3]	M.S.	—	Committee on Science and Engineering of Materials
Mathematics	M.A., Ph.D.	—	Department of Mathematics and Statistics
Microbiology	M.S., Ph.D.	—	Department of Microbiology
Molecular and Cellular Biology	M.S., Ph.D.	—	Interdisciplinary Committee on Molecular and Cellular Biology

[1] Graduate students in the School of Justice Studies and the Department of Anthropology are able to receive a concurrent M.S. degree in Justice Studies and M.A. degree in Anthropology.

[2] This major has formalized concentration(s); other areas of study are available.

[3] This program is administered by the Graduate College.

College of Liberal Arts and Sciences Graduate Degrees and Majors (continued)

Major	Degree	Concentration	Administered By
Natural Science	M.N.S.	Biology	Department of Biology
		Chemistry	Department of Chemistry and Biochemistry
		Geological sciences	Department of Geological Sciences
		Mathematics	Department of Mathematics and Statistics
		Microbiology	Department of Microbiology
		Physics	Department of Physics and Astronomy
		Plant biology	Department of Plant Biology
Philosophy	M.A., Ph.D.	—	Department of Philosophy
Physical Education	M.P.E.	—	Department of Exercise Science and Physical Education
Physics	M.S., Ph.D.	—	Department of Physics and Astronomy
Plant Biology[2]	M.S., Ph.D.	Ecology, photosynthesis	Department of Plant Biology
Political Science	M.A., Ph.D.	American politics, comparative politics, international relations, political theory	Department of Political Science
Psychology	Ph.D.	Behavioral neuroscience, clinical psychology, cognitive/behavioral systems, developmental psychology, environmental psychology, quantitative research methods, social psychology	Department of Psychology
Religious Studies	M.A.	—	Department of Religious Studies
Science and Engineering of Materials	Ph.D.[3]	High-resolution nanostructure analysis, solid-state device materials design	Committee on the Science and Engineering of Materials
Sociology	M.A., Ph.D.	—	Department of Sociology
Spanish	M.A.	Comparative literature, language and culture, linguistics, literature	Department of Languages and Literatures
	Ph.D.	Cultural studies, literature	Department of Languages and Literatures
Speech and Hearing Science	Ph.D.[3]	Developmental neurolinguistic disorders, neuroauditory processes, neurogerontologic communication disorders	Committee on Speech and Hearing Science
Statistics	M.S.[3]	—	Committee on Statistics
Teaching English as a Second Language	M.TESL	—	Department of English

[1] Graduate students in the School of Justice Studies and the Department of Anthropology are able to receive a concurrent M.S. degree in Justice Studies and M.A. degree in Anthropology.

[2] This major has formalized concentration(s); other areas of study are available.

[3] This program is administered by the Graduate College.

reinstatement and returning to good standing. By following recommendations and meeting established standards for summer school work or course work at other institutions, the possibility of successful reinstatement is enhanced. Academic discipline is one of the functions of the Office for Academic Programs. All students having academic difficulties of any kind should contact this office. Also available in this office is information on policies and procedures of the college on academic honesty, student grievances with respect to grades, and various petitions regarding college standards and graduation requirements.

Academic honesty is expected of all students in all examinations, papers, academic transactions, and records. The possible sanctions include, but are not limited to, appropri-

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 83.

ate grade penalties, loss of registration privileges, disqualification and dismissal.

STUDENT RESPONSIBILITIES

Any student enrolling in courses offered by CLAS is expected to follow the rules and deadlines specified in this catalog and the current *Schedule of Classes*. Students are urged to meet with their departmental academic advisors before registration. Students with additional questions or problems are also urged to meet with advisors in the Office for Academic Programs in SS 111, regarding the academic rules of the college and the university.

SPECIAL PROGRAMS

Barrett Honors College. CLAS works closely with the Barrett Honors College, which affords qualified undergraduates opportunities for enhanced educational experiences. For a complete description of requirements and opportunities, see "The Barrett Honors College" page 118.

Integrated Studies. An Integrated Studies major leading to the B.A. or B.S. degree provides students of outstanding ability in the humanities, natural sciences, and mathematics, and social and behavioral sciences opportunities to pursue courses of study that cut across departmental boundaries and focus on specific topics or problem areas. Completion of 32 semester hours at ASU with a GPA of at least 3.25 and three letters of recommendation from ASU faculty members are required for admission. For more information about degree requirements, visit the Office for Academic Programs in SS 111.

Washington Semester Program. Students have a variety of opportunities for practicum and internship experiences that enable them to meld classroom learning with practical application. Among the several individual departmental programs that provide internships for majors, the Department of Political Science is the ASU sponsor of the Washington Semester Program. The program provides students a one semester opportunity to study in Washington, D.C. through any one of several programs sponsored by the American University. The program is available to outstanding juniors or seniors and requires careful planning with an academic advisor early in the student's career. For more information, call the Department of Political Science at 480 965 6551.

Military Officer Training. The Departments of Aerospace Studies and Military Science offer programs leading to commissions in the armed forces, but they do not offer majors or minors. For more information, see the appropriate department descriptions in this catalog.

Certificate Programs and Areas of Emphasis

Certificates are available from numerous units in CLAS, and one college-wide Enriched College Degree Certificate is available to any major in the college as shown in the "CLAS Certificates" table page 337. Areas of emphasis are also available in some of the same subjects (e.g., Latin American Studies).

Enriched College Degree. CLAS offers an Enriched College Degree Certificate, available to any student within the university.

The Enriched College Degree Certificate consists of a minimum of 15 semester hours of a minimum of C grade credit. The certificate consists of:

1. a thematic requirement composed of a three-course sequence outside the student's major, characterized by an identifiable theme of intellectual relevance for students. Courses used for the thematic requirement cannot be from one's major, minor, or another certificate;
2. an approved upper-division bridge course selected to address the relationship of areas of inquiry and means of acquiring knowledge; and
3. an approved upper-division course in spoken English to provide a meaningful opportunity for substantive oral presentations.

For more information, visit the CLAS Office for Academic Programs, in SS 111 or call 480 965 6506.

American Public Policy. See "Certificate in American Public Policy," page 449.

Asian Studies. An Asian Studies Certificate is offered through the Center for Asian Studies.

Students must complete two years (20 semester hours) of an Asian language plus 30 additional hours of Asian area studies courses selected from core Asian studies courses or courses with a significant focus on Asia chosen in consultation with the Center for Asian Studies advisor. Students whose native language is an Asian language or who have otherwise mastered an Asian language may elect to take four additional Asian studies courses in place of the elementary and intermediate language classes. Language requirements may be selected from Chinese, Indonesian, Japanese, Korean, Thai, and Vietnamese.

An East Asian Studies Certificate is also available. Students must complete two years (20 semester hours) of Chinese, Japanese or Korean plus 30 additional semester hours of East Asian area studies courses; these courses must be selected from the core East Asian curriculum or must be courses with a significant focus on East Asia chosen in consultation with the Center for Asian Studies advisor.

Note: Students whose native language is Chinese or Japanese or who have otherwise mastered these languages may elect to take four additional East Asian studies courses in place of the elementary and intermediate language courses.

The center houses a comprehensive library and is involved in student and faculty exchange programs with several Asian universities as well as serving as a liaison with various Asian organizations.

For more information, contact the Center for Asian Studies in WHALL 130, or call 480 965 7184.

Civic Education. See "Certificate in Civic Education," page 449.

Classical Studies. Students admitted to undergraduate degree programs in any field are eligible for the Classical Studies certificate program. In addition to the course work

CLAS Certificates

Certificate Program	Administered By	Page
Enriched College Certificate	CLAS	336
African American Studies Certificate	African American Studies Program	343
American Public Policy Certificate	Department of Political Science	449
Asian Studies Certificate[1]	Center for Asian Studies	336
Civic Education Certificate	Department of Political Science	449
Classical Studies	Department of Languages and Literatures, and Interdisciplinary Humanities Program	336
East Asian Studies Certificate	Center for Asian Studies	336
Ethics Certificate	Department of Philosophy	337
Geographic Information Science Interdisciplinary Certificate in-	CLAS	
Health Physics Certificate	Pre Health Professions Office	337
History and Philosophy of Science Certificate	Department of Philosophy	338
International Studies Certificate	Department of Political Science	449
Jewish Studies Certificate	Jewish Studies Committee	338
Latin American Studies Certificate[1]	Latin American Studies Center	338
Medieval and Renaissance Studies Certificate	Arizona Center for Medieval and Renaissance Studies ACMRS	338
Medieval Studies Certificate[2]	ACMRS	
Museum Studies Certificate[2]	Department of Anthropology	
Renaissance Studies Certificate	ACMRS	
Russian and East European Studies Certificate[1]	Russian and East European Studies Consortium	338
Scandinavian Studies Certificate	Department of Languages and Literatures	339
Scholarly Publishing Certificate[2]	Department of History	
Southeast Asian Studies Certificate	Program for Southeast Asian Studies	339
Symbolic Systems	Department of Philosophy	339
Translation Certificate	Department of Languages and Literatures	402
Women's Studies Certificate	Women's Studies Program	339
Writing Certificate	Department of English	369

[1] Emphasis areas also available in the ... program.
[2] For more information see the Graduate Catalog.

and examinations required in the student's major, the student is responsible for fulfilling the following minimum requirements:

1. Five semesters of ancient Greek (17 semester hours, GRK 301 and 302 may be repeated for credit) or Latin (19 semester hours) language and literature instruction;
2. Two semesters (six semester hours) in courses related to classical studies to be approved by coordinators of the certificate;
3. a thesis (three semester hours in a Barrett Honors College thesis, six semester hours) or two additional courses at or above the 300 level (six semester hours); and
4. a minimum of a 2.00 average in all course work leading to the certificate.

Students interested in the Classical Studies certificate program need to submit an application before being accepted into the program. For further information call the program coordinators at 480 965 1110 or 727 651-.

Ethics. This certificate is designed to give students a richer understanding of systematic philosophical thinking about ethics. Students with majors in business, nursing, journalism, and public administration, among others, may well find that training in ethics is beneficial for their career goals. The certificate program permits some flexibility about course selection, thereby facilitating the interests of many students. For more information, visit the Department of Philosophy in PS A574, or call 480 965 3394.

Health Physics. The curriculum of health physics involves work in CLAS and the College of Engineering and Applied Sciences. The purpose of the concentration is to serve undergraduate students who wish to prepare themselves for careers in health physics. To qualify for professional status, a health physicist needs a B.S. degree in one of the physical or life sciences and a group of specialized courses in physics, mathematics, chemistry, engineering, and biology.

A Certificate of Concentration in Health Physics is awarded for the successful completion of a B.S. degree in a physical or life science that follows a prescribed program. For more information, visit the Pre-Health Professions

Letter-by-letter inquiry MA mathematics CS computer statistics quantitative applications HU humanities and fine arts SB social and behavioral sciences SG natural science engineering SQ natural science engineering quantitative Cultural diversity in the United States Global Historical Perspectives See General Studies page 3

Office in LSC 206C, or call 480 965 2365, where academic advising is available

History and Philosophy of Science. The Department of Philosophy offers an undergraduate History and Philosophy of Science Certificate. The certificate program is designed to give students an understanding of both traditional philosophic issues surrounding science and the historical development of concrete scientific theories and ideas. The philosophic questions, of the belief worthiness and interpretation of scientific claims as well as norms within or about science, both enrich and are enriched by their combination with historical study. Such philosophic and historical study will also often include the examination of contemporary sciences and their place within the larger society.

The certificate requires 18 semester hours bearing a PHI or HPS prefix of which 12 semester hours must be upper division. Included within the 18 semester hours, at least nine must bear the HPS prefix. PHI 314 Philosophy of Science is also required. All courses counting toward the certificate must be approved for this purpose by a Department of Philosophy undergraduate advisor and passed with a grade of "C" or higher.

For more information, visit the Department of Philosophy in PS A524, or call 480 965 3394.

International Studies. See "Certificate in International Studies," page 449.

Jewish Studies. The Jewish studies program is designed with the following goals in mind:

1. to examine the history and culture of the Jews,
2. to provide a model for interdisciplinary teaching and research,
3. to generate and facilitate research on Judaica;
4. to provide the community with programs, courses, and research furthering the understanding of Judaica; and
5. to stand as an example of the university's commitment to a program of meaningful ethnic studies on a firm academic base.

The Certificate of Concentration in Jewish Studies may be combined with a major in any college. For information about the program, refer to the Department of History or the Department of Religious Studies.

Latin American Studies. The Latin American Studies Certificate program is designed to give students an understanding of culture, economies, political structures, and the history of Latin American nations. The Departments of Anthropology, Economics, Geography, History, Languages and Literatures: Spanish and Portuguese, Political Science, and the College of Business offer courses that combine to make up the interdisciplinary certificate. Students must complete 30 semester hours of upper division courses from the above departments/colleges with a concentration in Latin America: 15 semester hours in the major subject and 15 semester hours in other disciplines. The certificate requires Spanish or Portuguese proficiency through the 313 level of conversation and composition. Only language courses above 313 in literature and civilization will count toward a major or interdisciplinary areas of preparation. Spanish and Portuguese courses above 313 in grammar and phonology will not count toward the major requirements.

The Latin American Studies Center offers the area of emphasis for students who do not wish to attain a high level of language proficiency.

For more information, visit the Latin American Studies Center in SS 213, or call 480 965 5127.

Medieval and Renaissance Studies. An undergraduate Certificate in Medieval and Renaissance Studies is offered by the Arizona Center for Medieval and Renaissance Studies (ACMRS). In addition to the course work and examinations required in a student's major field of interest, the following minimum requirements must be fulfilled to earn the certificate:

1. six to eight semester hours of classical Latin and six to eight semester hours of Latin classical and/or medieval or of a vernacular language of the period (e.g., Old English, Old Norse, Old French, Renaissance Italian);
2. six to eight semester hours of course work in medieval and renaissance studies outside the major discipline;
3. three semester hours of thesis on a topic concerning the Middle Ages or Renaissance. The thesis may be used to fulfill the Honors College thesis requirement for students enrolled in the Barrett Honors College, and
4. a minimum of a "C" average in all course work leading to the certificate.

Students interested in the certificate program need to complete an application form before being accepted into the program. Applications are available by calling ACMRS at 480 965 5900.

See the *Graduate Catalog* for information about the Certificate in Medieval Studies and the Certificate in Renaissance Studies, and "Arizona Center for Medieval and Renaissance Studies (ACMRS)," page 33, for information about the center.

Museum Studies. See the *Graduate Catalog* or contact the Department of Anthropology for more information.

Russian and East European Studies. Undergraduate students may complete an interdisciplinary certificate program leading to a bachelor's degree with a major in the chosen field with an emphasis in Russian and East Europe in studies. The requirements for the Russian and East European Studies Certificate comprise 1) three years (22 hours) of Russian or another Eurasian or East European language and 2) 30 upper division semester hours in Russian/East European area related course work.

At least three disciplines must be represented in the area related course work, and at least 12 hours must be outside the Department of Languages and Literatures (i.e., non RUS and non FLA courses). Fulfillment of these requirements is certified by the Russian and East European Studies Consortium and is recognized on the transcript by a bachelor's degree with "Major in [Discipline], Emphasis in Russian and East European Studies." The purpose of this undergrad

uate certificate program is to encourage students majoring in a chosen discipline to develop special competency in Russian or East European language and area studies. A major in any department may elect this emphasis.

For further information, contact the program coordinator of the Russian and East European Studies Consortium at 480 965 4188.

Scandinavian Studies. Students admitted to undergraduate degree programs in any field are eligible for the Scandinavian Studies Certificate program. In addition to the course work and examinations required in the student's major, the student is responsible for fulfilling the following minimum requirements (21 semester hours) before the certificate is issued:

1. six semester hours of Norwegian or Swedish at the 200 level or above;
2. three semester hours in SCA 250 Introduction to Scandinavian Culture;
3. nine semester hours of upper division course work in Scandinavian Studies outside the student's major discipline;
4. a minimum of a "C" average in all course work leading to the certificate; and
5. three semester hours in an independent study thesis on a topic concerning Scandinavian Studies. The thesis may be used to fulfill the Barrett Honors College thesis requirement for students enrolled in the Barrett Honors College.

Students who test out of the basic language courses would under advisement take other approved courses to fulfill the minimum requirement of 21 semester hours.

For more information, call the Department of Languages and Literatures at 480 965 6251.

Scholarly Publishing. See the *Graduate Catalog* for information on this certificate program.

Southeast Asian Studies. A Certificate in Southeast Asian Studies is available to any undergraduate student. The certificate program offers two options: (1) an area studies specialization emphasizing courses in the social sciences and humanities and requiring one year of Indonesian, Thai, or Vietnamese and (2) a language specialization requiring a two year sequence in a Southeast Asian language and a proportional number of area studies courses.

Students wishing to study a Southeast Asian language other than those offered on campus may transfer credits earned at the Southeast Asian Studies Summer Institute, a consortium for intensive language and area studies, or at other accredited programs. Qualified students may request placement testing on other national languages of the region, administered in accordance with the national American Council of Teachers in Foreign Languages (ACTFL) guidelines.

The ASL curriculum includes:

1. language instruction in Indonesian, Thai, or Vietnamese;
2. ASB GCL HST/POS/REL 240 Introduction to Southeast Asia;
3. HS 308 Modern Southeast Asia;
4. electives in the social sciences and humanities on the history, geography, culture, politics, and religion of the region; and
5. a culminating capstone seminar in which the students share multidisciplinary approaches to the region and integrate knowledge of Southeast Asia with their respective disciplinary orientations.

Courses counting toward the Certificate in Southeast Asian Studies fulfill requirements for undergraduate majors and General Studies in the social and behavioral sciences, humanities, literacy, and global and historical awareness areas. A two year sequence in Southeast Asian language study meets the foreign language requirement for undergraduates in CLAS.

For more information, contact the Program for Southeast Asian Studies in LL 9 (basement), 480 965 4732 or 480 965 6118.

Symbolic Systems. The Department of Philosophy offers a Certificate in Symbolic Systems. The certificate program takes an interdisciplinary approach to cognition, computation, and meaning. Course work is divided evenly between philosophy, psychology, and computer science in order to expose students to the subject matter from a conceptual, empirical, and practical point of view. The certificate may interest students with majors in any of the three disciplines on topics of common interest.

The certificate consists of 28 semester hours approved by an advisor in the Department of Philosophy and divided evenly between computer science and engineering, psychology, and philosophy as follows:

1. CSE 200, 210, and 240;
2. PSY 250 and 290 and either PSY 323, 324, or 437; and
3. either PHI 319, or 333, either PHI 315 or 317, and either PHI 312 or 314.

Students must satisfy the prerequisites for the listed courses. With written approval from the director of undergraduate studies in the Department of Philosophy, one substitution of a course from outside this list may be made. All courses must be passed with a minimum grade of "C".

For more information, visit the Department of Philosophy in PS A524, or call 480 965 3394.

Translation. See "Translation Certificate: Spanish-English," page 402, for information about the Certificate in Translation.

Women's Studies. Women's Studies provides students with an intensive interdisciplinary liberal arts education that enables them to write well, think critically, and analyze problems effectively.

The certificate program is equivalent to an interdisciplinary minor, consisting of 15 credit hours, and is open to

Literary and Critical Inquiry MA; theatre; Computer Science; Quantitative Psychology and Behavioral Neuroscience; Geography; Sociology; Quantitative Psychology; Cognitive Science; Undergraduate Minors; History; Graduate Studies, page 83

An eastward view down Tyler Mall toward the Bateman Physical Sciences Center

Tim Trumble photo

graduate as well as undergraduate students. Students pursuing a certificate in Women's Studies must consult with the Women's Studies advisor to select appropriate courses and fulfill requirements.

A Certificate of Concentration in Women's Studies is awarded for the successful completion of WST 100 (or 300) and WST 377 or 378 and an additional 12 semester hours from the list of approved Women's Studies courses.

Inquiries about the certificate program should be addressed to the Women's Studies Program academic advisor in ECA 209, 480/965-2358, where the current list of approved courses is available.

GENERAL INFORMATION

Research Centers. To expand educational horizons and to enrich the curriculum, CLAS maintains the following research centers:

Arizona Center for Medieval and Renaissance Studies
Cancer Research Institute
Center for Asian Studies
Center for Meteorite Studies
Center for Solid State Science
Center for the Study of Early Events in Photosynthesis
Exercise and Sport Research Institute
Hispanic Research Center
Institute of Human Origins
Joan and David Lincoln Center for Applied Ethics
Latin American Studies Center

CLAS also participates with the College of Education and the College of Engineering and Applied Sciences in maintaining the Center for Research on Education in Science, Mathematics, Engineering, and Technology. See "Research Centers, Institutes, and Laboratories," page 30, for more information.

Courses. The faculty also offer the following LIA course to familiarize students with available resources and services for research purposes.

For information on LIA courses, see the *Schedule of Classes*, visit the Office for Academic Programs in SS 111, or call 480/965-6506.

LIBERAL ARTS AND SCIENCES (LIA)

LIA 191 First-Year Seminar. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Department of Aerospace Studies

Air Force ROTC

www.asu.edu/clas/afrotc
480/965-3181
TC 324

Col. Ronald Scott Jr., Chair

Professor: Scott

Assistant Professors: Blacklock, Gage, Greensfelder

PURPOSE

The Department of Aerospace Studies curriculum consists of the general military course and history for freshmen and sophomores (AES 101, 103, 201, 203) and the professional officer course for juniors and seniors (AES 301, 303, 401, 403).

General Qualifications. Students entering the Air Force Reserve Officers' Training Corps (AFROTC) must meet the following requirements:

1. be a citizen of the United States (noncitizens may enroll but must obtain citizenship before commissioning);
2. be of sound physical condition; and

3. be at least 17 years of age for scholarship appointment or admittance to the Professional Officer Course (POC).

Additionally, scholarship recipients must be able to fulfill commissioning requirements by age 27. If designated for flying training, the student must be able to complete all commissioning requirements before age 29; persons in other categories must be able to complete all commissioning requirements before age 35.

FOUR-YEAR PROGRAM (GMC AND POC)

A formal application is not required for students entering the four-year program. A student may enter the program by simply registering for one of the general military course (GMC) classes at the same time and in the same manner as other courses. GMC students receive two semester hours for each AES 100- and 200-level class completed for a total of eight semester hours. GMC students not on AFROTC scholarship incur no military obligation. Each candidate for commissioning must pass an Air Force aptitude test and a physical examination and be selected by a board of Air Force officers. If selected, the student then enrolls in the POC the last two years of the AFROTC curriculum. Students attend a four-week field training course at an Air Force base normally between the sophomore and junior years. Upon successful completion of the POC and the college requirements for a degree, the student is commissioned in the U.S. Air Force as a second lieutenant. The new officer then enters active duty or may be granted an educational delay to pursue graduate work.

TWO-YEAR PROGRAM (POC)

The basic requirement for entry into the two-year program is that the student have two academic years of college work remaining, either at the undergraduate or graduate level. Applicants seeking enrollment in the two-year program must pass an Air Force aptitude and medical examination and be selected by a board of Air Force officers. After successfully completing a five-week field training course at an Air Force base, the applicant may enroll in the professional officer course (POC) in the AFROTC program. Upon completion of the POC and the college requirements for a degree, the student is commissioned.

ONE-YEAR PROGRAM (POC)

The basic requirement for entry into the one-year program is that the student have only one academic year of college work remaining, either at the undergraduate or graduate level. Applicants seeking enrollment in the one-year program must pass an Air Force aptitude and medical examination and be selected by a board of Air Force officers. The applicant will enroll in the POC in the AFROTC program. Upon completion of the POC, the college requirements for a degree, and a seven-week field training program at an Air Force base, the student is commissioned.

Qualifications. The following requirements must be met for admittance to the POC:

1. The four-year student must successfully complete the general military course and the four-week field training course.
2. The two-year applicant must complete a five-week field training course.
3. All students must pass the Air Force Officer Qualifying Test (AFOQT).
4. All students must pass the Air Force physical examination.
5. All students must maintain the minimum GPA required by the college.
6. All students must meet the physical fitness requirements.

Pay and Allowances. POC members in their junior and senior years receive $350 and $400 respectively per month for a maximum of 20 months of POC attendance. Students are also paid to attend field training. In addition, uniforms, housing, and meals are provided during field training at no cost to the student. Students are reimbursed for travel to and from field training.

Scholarships. AFROTC offers scholarships annually to outstanding young men and women on a nationwide competitive basis. Scholarships can cover college tuition for nonresident students and provide an allowance for books, fees, supplies and equipment, and a monthly tax-free allowance of $250 to $400 depending on the year. Scholarships are available on a four-, three-, or two-year basis. To qualify for a four- or three-year scholarship, a student must be a U.S. citizen and submit an application before December 1 of the senior year in high school. Interested students should consult their high school counselors or contact AFROTC at ASU for application forms to be submitted to

HQ AFROTC
MAXWELL AFB
AL 36112-6663

Applications can also be submitted online at www.afrotc.com

Students enrolled in AFROTC at ASU are eligible for a limited number of three- or two-year scholarships. Those students interested must apply through the Department of Aerospace Studies. Consideration is given to academic grades, the score achieved on the AFOQT, and physical fitness. A board of officers considers an applicant's personality, character, and leadership potential.

AEROSPACE STUDIES (AES)

AES 101 Air Force Today I. (2)
fa
ntroduces U S A r Force and AFROTC. Top cs nc ude: the A r Force m ss on and organ zat on customs and courtes es off cer opportun' t es officersh p and profess ona sm

L teracy and cr t ca nqu ry **MA** mathemat c **CS** computer stat t cs quant tat ve app cat ons **HU** human t es and f ne arts **SB** s c a and behav ora sc ence **SG** natura c ence genera ore course **SQ** natura c e ce quant tat ve **C** cu tura d vers ty n the Un ted States **G** g ba **H** h st r ca See Genera Stud es" page 83

AES 102 Leadership Lab. (0)
fa
Emphas zes common A r Force customs and courtes es dr and e emon es hea th and phys ca f tne s thr ugh group part c'pat on Corequ s te· AES 101

AES 103 Air Force Today II (2)
spr ng
Cont uat on of AES 101 Top cs nc ude the A r For e m ss on and organ zat on customs and c urtes es off cer opportun t es off cer h p and profess ona sm Prerequ s te AES 101 r de artment approva

AES 104 Leadership Lab. (0)
spr ng
Cont nuat on of AES 102 w th more n depth empha on ear ng the e v ronment of an A r Force off cer Corequ s te AES 103

AES 201 The Evolut on of USAF A r and Space Power I (2)
fa
Further preparat on of the AFROTC and date Top c nc ude A r F rce her tage and eaders commun cat on k s eth cs eadersh p qua ty A r Force and va ues Prerequ s te AES 103 or departme t approva .

AES 202 Leadership Lab. (0)
fa
App cat on of advanced dr and ceremon es, ssu ng commands know ng f ag et quette a d deve op ng d rect ng a d eva uat ng sk s to ead others Corequ s te AES 201

AES 203 The Evolut on of USAF Air and Space Power II (2)
spr ng
Cont nuat on of AES 201 Top cs n ude the A r For e m s on and organ zat on customs and courte es off er opportun t es off cer sh p a d profess ona sm Prereq s te AES 201 o depa tment app ova

AES 204 Leadersh p Lab. (0)
spr ng
Cont nuat f AES 202 w th emphas s on preparat on for f e d tr n ng Corequ s te AES 203

AES 301 Air Force Leadership Studies I. (3)
fa
Study of ommun cat on sk eader h p and qua ty management fundamenta s eader h p eth cs a d profes o a know edge requ red of an A r Force ff cer Prerequ te AES 203 or department approva
Genera Stud es L

AES 302 Leadersh p Lab. (0)
fa
Advanced eadersh p experience app y ng eadersh p and manage ment pr nc p e to mot vate and enhance the performance of other cadets Corequ s te AES 301

AES 303 Air Force Leadersh p Studies II. (3)
spr ng
Cont nuat o of AES 01 Top c nc ude commu cat on sk s et s, eadersh p profess ona kn w edge and qua ty management requ red of an A r Fo ce off ce . Prerequ s te AES 203 or department a p va
Ge era Stud es L

AES 304 Leadersh p Lab. (0)
spr ng
Cont nuat n of AES 302 w th emph s s on p ann g the m tary act v t e of the cadet c rps and app y ng advanced eadersh p method Core u te AES 303.

AES 401 National Security Affairs. (3)
fa
Exam nes advanced eth s A r For e d ctr ne at o a ecur ty pro cess and reg ona tud es Spec a top s c ude c v an c ntro f the m tary m t ry just ce and off cersh p Prerequ s te AES 03 or department approva
Genera Stud s L

AES 402 Leadership Lab. (0)
fa
Advan ed e de sh p expe ence demonstrat g ea ed sk s p a n ng and cont o ng the m tary a t v t e of the orp Corequ te AES 401

AES 403 Preparation for Active Duty II. (3)
spr ng
Cont uat on of AES 401 Top c nc ude c v an contro of t e m tary, doctr ne eth cs m tary just ce the nat ona se ur ty process a d off cersh p Pre equ s te· AES 401 or department approva

AES 404 Leadership Lab. (0)
spr ng
Cont n at on of AES 402 w th emphas s on preparat on for trans t on from c v an to m tary fe Corequ te AES 403.

Omnibus Courses. For an exp anat on of courses offered but not spec f ca y sted n th s c ta og, see O n bus Course page 56

African American Studies Program

www.asu.edu clas aframstu
480 965-4399
COWDN 227

Leanor Boulin Johnson, Director

CORE FACULTY

Professor Reyes
Assoc ate Professors· Bontemps, Bou n Johnson
Ass stant Professor Usman,
C n ca Assoc ate Professor Cox

AFFILIATED FACULTY

Anthropology
Sen or Lecturer. W nke man

Art
Professors. Sweeney Young
Assoc ate Professor Umberger

Asian Pacific American Studies
Ass stant Professor· Rosa

Dance
Facu ty Associate. Ganyo

Education
Assoc ate Professor. Hood

English
Professor: Lester
Assoc ate Professors Chancy, DeLamotte M er
Ass stant Professor: Fuse

Family and Human Development
Assoc ate Professor W son

History
Assoc ate Profe or· Barnes.
Ass stant Professor. Wh taker

Human Communication
Professors Ja n, Mart n,
Assoc ate Professor· Davey
Ass stant Professor: Dav s

Humanities
Ass stant Professor. Lund

Journalism and Mass Communication
Assoc ate Professor Bram ett So omon

Justice Studies
Professors F guer a McDonough Jur k Romero, Zatz;
Facu ty Associates. O ver o T bbs

Life Sciences (ASU West)
Assoc ate Professor. Graves

Music
Professors· P af an Sunkett
Assoc ate Professors Sm th, So s

Political Science
Professor McGowan·
Assoc ate Professor M tche

Psychology
Facu ty Assoc ate. Cota

Recreation Management and Tourism
Assoc ate Professor· Teye

Religious Studies
Assoc ate Professor Moore

Sociology
Professor· Cobas
Assoc ate Professor Ke th
nstructor W ams

Theatre
Assoc ate Professor Edwards

Women's Studies
Professor: Rothsch d
Ass'stant Professors: Anderson, Leong

African American Studies (AAS) is interdisciplinary and focuses on people of African descent throughout the w orld. Focus is given to the diversity of past and present experi ences of those who live in the United States as well as in Africa, the Caribbean, South America, and Centr il America. As an institutional program with a bidisciplinary emphasis, AAS is structured to

1. prepare students of all ethnicities to better under stand, value, and more effectively participate in our increasingly diverse society,
2. combine knowledge of tl e African diaspora with inte lectua and practical training n specific areas for the purpose of creating more effective cc mmu nity and global partnerships, and
3. provide students with a foundation for advanced studies in a variety of fields. While the program is dedicated to scholarly research, teaching, and cre ative activities, it also seeks to build partnerships with community based programs and organizations within Arizona and utilize channels for informing policies which affect the life of Blacks in the diaspora.

AFRICAN AMERICAN STUDIES—B.A.

Course Requirements. The n ajor in Afr can American Stud es requires 45 semester hc urs of course work. A mini mum of 30 sen ester hou s must be AFH, AFR, and AFS courses. The remaining course work must be in a related fie d approved by an AAS adv isor All majors must take 21 hours in the follc wing c ore courses:

AFH 3?? Africa America L teratu c. Bec nn nes Through the Ha lem Renais ance *L HL C* . 3
AFH ?94 Af ica American Literature Harlem Renaissance to the Present *L HL . C* . . . . . ?
AFR 210 I troducti n to Af can American Studies *C* . ?
AFR 429 At can American Studies Theory and Meth ds . . . . . ?
AFR 490 Field Stud e tl e Dia pora . . . . . ?
r AFR 495 Pro Seminar 3
AFS 36 Afri an An er can Histcry t 1865 *SB C, H* 3
AFS 64 Afr can A er can Histc y s t e 865 *SB C H* 3

Within the 45 semester hours, AAS ma ors must also take 12 sen ester ho irs in one of three concentrations: social and behav ioral sciences, humanities arts, or politics and society. The e courses are in addition to the required 21 core course semester ho irs Of the ren aining c ourse work, 12 hours must be taken in related cou ses i.e., non Afr can American Studies' prefixes). In addition to course work within the stu d nt's chosen concentration, six additional hours are required. Students shou d consult with an advisor

In addition, AAS majors are required to take a minor or a certificate program of a minimum of 18 hours in another academic field.

CERTIFICATE IN AFRICAN AMERICAN STUDIES

Course Requirements. The certificate requires 24 semester hours Fifteen core hours must be taken from the follow ing courses:

AFH 3?? Afri an Ame ican Literature Beginnings Thrc ugh the Har em Renaissa ce *L HL C* 3
or AFH ?94 African An eric in L terature Harlen Renaissance to the P esent *L HL . C* 3
AFR 210 Intr duction to Af ca American Studies *C* . ?
AFR 4 9 African Ame ca St d es Theory and Methods . . 3
AFS ?6? Afri an Ame can Hist y t 1865 *SB C, H* 3
AFS ?64 Af can Amer can History Sir ce 1865 *SB C H*. 3

In addition, one course from each of the three concentra tions (i.e., socia and behavioral sciences, humanities arts politics and soc ety must be taken. These courses are in addition to the required core courses. Courses should be selected in consultation with the major advisor.

MINOR IN AFRICAN AMERICAN STUDIES

Course Requirements. The minor requires 18 semester hours. All African Americ in Studies minors n ust take nine core hours from the fc llowing courses

L teracy a d t a u y **MA** mat emat cs **CS** omputer tat st c qua ttat v app at n **HU** hu a t s and fne art **SB** o a a d be v a sc enc **SG** t ra e e ge era core our e **SQ** at ra *e—q ant tat ve C tura d ve ty n the n t d State G g oba* H h t r a See Ge era Stud e page 8

AFH 353 African American Literature Beginnings Through the Harlem Renaissance *LHUC* 3
AFH 354 African American Literature Harlem Renaissance to the Present *LHUC* 3
AFR 21 Introduction to African American Studies *C* 3
AFS 363 African American History to 1865 *SBC H* . . . 3
or AFS 364 African American History Since 1865 *SBC H* 3

In addition, one course from each of the three concentrations (i.e., social and behavioral sciences, humanities arts, politics and society) must be taken. These courses are in addition to the required core courses. A minimum of 12 semester hours of upper division courses is required. Courses should be selected in consultation with the major advisor.

AFRICAN AMERICAN STUDIES HUMANITIES (AFH)

AFH Note 1. Completion of the First Year Composition requirement ENG 101 and 102 [or 105] or ENG 107 and 108 with a grade of C or higher is a prerequisite for all English courses above the 100 level.

AFH Note 2. A term paper or equivalent out of class writing work is required in all upper division 300 and 400 level ENG courses.

AFH Note 3. English majors and minors are expected to have completed ENG 200 before taking 400 level literature courses.

AFH 202 Art of Africa, Oceania, and the Americas. (3)
spring
History of art of Africa, Oceania, and the New World. Meets non Western art history requirement. Lecture discussion. Cross listed as ARS 202. Credit allowed for only AFH 202 or ARS 202.
General Studies HU GH

AFH 225 African American Religion. (3)
selected semesters
Introduces the history and development of the African American religious tradition. Lecture discussion. Cross listed as REL 225. Credit is allowed for only AFH 225 or REL 225.
General Studies HU C

AFH 322 Malcolm and Martin. (3)
selected semesters
Examines and contrasts the views, main tries, contributions and legacies of Malcolm X and Martin Luther King, Jr. Cross listed as REL 322. Credit is allowed for only AFH 322 or REL 322.
General Studies H C

AFH 323 Black Religion: A Biographical Approach. (3)
selected semesters
Examines the experiences, motivations and contributions of a number of figures associated with African American religion. Cross listed as REL 323. Credit allowed for only AFH 323 or REL 323.
General Studies HU C

AFH 333 American Ethnic Literature. (3)
once a year
Examines American multiethnic identity through works of literature that depict American ethnic, gender and assimilation issues. Cross listed as ENG 333. Credit allowed for only AFH 333 or ENG 333. See AFH Note 2.
General Studies LHUC

AFH 347 Jazz in America. (3)
fall spring summer
Current practices employed by contemporary jazz musicians. The history of jazz techniques. Credit not applicable toward any Music degree. Lecture discussion. Cross listed as MUS 347. Credit is allowed for only AFH 347 or MUS 347.
General Studies HU

AFH 353 African American Literature: Beginnings Through the Harlem Renaissance. (3)
fall
History, culture, literary traditions and cultural contexts from slavery through the 1930s. Cross listed as ENG 353. Credit is allowed for only AFH 353 or ENG 353. See AFH Notes 1 2.
General Studies LHUC

AFH 354 African American Literature: Harlem Renaissance to the Present. (3)
spring
History, culture, literary traditions and cultural contexts from the 1920s to the present. Cross listed as ENG 354. Credit is allowed for only AFH 354 or ENG 354. See AFH Note 1 2.
General Studies LHC

AFH 401 Focus on Multiethnic Film. (3)
selected semesters
Specialized study of major ethnic films and prominent film artists. Emphasizes the creative process. Lecture, film viewing, paper. Prerequisite ENG 101.

AFH 459 Studies in African American Caribbean Literatures (3)
selected semesters
Studies African American or Caribbean literature, arts according to genre, period, theory or selected authors. May be repeated for credit when topics vary. Cross listed as ENG 459. Credit is allowed for only AFH 459 or ENG 459. See AFH Notes 1 2 3.

Omnibus Courses. For an explanation of courses offered but not specifically listed in the catalog see Omnibus Courses page 56.

AFRICAN AMERICAN STUDIES (AFR)

AFR Note 1. For Justice Studies students to take a nonrequired 300 level JUS course, they must have at least a C in each of the required US courses (US 105 or 305, 3 1 302 and 303—and a minimum average GPA of 2.50 for these four courses). For non Justice Studies students to take a 300 level JUS course, they must have a minimum of 56 earned semester hours, junior status and a minimum cumulative GPA of 2.00. Non Justice Studies students may take JUS 301, 302 and 303 with school approval.

AFR 105 Introduction to Justice Studies. (3)
fall spring summer
Introductory overview to the study of justice from a social science perspective. Primary topics include justice theories and justice research. Credit is allowed for only AFR 105 or 305 or JUS 305. Appropriate for freshmen and sophomores. Lecture, discussion. Cross listed as JUS 105. Credit is allowed for only AFR 105 or JUS 105.

AFR 191 First Year Seminar. (1 3)
selected semesters

AFR 194 Special Topics. (1–4)
selected semesters

AFR 210 Introduction to African American Studies. (3)
fall
Examines the political, historical and cultural origins of African American studies as an academic discipline. Lecture, discussion.
General Studies C

AFR 263 Elements of Intercultural Communication. (3)
fall spring summer
Basic concepts principles and skills for improving communication between persons from different minority racial ethnic and cultural backgrounds. Lecture, discussion. Cross listed as COM 263. Credit is allowed for only AFR 263 or COM 263. Prerequisite. 2.25 GPA.
General Studies SBC G

AFR 294 Special Topics. (1–4)
selected semesters

AFR 298 Honors Directed Study. (1–6)
selected semesters

AFR 305 Principles of Justice Studies. (3)
fall, spring, summer
Introductory overview to the study of justice from a social science perspective. Primary topics include justice theories and justice research. Credit is allowed for only AFR 305 or 105 or JUS 105. Appropriate

for jun ors and sen ors Lecture d scu s on Cros sted as US 305 Cred t s a owed for on y AFR 305 or JUS 3 5 See AFR Note 1

AFR 317 Genes, Race, and Society. (3)
spr ng
Exam nes h story of b o og ca and soc a nstr ct ons of race n western soc ety Lecture d scuss on
Genera Stud es SB C H

AFR 321 Wealth Distribution and Poverty. (3)
once a year
Exam nes wea th and ncome d str but o in t e ted States a d ana yzes deo og ca and po t ca for es produc ng an ncreas ng y unequa oc ety Lecture d scuss on Cr s sted as JUS 321 Cred t s a owed for on y AFR 321 or JUS 321 See AFR N te 1
Genera Stud es· SB C

AFR 371 Language, Culture, and Communication. (3)
fa and spr ng
Cu tura nf uences of anguage on commun cat on, n ud ng soc a funct ons of anguage b ngua sm b cu tura sm a d b d a ect sm Le t re, d scuss on Cross sted as COM 371 Cred t s a owed for on y AFR 3 1 or COM 371 Prerequ s tes COM 263 or AFR 263 m n mum cum at ve ASU GPA of 2 50
Genera Stud es SB C G

AFR 375 Race, Gender, and Sport. (3)
fa and spr ng
nterd sc p nary exam nat on f the soc a concepts of race and gen der and t e r econom c mpact n sports n Amer ca Le ture d cu s o Prerequ s te ENG 102 r ts equ va ent or nstructor approva
Genera Stud es SB C

AFR 394 Special Top cs. (1–4)
se ected semesters

AFR 428 Critica Race Theory. (3)
spr ng
Exam nes ways n wh ch race has been h stor ca y ut zed con structed and contested n Amer can c v s c ety Lecture d scuss on.

AFR 429 African American Studies Theory and Methods. (3)
spr ng
Exam nes soc a and behav ora sc ence theor es and methodo og ca procedures perta n ng to Afr can Amer cans. Prerequ s te sen or stand ng

AFR 460 Race, Gender, and Media (3)
spr ng
Read ng sem nar de gned to g ve a prob ng exam nat on of the nter face between AHANA Amer cans and the ma s med a n the Un ted States. Lecture d scuss on Cross sted as MCO 460 Cred t a owed for o y AFR 460 or MCO 460
Genera Stud es· C

AFR 463 Intercultural Communicat on Theory and Research. (3)
fa , spr ng, summer
Surveys and ana yzes ma or theor es and research dea ng w th com mun cat on between peop e of d fferent cu tura backgrounds, pr mar y n nternat ona sett ngs Lecture, d s uss on sma group work Cross sted as COM 463 Cred t s a owed for on y AFR 463 or COM 463 Prerequ s tes COM 263 or AFR 263 , 308 m n mum umu at ve ASU GPA f 2 50.
Genera Stud es SB G

AFR 484 Internsh p. (1 12)
se ected semesters

AFR 490 Field Studies in the Diaspora. (3)
spr ng
ntr du es methods and pr nc p es of resear h app ed to B ack com mun t es w th n and outs de Ar zona nvo ves work ng w th f e d off er and facu ty Le ture f e d study Prerequ s te· senior stand ng Pre or corequ s te AFR 429

AFR 492 Honors Directed Study. (1–6)
se ected semesters

AFR 493 Honors Thesis. (1–6)
se ected semesters
Genera Stud es. L

AFR 494 Special Topics. (1–4)
se ected semesters

AFR 497 Honors Colloquium (1–6)
se ected emesters

AFR 498 Pro-Seminar. (3)
spr ng
Top c s se ected by nstructor n consu tat on w t the student Des gned to tegrate and deve op resear h sk s Requ red for majors Prerequ s te: sen or stand ng P e or corequ s te AFR 429

AFR 499 Ind'vidualized Instruction. (1–3)
se ected semesters

Omnibus Courses. For an exp a ation of courses offered but not spec f a y sted n th s cata og ee Omn bus Course " page 56

AFRICAN AMERICAN STUDIES SOCIAL SCIENCE (AFS)

AFS 202 Ethnic Relations in the United States. (3)
fa and sp ng
Processes of ntercu tura re at o s, systems approach to h story of U S nterethn c e at ons psychocu tura ana ys s of contemporary U.S. ethn c re at ns. Lecture, d scuss on Cross sted as ASB 202 Cred t s a wed f r on y AFS 202 or ASB 202
Genera Stud es C H

AFS 210 Introduction to Ethnic Stud es in the U.S. (3)
fa and spr ng
C vers d vers ty of exper ences and re at ons among r c a and ethn c groups n the Un ted States ecture d scuss on Cross sted as APA 210 CCS 210 Cred t s a owed for on y AFS 210 or APA 210 or CCS 210
Genera Studies C

AFS 310 African African American Psychology. (3)
fa and spr ng
H tor ca and contemporary overv ew of the deve pment f Afr an B ack psycho ogy and Afr can Amer can frame f reference Lecture d scuss on

AFS 363 African American H'story to 1865. (3)
once a year
The Afr can Amer can n Amer an h st ry, thought and cu ture from s avery to 1865 Cross sted as HST 333 Cred t s a owed for on y AFS 363 or HST 333
Genera Stud e SB C H

AFS 364 Afr can American History Since 1865. (3)
once a year
The Afr an Amer can n Amer c n h story, thought and cu ture from 1865 to the present Cross sted as HST 334 Cred t s a owed for on y AFS 364 or HST 334
Genera Stud es SB C H

AFS 366 African Civilization Before 1850. (3)
fa and sp ng
Afr can cu ture h story and preco on a c v zat o Meets on Wester requ rement Le ture d scuss on Cr ss sted as ASB 366 Cred t s a owed for on y AFS 366 or ASB 366
Genera Stud es SB G H

AFS 370 Family, Ethnic, and Cultural Diversity. (3)
fa and sp ng
tegra ve approach t nderstand ng h stor ca and current ssues re ated to the structure and nterna dynam cs of d verse Amer can fam es Lecture d scuss n Cross sted as FAS 370 Cred t s a owed for on y AFS 370 or FAS 370 Prerequ s te PGS 101 or SOC 101
Genera Stud es SB C

AFS 466 Peoples and Cultures of Africa. (3)
fa and spr ng
Survey of African peop e and the r cu t res externa contact and changes Meets non Western requ rement Lecture d scuss on Cross sted as ASB 466. Cred t s owed for n y AFS 466 or ASB 466
Genera Stud es SB G, H

Omnibus Courses. For an exp anat on of course offered but not spec f ca y sted in th s cata og see Omn bus Courses, page 56

L tera y and r t ca qu ry **MA** athemat **CS** mputer tat st s q ant tat e app cat ns **HU** man t e and f n rt **SB** oc a a d behav ora e e **SG** natu a en e—ge e a o e course **SQ** natura en e qu nt t ve **C** t ra d ve ty n the nted t te **G** g oba **H** h sto a See Genera Stud e " page 83

Department of Anthropology

www.asu.edu clas anthropology
480 965-6213
ANTH 233

John K. Chance, Chair

Regents Professors: Clark Turner

Professors: Bahr Barton, Brandt, Carr Chance Cowg , Eder Hudak Johanson, Kintgh Koss Ch o no, Marean Martin, Marzke, Merbs, Nash, B. Ne son M Ne son Redman, Sp'elmann, Stark, W ams

Associate Professors: Falconer, Hegmon, K mbe , R ce Welsh

Assistant Professors: Baker, Haenn Jonsson Lockwood, Reed Steadman

Senior Lecturer: W nkelman

Associate Research Professors: S mon, Sug yama

ANTHROPOLOGY—B.A.

Course Requirements. The Anthropology major consists of 45 semester hours, of which 39 must be in anthrop logy and six in related fie ds At least 18 ot the semester hours must be in upper division courses 300–400 level . Three of the six hours in related fields n ust be in statistics. Related fields are determined by the students in consu tation with their advisor. No ASU course is auton atically classi fied as being either related or unrelated. Course require ments for the ma or are distributed as fol ows:

Required Introductory Courses

ASB 102 Introduction to Cultural and S c al Anthropology *SB, G*..... . . . 3
ASB 222 Buried Cities and Lost Tribes Our Human Heritage *HU SB, G, H* 3
or ASB 223 Bur ed Civ lizations of the Americas *HU SB G H* 3
ASM 101 Bones, Stones, and Human Ev lut on *SB* . . . 3

Distribution Requirements

Archaeology 6
Geographic area c u se in archaeo o y er physical anthropolo_y 3
Geographic area course n ethnography 3
Upper division linguistics 3
Physical anthropology 6
Social/cultural 6

Elective

Anthropology 3

Related Fields

Statistics 3
Approved course 3

Total 45

Consultation with the undergraduate advis t and a faculty ment or in the Department c f An throp lo y is recom me ded each sem ster. The anthrop c y undergr duate advising off ce is located in ANTH 208

Cou se work n anthropol gy compl t d at ther institu tions is eva uated by the undergraduate advisor The Col e of Liberal Arts and Sciences requires that transfer students comp ete at east 12 sem ster hours of upp r division c urse work at ASU n the department of the r major in r ler to b e eligible for graduation.

In ad ition to a cun ulative GPA of 2 0 (or hi h er, all anthrop logy students r ust obta n a minimum gr a le of "C" in all upper ar d o ver d v sion anthropology c ourses and a related fie ds.

Each student s Declarat on of Graduation a d De ree Audit Report, or Program of Study, must be reviewed and approved by the anthropology undergra duate advisor

Introductory, Distribution, and Related Fields Requirements

Consult with an ar th ropo o y ur der raduate a ivisor fo semester course description booklets and sem ster sched ules, which indicate the re ular and omnib s courses being offered. No courses may be used to fulfill mo re th n one Anthropol gy m ajor or minor req irement.

Required Introductory Courses

ASB 2 Intr d ct on to Cultura a d S cial Anthrop logy *SB G*.... . . . 3
ASB 2? Bu ie l C t es and Lo t Tr bes *HU SB G H* . . 3
or ASB 22? Buried Ci zat ons of the Americas *HU SB, G, H*
ASM 101 Bones St n s and Hu a Evolut n *SB* . . . 3

Distribution Requirements

Linguistics

O e c u se ch s n from the f l ing list . . .
ASB 48 In t oduction t Lin t cs *SB* ?
ASB 481 Lan _uage and Cu ture *SB* 3
ASB 483 Soc o inguist cs an l the Ethn g aphy of C mn unicati n *SB* 3

Sociocultural

w courses h sen fro the f ow g t i im mum h o . . 6
ASB 2 ? Ethn Relati ns i th nte l State C l s
ASB 2 Women in Other C tu es *HU SB G* s
ASB 3 Pri c p e f S i Ar thr pol gy *SB* 3
ASB 314 Com parative Re ic 3
ASB 35 Ar th ropol gy an l Art 3
ASB 351 Psych l g a A thr p l y *SB* 3
ASB 353 De th ar d Dy n n Cross Cult ra Perspective *HU SB* 4
ASB 411 Kinsh p nd Soc a Orga i zat on s
ASB 41_ History of Anthropo y *L SB* s
ASB 4 (Econ m A thr p lo y *L SB* s
ASB 417 Polit ca A throp l y s

Archaeology

Tw courses ch sen fro the f win l st m i n fo ns . . 6
ASB 231 Arch aeol o a F e d Method *SG* 4
ASB 326 Hun in In p cts t An t E vir nments *SB, H* ?
ASB s Pri ip e of Ar hae y *SB* s
ASB 3 Preh t y f the S uth we t *SB C H* 3
ASB Pre Hispan C vil zat n of Midd e Amer a *H SB G H* 3
ASB 33 Archae ology of North An e a *SB H*
ASB 361 O d W rd P ehisto _ *H* 3

ASB 362 Old World Prehistory II *H* 3
ASM 338 Anthropological Field Session 2–8
ASM 365 Laboratory Methods in Archaeology 4
ASM 435 Archaeological Pollen Analysis 3
ASM 472 Archaeological Ceramics 3

Physical Anthropology
Two courses chosen from the following list (minimum hours) 6
ASM 246 Human Origins 3
ASM 311 Peopling of the World *SB* 3
ASM 341 Human Osteology 4
ASM 342 Human Biological Variation *SG* 3
ASM 343 Primatology 3
ASM 344 Fossil Hominids *H* 3
ASM 345 Disease and Human Evolution 3
ASM 348 Social Issues in Human Genetics *SB* 3
ASM 452 Dental Anthropology *SG* 4
ASM 454 Comparative Primate Anatomy 4
ASM 455 Primate Behavior Laboratory *L* 3

Geographic Area Courses
Archaeology and Physical Anthropology
One course chosen from the following list* ... 3
ASB 333 New World Prehistory *L SB* 3
ASB 335 Prehistory of the Southwest *SB C H* 3
ASB 337 Pre Hispanic Civilization of Middle America *HL SB G H* 3
ASB 338 Archaeology of North America *SB H* 3
ASB 361 Old World Prehistory I *H* 3
ASB 362 Old World Prehistory II *H* 3
ASM 311 Peopling of the World *SB* 3
Ethnography
One course chosen from the following list* 3
ASB 319 The North American Indian 3
ASB 331 Indians of the Southwest *L SB C H* 3
ASB 332 Indians of Mesoamerica *SB G* 3
ASB 333 Indians of Latin America *SB G* 3
ASB 334 Peoples of the Pacific *G* 3
ASB 335 Peoples of Southeast Asia *G* 3
ASB 485 U S Mexico Border in Comparative Perspective 3

Related Fields (six semester hours)
One lower or upper division statistics course in mathematics, sociology, psychology, political science or history ... 3
One course from a field related to but outside of anthropology chosen with advisor ... 3

Anthropology Elective
Any anthropology course minimum ... 3

Total ... 45

Consult with an anthropology undergraduate advisor for courses not listed above that may fulfill distribution requirements

MINOR IN ANTHROPOLOGY

The Anthropology minor requires 18 semester hours. Two of the introductory courses from ASB 102, ASM 101, and ASB 222 or 223 are required. The particular introductory courses selected may limit the anthropology courses available in the upper division however. The other 12 semester hours must be upper division and represent at least two of the three subfields of anthropology. The three subfields are:

1. sociocultural anthropology (with linguistics),
2. archaeology; and
3. physical anthropology

The courses chosen to represent two of the three subfields must be drawn from the "Distribution Requirements" table, page 346, of those two subfields. A minimum grade of "C" is required for all courses taken for the minor in Anthropology.

The minor in Anthropology provides students with a great deal of flexibility in selecting courses. The program has been designed to allow students to focus on areas within the discipline which articulate well with their major. All students interested in the Anthropology minor are encouraged to discuss the options available with an anthropology undergraduate advisor.

CONCENTRATION IN ANTHROPOLOGY FOR B.I.S. MAJORS

For students pursuing the Bachelor of Interdisciplinary Studies (B.I.S.) degree, a concentration in anthropology requires 24 semester hours. All three of the introductory courses (ASB 102, ASM 101, and ASB 222 or 223) are required. The other 15 semester hours must be upper division and represent two of the three subfields:

1. sociocultural anthropology with linguistics;
2. archaeology; and
3. physical anthropology.

The courses chosen to represent the two subfields must be drawn from the "Distribution Requirements" table, page 346. A minimum grade of "C" is required for all courses taken for the minor in Anthropology for B.I.S. students.

Latin American Studies Certificate or Emphasis. Students majoring in Anthropology may elect to pursue a Latin American Studies Certificate or emphasis, combining courses from the major with selected outside courses of which fulfill Latin American content. For more information see "Latin American Studies," page 338.

Certificate in Museum Studies. See the *Graduate Catalog* or contact the Department of Anthropology for more information

GRADUATE PROGRAM

The faculty in the Department of Anthropology offer programs leading to the M.A. and Ph.D. degrees. See the *Graduate Catalog* for requirements

SECONDARY EDUCATION—B.A.E.

Social Studies. The major teaching field consists of 63 semester hours, of which 30 hours must be in the anthropology courses required for the B.A. degree. Of the remaining hours, two groups of 15 hours are to be taken in related social sciences. Psychology or a single natural science may be used as one of the 15 hour fields. SED 458 is taken to provide the remaining three hours.

SED 480 Special Methods of Teaching Social Studies ... 3
Anthropology ... 30

Literary and Critical Analysis **MA** mathematics **CS** computer science **QT** quantitative approaches **HU** humanities and fine arts **SB** social and behavioral sciences **SG** natural science and technology—general education courses **SQ** quantitative—quantitative courses **C** cultures and civilizations of the United States **G** global perspectives **H** historical perspectives **L** second language proficiency **83**

Social sciences 15
Social sciences, natural sciences, or psychology 15

Total 63

The minor teaching field consists of 24 semester hours in anthropology. Courses ASB 102 and ASM 101 and two upper division courses in each subfield archaeology, physical anthropology, and sociocultural anthropology are required.

For more information, call the Office of Student Services in the College of Education at 480 965 5555.

ANTHROPOLOGY (SOCIAL AND BEHAVIORAL) (ASB)

ASB 102 Introduction to Cultural and Social Anthropology. (3)
fall and spring
Principles of cultural and social anthropology with illustrative materials from a variety of cultures The nature of culture social political and economic systems religion aesthetics and language
General Studies SB G

ASB 202 Ethnic Relations in the United States. (3)
fall and spring
Processes of intercultural relations; systems approach to history of U S interethnic relations psychocultural analysis of contemporary Sethnic relations Lecture discussion Cross listed as AFS 202 Credit allowed for only AFS 202 or ASB 202
General Studies C H

ASB 210 Sex, Marriage, and Evolution. (3)
selected semesters
Examines the sexual nature and behavior of humans from both a biological and an anthropological point of view

ASB 211 Women in Other Cultures. (3)
selected semesters
Cross cultural analysis of the economic social political and religious factors that affect women s status in traditional and modern societies.
General Studies H SB G

ASB 222 Buried Cities and Lost Tribes: Our Human Heritage. (3)
spring
Archaeology through its most important discoveries human origins Pompeii King Tut, the Holy Land Southwest Indians, and methods of field archaeology
General Studies HU SB G H

ASB 223 Buried Civilizations of the Americas. (3)
fall and spring
Archaeology through examination of several ancient civilizations of Mesoamerica South and North America
General Studies HU SB G H

ASB 231 Archaeological Field Methods. (4)
spring
Excavation of archaeological sites and recording and interpretation of data includes local field experience 2 hours lecture 8 hours lab Prerequisite ASM 101 or instructor approval
General Studies SG

ASB 240 Introduction to Southeast Asia (3)
fall
Interdisciplinary introduction to the cultures regions political systems geography and history of Southeast Asia Cross listed as GCU 240 HST 240 POS 240 REL 240 Credit is allowed for only ASB 240 or GCU 240 or HST 240 or POS 240 or REL 240
General Studies G

ASB 242 Asian American Experiences: An Anthropological Perspective. (3)
fall
History and contemporary experiences of Asian Americans in terms of the anthropological concepts of culture ethnicity and adaptation Prerequisite ENG 101 or 105
General Studies L, C

ASB 250 Anthropology Topics. (3)
selected semesters
Covers five areas of anthropological inquiry Emphasizes library research critical analysis and communication skills relevant to upper division anthropology course work. Prerequisites ASB 102 ASM 101 or its equivalent completion of the First Year Composition requirement
General Studies L

ASB 252 Anthropology of Sports. (3)
fall and spring
Cross cultural examination of symbolic and social dimensions of sports past and present

ASB 302 Ethnographic Field Study in Mexico. (3)
summer
Fieldwork study of cultural adaptation Mexican culture United States Mexican cultural contrast, ethnographic research methods and local culture Lecture, discussion, field research Prerequisite SPA 101 or its equivalent

ASB 311 Principles of Social Anthropology. (3)
spring
Comparative analysis of domestic groups and economic and political organizations primitive and peasant societies
General Studies SB

ASB 314 Comparative Religion. (3)
fall and spring
Origins elements forms, and symbolisms of religion a comparative survey of religious beliefs and ceremonies the place of religion in the total culture Prerequisite: ASB 102 or instructor approval

ASB 319 The North American Indian. (3)
once a year
Archaeology ethnology and linguistic relationship of the Indians of North America Does not include Middle America Prerequisite ASB 102 or instructor approval

ASB 320 Indians of Arizona. (3)
selected semesters
Traditional cultures and the development and nature of contemporary political economic and educational conditions among Arizona Indians

ASB 321 Indians of the Southwest. (3)
spring
Cultures of the contemporary Indians of the southwestern United States and their historic antecedents Prerequisite ASB 102 or instructor approval
General Studies L SB C, H

ASB 322 Indians of Mesoamerica. (3)
spring
History tribes and folk cultures Prerequisite ASB 102 or instructor approval
General Studies. SB G

ASB 323 Indians of Latin America. (3)
fall
Indigenous cultures of the Amazon the Andean region Central America and southern Mexico Lecture, discussion Prerequisite ASB 102 or instructor approval
General Studies SB G

ASB 324 Peoples of the Pacific. (3)
selected semesters
Peoples and cultures of Oceania focusing particularly on societies of Melanesia Micronesia, and Polynesia Prerequisite ASB 102 or instructor approval
General Studies G

ASB 325 Peoples of Southeast Asia. (3)
fall
Cultural ecological perspective on the peoples of mainland and insular Southeast Asia Subsistence modes social organization, and the impact of modernization Prerequisite ASB 102 or instructor approval
General Studies G

ASB 326 Human Impacts on Ancient Environments. (3)
spring
World survey of successful and unsuccessful ancient societies and their impacts on the environment
General Studies SB H

ASB 327 Action Anthropology. (3)
fa
Exp ores contemporary ssues and prob em so v ng n Cuna M rone s a, Mayan, and U S Lat no commun t es, through app ed anthropo ogy and commun ty n t at ves

ASB 330 Principles of Archaeology. (3)
fa and spr ng
Methods and theor es for reconstruct ng and exp a n ng the feways of preh stor c peop es Prerequ s te 3 hours n archaeology
General Stud es SB

ASB 333 New World Prehistory. (3)
fa
Var ety of archaeolog ca patterns encountered n the Western Hem sphere Covers the per od from t e appearance of humans n the New Wor d to European contact covers the area from A a ka to T erra de Fuego Prerequ s te. comp et on of the F rst Year Compos t on requ re ment. Pre or coreq s te. 1 upper d v s on ASU course
Genera Stud es L SB

ASB 335 Prehistory of the Southwest. (3)
fa and spr ng
Anthropo og ca under tand ngs of major u t ra processes and events n the pre story of t e Amer can Southwest us ng ev dence from archaeo ogy
Genera Studies SB C H

ASB 337 Pre-Hispanic Civilization of Middle America. (3)
spr ng
Preconquest cu tures and c v zat ons of Mex co The Aztecs Mayas, and the r predecessor Prerequ s te. ASM 101 or nstructor approva
Genera Stud es. HU SB G H

ASB 338 Archaeology of North America. (3)
se ect d semesters
Or g n spread and deve opment of the preh stor c nd ans of North Amer ca up to the h stor c tr be Does not 'nc ude the Southwest Pre requ site ASM 101 or nstructor approva
Gene a Stud es SB H

ASB 350 Anthropology and Art. (3)
once a year
Art forms of peop e n re at onsh p to the r soc a and cu tura sett ng. Prerequ s te ASB 102 or nstructor approva

ASB 351 Psychological Anthropology. (3)
spring
Approaches to the nterre at ons between the persona ty system and t e soc ocu tura env ronment. Prerequis te ASB 102 or nstructor approva
Genera Stud es SB

ASB 353 Death and Dying in Cross-Cultural Perspective. (4)
fa
Human st c and sc ent f c study of ag ng, s ckness dy ng, death, funer a s and gr'ef and the r ph osophy and eco ogy n non Western and Western cu tures 3 hours ecture, 1 hour d scuss on.
Genera Stud es. HU SB G

ASB 355 Shamanism, Healing, and Consciousness. (3)
spr ng
Wor d v ews, practices, and r les of shamans and trad t ona and con temporary hea ers expla atory b opsycho og ca mode s of con sc ousne s.
Genera Stud es HU SB

ASB 361 Old World Prehistory I. (3)
fa
B osoc al evo ut on n the P e stocene emphas z ng techno og ca ach evements and the re at onsh p between techno ogy and env ron ment in western Europe sub Saharan Afr ca. Prerequ s te ASM 101 or n tru tor approva
Genera Stud es H

ASB 362 Old World Prehistory II. (3)
sp ng
Trans t on from hunt ng and co ect ng soc et es to domest cat on econ om es estab shment of sett ed v age fe, emphas z ng the Near East Egypt Southwest Europe Prerequ s te: ASM 101 or nstru tor approva .
Genera Stud es H

ASB 366 African Civilization Before 1850. (3)
fa and spr ng
Afr can cu ture h story and preco on a c v zat on Meets non Western requ rement Lecture d cus on Cros sted as AFS 366 Cred t is a owed for on y AFS 366 or ASB 366
Genera Stud es SB, G, H

ASB 400 Cultural Factors in International Business. (3)
spr ng
Anthropo og ca perspect ves on nternat ona bu ness relat ons app ed pr nc p e of ross cu tura commun at on and management, reg ona approaches to cu ture and bus ness
Genera Stud es. G

ASB 411 K'nship and Social Organization. (3)
se ected semesters
Mean ng and uses of concepts referr ng to k nsh p o sangu n ty aff n ty descent a ance and res dence n t e ontext of a survey of the var et es of soc a groups marr age ru es and k n h p term n og ca systems Prerequ s te 6 hours n anthropo ogy or nstructor approval.

ASB 412 History of Anthropology. (3)
fa
H sto ca treatment of the deve opment of the cu ture concept and ts express on n the ch ef theoret cal trends n anthropo ogy between 1860 and 1950 Prerequ s te ASB 102 or nstructor approva
Genera Stud es SB

ASB 416 Economic Anthropology. (3)
fa
Econom c beh v or and the economy n pre ndustr a so et es, descr pt on and c ass f cat on of exchange systems re at ns between prod ct on, exchange systems and other soc eta subsystems Pre requ s te: ASB 102 or nstr tor approva
Gene a Stud es. L/SB

ASB 417 Political Anthropology (3)
se e ted semesters
Comparat ve exam nat n of the forms and processes of po 't ca orga n zat on and act v ty n pr m t ve peasant and c mp ex s c et es Pre requ s te ASB 102 or nst tor approva

ASB 462 Medical Anthropology: Culture and Hea th. (3)
fa l
Ro e of cu ture n ea th ness and cur ng hea th status prov der relat ons and nd genous hea ng pract ces n Un ted States ethn c groups. Lecture d scuss on
Genera Stud es. C

ASB 466 Peoples and Cultures of Africa. (3)
fa and spr ng
Survey of Afr can peop es and the r cu tures externa ontact and changes Meets non Western requ rement Lecture d uss on Cross l sted as AFS 466 Cred t s a owed for on y AFS 466 or ASB 466.
Genera Stud es. SB, G, H

ASB 471 Introduction to Museums. (3)
fa
H story ph osophy and current status of mu eums Exp ores co ect ng preservat on exh b t on educat on, and resear h act v t es n d f ferent types f museums. P erequ s tes both ASB 102 and ASM 101 or on y str tor approva
Genera Stud es· L

ASB 480 Introduction to Linguistics. (3)
fa
Descr pt ve and h stor ca ngu st s Survey of theor e of human an guage emphas z ng synchron ngu st cs
Genera Stud es. SB

ASB 481 Language and Culture. (3)
spr ng
App es l ngu st c theor es and f nd ngs to non ngu st c aspects of cu ture anguage change psy ho ingu st cs. Prerequ s te ASB 102 or nstructor approva
Genera Stud es SB

L te a y and r t ca nqu ry **MA** n athemat **CS** m ute tat t q ant tat ve app cat on **HU** huma t d f e a t **SB** oc a d behav a e ce **SQ** natura s e ce—ge era r ur es **SQ** natura sc en e—q a t tat ve **C** cu tu a d vers ty n t e n t d States **G** g oba H h st a S e Genera Stud e age 3

ASB 483 Soc o inguistics and the Ethnography of Communication. (3)
se ected semeste s
Re at onsh ps between ng st c and soc a categor es funct ona ana ys s of anguage u e ma ntenan e, and d vers ty nteract on between verba and nonverba commu cat on Prerequ s tes both ASB 480 and ENG 213 or FLA 400 or on y n tructor approva
Genera Stud es SB

ASB 485 U.S.-Mex'co Border n Comparative Perspective. (3)
spr ng odd years
Exp ore the mu t cu tura a d s c a d mens ons of comm n t es a ong the U S Mex o border emphas z ng soc a organ zation m g at on cu ture, and front er deo ogy Prerequ s te 6 hours n anthropo ogy or struct r approva

ASB 501 App ied Medical Anthropology. (3)
fa
Overv ew of anthrop gy s app cat ons n med ne and ts adapta t n to U S ethn c popu at ons Req res research project n med ca ett g e ture e nar Prerequ s te grad ate stand g or nst u tor approva

ASB 502 Health of Ethnic M norities. (3)
spr ng
Preva e ce f ness r sk f ctors hea th eco ogy and med ca and nd genous treatme ts Le t re, sem ar Prereq s te. graduate stand ng or n tructo appr va

ASB 503 Advanced Med cal Anthropology. (3)
fa
Theory n med ca anthrop ogy a d cross cu tura stud es that s trate part cu ar theor e Lecture em nar Prerequ te graduate stand ng or nstru t r approva

ASB 504 Ethn c Relations. (3)
fa
Structura processes of ntergro p re at ns methods fo nvest gat ng psycho u tura d men ons of et n c ty w t focus upon S ethn c groups Lecture sem nar Prerequ s te graduate stand ng r nstructor app va

ASB 506 Gender, Emot ons, and Culture. (3)
sp ng
Re at o sh p amo g gen er and em t on a ross u t res Lectu e sem nar Prerequ te grad ate stand ng or n tructor app va

ASB 529 Culture and Pol tical Economy. (3)
s ected semesters
Or g n and s ead f Weste n ap ta m and ts mp t on non West ern soc et es t zes ethn graph and h stor al ase stud es Pre requ s te graduate ta d ng

ASB 530 Eco og ca Anthropology. (3)
o e a year
Re at ons am ng the p pu at on ynam cs soc a org n zat on, cu ture and e v ronment of human popu at ons w th spe a emphas s on hunter gatherers a d exte ve agr u tura st

ASB 532 Graduate Fie d Anthropology. (2–8)
spr ng
dep ndent research on a spec f c anthropo og c prob em to be se ected by the student consu tat on w th t e t ff May be repeated for cred t Prerequ s te. ASM 338 or ts equ va ent nstructor app ova

ASB 536 Ethnohistory of Mesoamer ca. (3)
e ected semesters
nd genous so et es of o the n Mex co and Guatema a at pan sh co tact a d the r p t onquest tran for at on. Emphas zes the Azte Emp re Prerequ te g aduate stand ng

ASB 537 Topics in Mesoamerican Archaeo ogy. (3)
se ected semeste s
Exp ores ch ng ng organ zat on f pre C umb an c v zat ons n Mesoamer ca through nterp et ve ssues s ch as reg na ana ys s ch efdoms urb n sm and ex hange Prerequ s te nstructor approva

ASB 540 Method and Theory of Sociocultural Anthropo ogy and Archaeology (3)
fa
Bas ssues con ern ng on pts of soc a and et n c groups c tura a d soc o og ca theory and the nat re of anthropo og a research Prerequ s te st tor approva

ASB 541 Method and Theory of Social and Cultural Anthropology. (3)
spr ng
Cont nuat on of ASB 540. Prerequ s te ASB 540 or nstructor approva

ASB 542 Method and Theory of Archaeology I. (3)
spr ng
Mode s of human evo ut on cu ture change and nterpretat on of hunter gatherer and tr ba soc et es ceram c th c and fauna mater a s Prerequ s te. nstr ctor approva

ASB 543 Method and Theory of Archaeology II. (3)
fa
Covers concepts of soc a comp ex ty a ong w th economy demogra phy and soc a dynam cs, fo owed by archaeo g ca research des gn Prerequ s te nstructor approva .

ASB 544 Sett ement Patterns. (3)
se ected semesters
Spat a arrangement of res dences act v ty s tes and ommun t es over and cape Emphas zes nat ra and cu tura factors nf uen ng sett ement pattern Prerequ s te nstructor approva

ASB 546 Pleistocene Prehistory. (3)
fa
Deve opment f oc ety and cu ture n the O d Wor d dur ng the P e s t cene epoch emphas z ng techno og ca change through t me and the re at onsh p of peop e to the r env ronment Prereq s te ASB 361 r ts equ va ent

ASB 547 Issues in Old World Domestication Economies. (3)
spr ng
Archaeo og ca ev dence for trans t on n O d Wor d subs stence econom es from hunt ng and gather ng to depe dence n domest cated p ants and an ma s Pre equ s te ASB 362 or ts equ va ent

ASB 550 Economic Archaeology. (3)
se ected semesters
Preh stor c econom es n hunter gatherer tr ba and comp ex soc et e Covers ubs stence strateg es craft pr duct on and spec a zat on and exchange Prerequ s te. nstruct r approva

ASB 551 Prehistoric Diet. (3)
se ected semesters
Cr t ca rev ew of techn ques for recover ng d etary nformat on and theoret ca mode s o cerned w th exp a n ng d et and n tr t n Pre requ s te nstructor approva

ASB 555 Comp ex Societ es. (3)
spr ng
Exam nes structura var at ons n h erarch ca y organ zed soc et es a ong w th or g ns dynam cs and co apse Sem nar

ASB 559 Archaeology and the Ideational Realm. (3)
se ected semesters
Po tprocessua and other v ews concern ng re evance of menta phenomena for understand ng soc ocu tura hange Var ous approaches to nferr ng preh tor mean ngs

ASB 563 Hunter Gatherer Adaptations. (3)
se ected emesters
Evo ut on of preh sto c hunter gatherer soc et es n the O d and New Wor ds from the m st anc ent t mes through protoh stor c ch efdoms Prerequ s te nstructor approva

ASB 567 Southwestern Archaeology. (3)
spr ng
Broad coverage of Southwestern u tura deve opments focus ng on current debates and r g ous use of archaeo og ca data n mak ng cu tura nferences

ASB 568 Intrasite Research Strategies. (3)
fa
Researc ssues w th n a s ng e s te context Top cs nc ude quant ta t ve spat a ana ys s s te def n t on samp ng d str but ona ana ys s and substant ve nterpretat on

ASB 571 Museum Pr nc'ples. (3)
fa
H story ph osophy and curre t status of muse ms. Exp ores co ect ng preservat on exh b t on educat o and re earch act v t es n d f ferent types of museums Prerequ s tes both ASB 102 and ASM 101 or on y nstructor approva

ASB 572 Museum Co lect'on Management. 3)
spr ng
Pr nc p es and pract ces f acqu s t on do umentat n care a d se of museum co ect ons reg st a' n, ata og ng and preservat methods ega and eth ca ssues Prereq te ASB 571 o st u tor app ova

ASB 573 Museum Administrat on. (3)
spr ng
Forma orga zat n and anagement f museum . governance per s nne matters fund ra s g and grantsm nsh p, ega and eth a ssues P erequ s te ASB 571 r nstruct ppr va .

ASB 574 Exhibition Planning and Des gn. 3)
spr ng
Exh b t on ph osoph es and deve opment processes of p ann ng, des gn ng stag ng nsta ng eva at ng and d assemb ng tempo rary and ong-term exh b ts Prerequ tes b th ASB 571 and 572 r on y nstructo app ova

ASB 575 Computers and Museums. (3)
fa
Bas cs of museu computer app at n hardware a d softwa e fundamenta s of database manageme t s ues of research co ect ons management and adm n strat n

ASB 576 Museum Interpretation. 3)
fa
Processes of p ann ng mp ement ng document ng and eva uat ng educat ona program n museums for var ed aud ences ch dren adu ts and spec a nterest groups Lecture d s uss on Prerequ s te ASB 571

ASB 577 Principles of Conservation. (3)
spring
Preservat on of museum b ects nature of mate a s, env ronmenta co tro s and causes f degradat on re g z ng pr b ems, damage and so ut ns, proper care f obje ts. Prerequ s tes both ASB 571 and 572 or on y st tor approva

ASB 579 Crit'ca Issues in Museum Studies. (3)
fa
Current debates f museum pra t ce from an anthropo og ca perspec t ve Addresses ssues f co ect n presentat on authent c ty, a d auth r ty Sem nar Prerequ s te ASB 571 or nstructor approva

ASB 591 Seminar. (1 12)
se ected semesters
Se ected top cs n archaeo ogy ngu st cs, and soc a cu tura anth o po ogy Top cs may nc ude the f ow ng
- Archae og ca Ceram c 3
- Archaeo gy of North Amer ca 3
- Cu tura Anthropo ogy 3
- Cu ture and Pers na ty 3
- Ev ut on and C ture 3
- H st r ca Archaeo ogy. 3
- nterdepartmenta Sem nar 3
- Language and Cu ture 3
- L ngu st cs 3
- Museum Stud es 3
- Prob ems Southwestern Archaeo gy 3
- Prob ems n Southwestern Ethn gy 3
- Soc a Anthropo ogy 3

Omnibus Courses. For an exp anat on of u ses offered but not spec f ca y sted n th s cata og see O n bus Co rses page 56

ANTHROPOLOGY (SCIENCE AND MATHEMATICS) (ASM)

ASM 101 Bones, Stones, and Human Evolution. (3)
fa and spr ng
Phys ca anthrop gy and archae ogy Ev dence and pro esses f human evo ut on and of cu ture ha ge Pr mates Foss hom n ds and the r too s Race var at on and hered ty Env ronment and human b o ogy Preh sto c cu ture and s c ety Corequ s te ASM 103
Genera Stud es SB SG f cred t a s earned n ASM 103

ASM 103 Bones, Stones, and Human Evolution Laboratory. (1)
fa and spr ng
Ha ds on b ratory exerc ses addres ng h man b o og ca va at on evo ut onary me han sms n nhuman and human pr mate m rpho ogy and behav or and the fos record b exer ses sma -group d s uss on Corequ s te ASM 101
Genera Stud es SG f cred t a so earned n ASM 101

ASM 241 B ology of Race. (3)
fa and sp ng
Huma var at n and ts nterpretat on n an evo ut onary context

ASM 246 Human Or gins. (3)
fa
H st ry f d scover es and chang ng nterpretations of human evo u t n Ear est ancestors t emergence f modern humans Human ty s p ace at re

ASM 248 Bioarchaeo ogy of Cannibalism, Violence, and Social Pathology. (3)
spr ng
Wor dw de rev ew of c a ms of severe y abn rma behav or n preh s-tory ba ed n per mortem b ne tap onomy ana ogues and c mpara t ve case e ture, as demo strat n

ASM 301 Peop ing of the World. (3)
spr ng
Rev ew a ev dence f r human d spersa dur ng the ast 1 0 000 years or g ns of anguage cu tures races, and beg nn ngs of modern humans Prerequ s te ASM 101
Genera Stud es SB

ASM 338 Anthropo ogical Field Session. (2–8)
spr ng
Anthropo og a f e d techn ques ana ys of data and preparat on of f e d ep ts May be repeated for cred t Prerequ s te nstructor approva

ASM 341 Human Osteology. (4)
fa
Osteo gy, human pa eonto ogy and osteometry Descr pt on and ana ys s f archaeo og ca and c ntemporary human popu at ons 3 hours e ture 3 h urs ab Prerequ s te ASM 101 o nstructor approva

ASM 342 Human Bio ogical Variation. (4)
sp ng
Ev ut onary nterpretat ons of b o og ca var at on n v ng human pop-u at ons w th emphas s on anth po og ca genet cs and adaptat on Nutr t on and d ease a d the r re at n to genet cs and behav or 3 hours ecture 3 hours ab Prerequ tes both ASM 101 and MAT 106 or ts equ va ent or n y nstr ctor approva
Genera Stud es. SG

ASM 343 Primatology. (3)
fa
Evo ut on and adaptat ons f n human pr mates emphas z ng socia behav or nc ude mater a from foss ev dence and f e d and abora-tory stu es behav r and b o ogy Prerequ s te ASM 101 or nstruc t r approva

ASM 344 Foss'l Hominids. (3)
on e a year
Anc ent Afr an As an and European human and pr mate ske eta denta and cu tura rema ns Human b o og ca , behav ora and cu tura evo ut on Prerequ s te ASM 101 or nstruct r approva
Genera Stud es H

ASM 345 Disease and Human Evolution. (3)
fa
nte act on of peop e and path gens fr m preh stor c t mes to the pre ent, w th emphas s d sease as an agent of genet c se ect on Pre equ s te ASM 101 or str tor approva

ASM 348 Soc'a Issues 'n Human Genetics. 3)
spr ng
Mora and soc a mp cat ons f deve opments n genet c ence par-t cu ar y as they affect reprodu t on med c e and evo ut on
Ge era St d es SB

L tera y a d r t a nqu ry **MA** mathemat cs **CS** c mputer stat st cs q a t tat ve app cat **HU** uma t e nd f ne arts **SB** oc a and beha ra ence **SG** atu a s en ge era co e ur es **SQ** at ra ence qua t tat e **C** u tura d vers ty n t e Un te State **G** g ba H h st r a Se Genera Stud es pag 83

ASM 365 Laboratory Methods in Archaeology. (4)
se ected semeste s
Techn ques f art fact ana ys Bas c ar t aeo og ca re earch tech n ques method of repo t wr t ng May be repeated for red t for tota of 8 h urs Prerequ s te· A M 01 o nstruct r approva

ASM 435 Archaeological Pollen Analysis (3)
se ected emesters
heory met odo gy and pra t e f po e an yt c techn que Com pares u e n botany geo ogy and ar haeo ogy 2 hour ecture hours ab pos b e f e d tr p Prerequ te nstructor appr va

ASM 448 Geoarchaeology. (3)
fa and spr ng
Geo og c ntext re evant to arc aeo og a research Top cs nc ude sed ment , depos t on env r nments o anthropogen c and b o gen c dep ts nd quate nary h ono ogy Lecture d s u s on f e d exper ences P e equ s tes ASB 22 r 223 or GLG 101 or 103 or GPH 111 n tructor approva

ASM 450 Bioarchaeology. (3)
spr ng
Surveys arc aeo g ca and phys a anth rop og a method a d theor es for eva uat ng ske eta and bur a ema ns to reconstruct b o cu tu a daptat on and feways Prerequ te ASM 101 or n tru tor approva

ASM 452 Dental Anthropology (4)
fa
Huma a d pr mate denta morpho ogy growth evo t o and genet cs W th and between group var at on Denta pat o ogy and behav ora c tura d etary factors 3 ho ecture 3 h urs ab. P e requ te st t r appr va
Genera Stud es SG

ASM 454 Comparative Primate Anatomy. (4)
spr ng
F nct ona a atomy of the cran a denta and ocomot r apparatus of pr mates nc ud ng uman emphas z ng the re at on of morph ogy to behav or and env r ment 3 hour ecture 3 h u s ab d sect ons de n trat on Prerequ te nstru tor approva

ASM 455 Primate Behavior Laboratory (3)
se e ted semeste s
nstruct on and pract e n methods of bservat on and ana ys s of pr mate behav or D s u s on f the re at onsh p between c a s w rk on apt ve an ma s and f e d techn que for study ng f ee rang ng groups D e ted read ngs 6 hours ab Prerequ tes ASM 343 n tru tor app ova
Genera Stud es L

ASM 456 Infectious D'sease and Human Evolut on. (3)
once a year
Study of nfe t ous d sease and human ty u ng ev dence f m anthro po o y h story med c ne and nc ent ke eto s P erequ s te ASM 345

ASM 465 Quantification and Ana ys s for Anthropologists 3)
spr ng
Stat st ca quant tat ve and geomet c tr teg e for env s on ng and exp or ng ar haeo og ca phys ca anthropo og ca b oarc ae g a and soc oc tura data n var ate and m t var ate methods Pre equ s tes ntroducto y tat st a urse nstr cto approva

ASM 472 Archaeological Ceramics. (3)
se ected emesters
A a ys s and dent f cat n of p ttery ware type and var et es Sys tems for ceram c c ass f cat on and u t ra nterpretat on 2 hour e ture hour ab P erequ s te nstru t r approva

ASM 548 Geoarchaeology. (3)
fa
Geo og c context re eva t to archaeo og ca re earch T p cs n ude sed ments depos t on env ro ments o s anthropogen c and b o gen c dep s ts and quaternary c ro ogy P erequ s te n tructor approva

ASM 555 Advanced Human Osteology. (3)
se e ted semesters
Laboratory a d f e d techn q e n dea g w th the hun an ske eton Emphas zes preparat on dent f cat n rad ography sect on ng m croscopy, and data p ess ng 1 h ur ecture 6 h u s ab Prereq u s te. ASM 341 or nstructor ap rova

ASM 565 Quant tative Archaeology (3)
spr ng
Forma meth d of structur n o fy g a d ana yz ng data fo a ae og a pr b ems Des gn ng resear h t y e d data amenab e to prod t e a ay s s

ASM 566 Advanced Top cs in Quant tative Archaeology. (3)
fa
Archaeo og a s ue a soc ated w th ua t tat ve a ay s s e g Bayes an nd Monte Car o approac e s m at d vers ty May be repeated for red t Prerequ te ASM 565 or nstructo approva

ASM 573 Lithic Analysis. (3)
se e ted sem sters
An ys s and terpretat on of c pped stone art fa ts Focu es on both te hn ques and under y ng concepts and the r app cat on t rea e t ons Prere u te nstr ctor pprova

ASM 591 Seminar (1 12)
e ected semeste s
Se ected top s ar ae gy and p ys ca anthropo ogy Top s may nc ude t e fo ow g
- B oarchaeo ogy 3
- Evo t on and C ture 3
- nterdepartmenta em nar 3
- hy ca Anthrop gy 3
- Pr mate and Behav or 3

Omnibus Courses. For an exp anat on of cour es offered but n t pe f ca y sted n th cata og ee Omn bus C urse page 56

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480 965-3571
LSC 226

James P. Collins, Chair

Regents' Professors: A cock Ma ensche n

Professors: Capco Chand er Church Co ns, Dow ng E ser Faeth F sher Gr mm Haze Hedr ck Lawson McGaughey, Moore Ohmart. Pyne Rutowsk Satter e, Sm th, Wa sberg

Associate Professors: Dev che Fewe , Fouquette, Go dste n. Harr son Orch n k

Assistant Professors: DeNardo. Fagan, Gerber Hofmann K nz g Kumar Laub cher Lorson, Newfe d Raw s, Sabo W son Raw s

Senior Research Professional: Kaz ek

Research Professors: Dav dson, Pearson

Assistant Research Professors: Hope, Neuer

Assistant Research Scientist: Lyubchenko

Curator of Collections: Doug as

BIOLOGY—B.S.

Tl e major ir Biolo y cons sts of a r nimum of 33 s m ester hours n biolo y, and a minimun of 2(seme ter

hours in related fields, plus a three semester hour mathematics proficiency. Required major courses are as follows:

BIO 157 General Biology I *SQ* . . . 4
BIO 158 General Biology II *SQ* . . . 4
Choose one of the courses below 3–4
BIO 370 Fundamentals of Ecology 3
BIO 381 Animal Behavior 3
BIO 370 Vertebrate Zoology 4
BIO 385 Comparative Invertebrate Zoology 4
MIC 222 Biology of Microorganisms 3
PLB 323 Comparative Plant Diversity *LSG* 4
BIO 340 General Genetics 4
BIO 345 Organic Evolution 3
Choose one of the courses below 3–4
BIO 351 Developmental Anatomy 3
BIO 355 Cell Biology 3
MIC 360 Bacterial Physiology 3
PLB 323 Plant Physiology 4

Total 12–25

The remaining hours (from 10–12) to bring the total to 37 are selected from among upper division courses, approved for major credit, in BIO, MIC, PLB, and approved BCH courses, in consultation with a Department of Biology advisor. The major must include at least three upper division laboratory courses. Required courses in related fields plus math proficiency are as follows:

CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* . . . 5
Choose between the combinations of organic chemistry courses below . . . . . 4 or 8
CHM 231 Elementary Organic Chemistry *SQ* 3
CHM 235 Elementary Organic Chemistry Laboratory *SQ* 1

CHM 331 General Organic Chemistry 3
CHM 332 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory 1
CHM 336 General Organic Chemistry Laboratory 1
MAT 251 Calculus for Life Sciences *MA* 3
or MAT 213 Brief Calculus *MA* 3
or any other calculus
STP 226 Elements of Statistics 3

Total . . . . . 23 or 31

Both CHM 231 and 235 must be taken to secure SQ credit.
Both PHY 221 and 223 or PHY 231 and 233 must be taken to secure SQ credit.

CONSERVATION BIOLOGY—B.S.

The major in Conservation Biology consists of a minimum of 37 semester hours in the required major courses and a minimum of 16 hours in related fields, plus a three semester hour mathematics proficiency. Required courses are as follows:

BIO 157 General Biology I *SQ* . . . 4
BIO 158 General Biology II *SQ* . . . 4
BIO 317 Conservation Biology . . . 3
BIO 327 Fundamentals of Ecology 3
BIO 334 General Genetics 4
or BIO 341 Genetic Analysis 5
BIO 360 Animal Physiology . . . 3
BIO 410 Techniques in Wildlife Conservation Biology *L* 3
BIO 411 Advanced Conservation Biology I . . . 3
BIO 412 Advanced Conservation Biology II . . . 3

Total . . . . . 36 or 37

The remaining hours to bring the total to 37 are selected from among relevant upper division courses in BIO and PLB courses or in related departments, in consultation with a Department of Biology advisor. Required courses in related fields plus math proficiency are as follows:

CHM 113 General Chemistry *SQ* . . . 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* . . . 5
Choose between the combinations of organic chemistry courses below . . . . . 4 or 8
CHM 231 Elementary Organic Chemistry *SQ* 3
CHM 235 Elementary Organic Chemistry Laboratory *SQ* 1

CHM 331 General Organic Chemistry 3
CHM 332 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory 1
CHM 336 General Organic Chemistry Laboratory 1
MAT 251 Calculus for Life Sciences *MA* 3
or MAT 213 Brief Calculus *MA* 3
or any other calculus
STP 226 Elements of Statistics . . . 3

Total . . . . . 19 or 23

Both CHM 231 and 235 must be taken to secure SQ credit.

Concentration in Biology and Society

The major in Biology with a concentration in biology and society is intended for students with a strong interest in life sciences and in the interaction between life sciences and the society within which science is done. This option consists of a minimum of 44 semester hours in life sciences and societal interface courses and 12 hours in related fields, plus a three semester hour mathematics proficiency. Required courses are as follows:

BIO 157 General Biology I *SQ* . . . 4
BIO 158 General Biology II *SQ* . . . 4
BIO 311 Biology and Society . . . 3
BIO 327 Fundamentals of Ecology . . . 3
or BIO 345 Organic Evolution 3
BIO 334 General Genetics . . . 4
or BIO 341 Genetic Analysis 5
BIO 415 Research Colloquium in Biology and Society *L* . . . 3
BIO 484 Internship . . . 3
or BIO 490 Honors Thesis *LHU* 3
or BIO 495 Undergraduate Thesis
or BIO 499 Individualized Instruction
Approved hours in research 3

Literacy and Quantitative Analysis **MA** Mathematics **CS** Computer Statistics **QU** Quantitative Approaches **HU** Interdisciplinary Arts and Humanities **SB** Social and Behavioral Sciences **SG** Natural Sciences and Technology **SQ** Natural Sciences and Technology **L** Global Perspectives **H** Historical Perspectives page 8

MAT 251 Calc us for Life Scie es *MA* 5
or MAT 21 Brief Cal ulus *MA* 3
r any other calculu

Tota 37

The remaining courses to complete the major a e deter mined by the student in consultation with a Departi ent of Biology advisor and must be distr buted in the fo w ing areas.

1. 12 hours of upper divisiot electives from B O, MIC, PLB;
2. 12 hours of upper division interface courses from an approved list. At least three semester hours in each of these areas: ethics, h story and pl ilosophy of sci ence, and contemporary societal issues.
3. 11 hours of phys c al sciences (CHM recon n ended · and
4. three to four hours of an approved course n statis tics.

MINOR IN BIOLOGY

The Bio ogy minor consists of 24 semester ho irs i clud ing BIO 187 General B ol ogy I and BIO 188 Ceneral Biol ogy II, and 16 hours selected with appr val of a idviso in the Department of Biol ogy, at least 12 hours must be it the upper division. Courses not available for cred t n the L fe Sciences major BIO MBB MIC and PLB cannot be used for the minor (e.g., BIO 100 The L ving W rld and BIO 201 Human Anatomy and Physiolo). This n inor s nct a ail able to students majoring it the life sciences.

SECONDARY EDUCATION—B.A.E.

Biological Sciences. The i ajor te aching fie d consists of a minimum of 40 semester hours and at least 22 hours in sup portino courses. Required ma or courses are as follows

BIO 187 General Biolo y I *G* ... 4
BIO 188 General Biol gy II *Q* ... 4
BIO 320 Fundamer tal of Ecol y s ... 3
BIO 340 Genera Ge etics ... 4
or BIO 34 Ge etic Analy is 5
BIO 345 Organic Ev l t on ... 3
BIO 36 Anima Phys ol gy ... 3
BIO 37 Vertebrate Z ol gy ... 4
or BIO 385 Co pa at v Inverteb ate Z gy 4
or PLB 300 Comparative Plant D vers ty *LSG* 4
or PLB 311 The Fl ra of Ar z na 4
MIC 205 Mi ob ol ogy *SG*. 3
or MIC 222 Bi o y of Micro rgan m 3
MIC 206 M ob ol gy Laboratory *SG* 1
PLB 338 P ant Physi o y ... 4

Total ... 36 to 34

* Both MIC 2 5 a d 2 6 n st be taken t s ure SG cr t

The remaining c urses in the major six hours n inim um should be selected to reflect a ba ance between BIO MIC, and PLB course Required supporting c urses are as fo lows:

B O 316 H st ry of B lo y C fl ct and Contr versies *H* ... 3
r HPS 33 Hist y of Biol gy Confli ts a d C ntr versies *H* 3
CHM 1 3 G n ra Cl e n try *SQ* ... 4
CHM 115 Genera Cl er str w th Qua tati e Ana ysis *SQ* ... 5
CHM 116 Gen ra Che n str *SQ* 4
GLG 1 5 ntroducti n t Ge ol g I Histor ca *SG, H*. ... 3
or CLG 3 Ge g ol Ar z a 3
MAT 17 Pre al ulus *MA* ... 3
PHY 1 Intr du t n to Physics *SQ* ... 4
r PHY 111, Cenera Physic *SQ** 6
nd PHY 1 s, 114 Ceneral Phys s
Laborato *SQ* *

M n m tota ... 44

Both GLG 1 3 an 4 ust be taken t sec r SG red t
Both PHY 111 nd 3 or PHY 112 a d 1 4 must be taken t secur SQ cred t

BIO 480 Methods of Teaching Bi logy and BIO 482 Advanced Methods of Teaching Biology are required in the professional education pro ram

Th e minor teach n_ field consists of 24 eme ter hours as fc llows: BIO 187 188, 16 additional hours n BIO MIC, and PLB courses elected to r flect a balance across the dis ciplines and subdis pli es in b ology B O 480 is required in ad i t on t> the 24 semeste hours in biologic s sc ences

GRADUATE PROGRAM

The fac t y in the Depart n e t of Biology offe programs leadino to the degrees of Master of Natura Science, M S , and Ph D. w th a con entr ation in ecology for the M.S. and the Ph D. . See the *Gr id iate Catal g* for requirements.

The department participates in the nterd sc plinary pro gran for the M.S. and Ph D degrees in Mo ecular and Cel ilar Bio ogy. See the *Gr iduate C at g* for more informa t on

Departmental Assessment. The Department of Biology works continuously on assessing and improving the effec tiveness of its academic programs. To accomplish this, the department conducts, coord nates, and n anages research des gned to measure the degree to v h ch courses, curricula, and academic programs impart knowledo to students Th's research is cond cted throu h student surveys, inter ews, review of student rec rds, and other common educat ona research methods. Th e esults of these studies, or assess ments, are used tc enhance the intel ectual integrity of a Departn ent of Biology ed ication

BIOLOGY (BIO)

BIO 100 The L ving World. (4)
fa spr g summ
Pr nc p es of b o ogy a not be u ed for majo cred t the b o og ca enc 3 hours ect re 3 h urs ab
Genera Stud es SQ

BIO 120 Human Physiology. (4)
se ected semeste s
D scus es bas c concepts of genera s ence ng urrent sues a d bas o cepts of h man phy ogy a a fo u Ca not be used for ma o red t b o og a sc ences 3 h r ectu e 3 hours ab
Ge era Stud es SG

BIO 187 General Biology I. (4)
fa spr ng summer
B o og ca concepts emphas z'ng pr nc p es and nterp ay of structure and funct on at the organ sma popu at on and commun ty eve s. nc udes eco ogy evo ut on Lecture ab. Prerequ s te fe sc ence or hea th-re ated sc ences major
Genera Stud es SG

BIO 188 General Biology I . (4)
fa spr ng summer
B o og ca concepts emphas z ng pr nc p es and nterp ay of structure and funct on at the mo ecu ar ce u ar and organ sma eve s, nc udes genet cs ce b o ogy phys o ogy. Lecture, ab. Prerequ s te BIO 187 recommended
Genera Stud es. SQ

BIO 193 The Nature of Biological Science. (4)
se ected semesters
Creat ve and cr t ca th nk ng sk s n b o og ca research nature of b o og ca know edge ro e of exper mentat on pred ct ons hypotheses theor es va ues Lecture ab d scuss on. Fee Prerequ s te h gh schoo b o ogy
Genera Stud es SQ

BIO 201 Human Anatomy and Physiology I. (4)
fa spr ng summer
Structure and dynam cs of the human mechan sm Cannot be used for major cred t n the Department of B o ogy 3 hours ecture 3 hours ab
Genera Stud es' SG

BIO 202 Human Anatomy and Physiology II. (4)
fa , spring, summer
Cont nuat on of B O 201 Cannot be used for major cred t n the Department of B o ogy 3 hours ecture 3 hours ab Fee Prerequ s te B O 201 or nstructor approva

BIO 218 Medical History. (1)
se ected semesters
Br ef urvey of humank nd s mportant nvent ons and d scover es n the art and sc ence of med c ne ustrat ng nterre at onsh ps of med ca deas.

BIO 241 Human Genetics. (4)
fa
ntrodu es bas c oncepts n ge et'cs as they are app ed to human hered ty Cannot be u ed for major cred t n the Department of B o ogy 3 hours ecture, 3 hou s ab Prerequ s te· a course n the fe sc ences
Genera Stud es SG

BIO 300 Natural History of Arizona. (3)
se ected semesters
P ant and an ma commun t es of Ar z na Cannot be used for major cred t n the b o og ca c ences Prerequ s te jun or stand ng

BIO 301 Fie d Natural History (1)
se ected semesters
Organ sms and the r natura env ronment. Cann t be used for ma or cred t n the b o og ca sc ences 2 weeke d f e d tr ps, f e d project Fee Pre or corequ s te B O 300

BIO 302 Cancer and Heart Disease. (3)
fa
nc dence and morta ty stat st cs for cancer and heart d sease host and env ronmenta r sk factors d ag os s, treatment and prevent on strateg es Cannot be counted toward a B ology major Prerequ s tes a comb nat on of CHM 231 or ts equ va ent and 12 hours n fe ences and a Genera Stud es L course or on y nstructor approva
Genera Stud es L

BIO 303 Radiation and Life. (3)
spr ng
Benef ts and r sks of ad at on exposure n soc ety med ca app a t ons food rrad at on nuc ear power so ar UV popu at on hea th effects Cannot be counted toward a B o ogy major Prerequ s tes a comb nat on of CHM 231 or ts equ va ent and 12 hours n fe sc ences and a Genera Stud es L course or on y nstructor approva
Genera Stud es L

BIO 304 Radiation Medicine and Biology. (3)
fal
Uses of rad at on n med c ne nc uding CT d agnost c x rays MR , nuc ear med c ne u trasound b o og ca effects of rad at on w th emphas s on cancer Prerequ s tes a comb nat on of PHY 112 and 12 hours n fe sc ences and a Genera Stud es L course or o y nstruc tor approva
Genera Stud es· L

BIO 310 Spec al Problems and Techniques. (1 3)
fa and spr ng
Qua f ed undergraduates may nvest gate a spec f c b o og ca prob em under the d rect on of a facu ty member May be repeated for a tota of 6 semester hours Prerequ s tes forma conference w th the nstructo app va of the prob m by the nstructor and department cha r

BIO 311 Biology and Society. (3)
spr ng
Exp ores nteract ons between b o og ca sc ences and oc ety e g b omed ca env ronmenta eth ca h stor ca ega ph osoph ca po t ca and oc a ssues Lecture d scuss on Cross sted as HPS 340 Cred t s a owed for on y B O 311 or HPS 340 Prerequ s tes both B O 187 and 188 or on y B O 193 or 100

BIO 316 History of B ology: Conflicts and Controversies. (3)
se ected semesters
Focuses on 19th and 20th centur es cons der ng b o ogy as a d sc p ne Evo ut on prob ems of hered ty deve opment and ce theory Cross sted as HPS 33 Cred t s a owed for on y B O 316 or HPS 330
Genera Stud es H

BIO 317 Conservation Biology. (3)
fa
Sc ent f c and techn ca mean for management ma ntenance protec t on and rest rat on of b o og ca reso rces on th s p anet Prerequ te 8 hours n b o ogy.

BIO 318 H'story of Med cine. (3)
o ce a year
Sc ent f c study of the human body cha g ng theor e of d sease evo ut o of pract ca op s on treatment and the emerg ng n t tut n a zat n of med ca pract ce Cro s sted as HPS 331 Cred t s a owed for on y B O 318 or HPS 331
Genera Stud es H

BIO 319 Environmental Sc ence (Nonmajor). (3)
fa
Env o menta and b g a concepts used t understand eco og a systems w th spec f c fe ences to p ems ca sed by humans Cann t be used for major cred t n t e b o og ca sc ences Cross sted as PLB 20 Cred t s a owed f r on y B O 319 o PLB 320
Genera Stud es G

BIO 320 Fundamentals of Ecology. (3)
fa and spr ng
Organ zat on funct on g a d deve pment of eco og ca systems energy f ow b oge chem a cyc ng env r nmenta re at ons popu a t on dynam c Prerequ s te B O 187 or nstructor approva

BIO 321 Introductory Ecology Laboratory. (3)
once a year
Laboratory and f e d observat ns and exper ments to test urrent con cepts and theor es n e o ogy. Lab Fee Pre or orequ te B O 320.
Genera Stud es· L

BIO 331 Animal Behavior. (3)
fa
Evo ut onary genet c phys o og a , and eco og ca bases of an ma behav or Prerequ s te B O 187 or ts equ va ent

BIO 336 Sociobiology. (3)
se ected semesters
Survey of an ma and human soc a be av o exam ned f om an evo u t nary perspect ve Su tab e for nonm rs Prerequ te B O 331 ec ommended

BIO 340 General Genetics. (4)
fa pr ng summer
Sc ence of hered ty and var at o 3 hou s ecture 1 hour rec tat on Prerequ s te. B O 187

L teracy a d t c nq y **MA** mathemat **CS** co puter stat st s quant tat ve app at **HU** h m n t e and f e art **SB** c a and behav ora enc **SG** natura sc en e ge e a e u e **SQ** atura ence q ant tat ve **C** c t ra d ve ty n the n ted States **G** g ba **H** st r a See Genera Stud e pa e 3

BIO 341 Genetic Analysis. (5)
se ected semesters
Genera genet cs sc ence of hered ty and var at on us ng cr t ca nqu ry Not open t students w th red t for B O 340. 3 hours ecture, 6 h urs ab Prerequ s tes BIO 187 and 193 or the r equ va ents

BIO 342 General Genet'cs Laboratory. (2)
fa
Exp ores genera pr nc p es of her tan e w t spec a eference to Mende an, mo ecu ar and computat ona genet cs v a aboratory exper ments Lab Pre or corequ s te B O 340

BIO 343 Genetic Engineer ng and Society. (4)
fa
ntroduces genet c eng neer ng, w th emphas s on app cat ons gene therapy, DNA f ngerpr nt ng b oremed at on transgen c an ma s and p ants . 3 hours ecture 3 hou s ab. Cross sted as MBB 343. red t s a owed f r n y B O 343 or MBB 343 Pre equ s tes. preferab y b th MBB 245 a d 246 or n y B O 188 or ts equ va ent .
Genera Stud es L

BIO 344 Origins, Evolution, and Creation. (3)
selected semesters
Exam es c ent f c myth c and re g ous deas re at ng to or g ns par t cu ar y huma P ace f ant ev ut on sm and sc ent f c creat'o sm n Amer can u ture Le ture d scus on Cross sted as HPS 311 HUM 371 REL 383 Cred t s a owed for on y B O 344 or HPS 311 or H M 371 o RE 383

BIO 345 Organic Evolution. (3)
spr ng
Processes of ad pt ve change and spec at on n sexua popu at ons Prerequ s te B O 187

BIO 346 The Darwinian Revolution. (3)
se ected semesters
nte ect a and ult ra h story f Darw n sm and modern evo ut onary theory and the r mpact on 19t a d 20t century thought Lecture d scuss on Cross ted as HPS 332 HUM 372 Cred t s a owed for on y B O 346 or HPS 332 or HUM 372

BIO 351 Developmental Anatomy. (3)
fa
Genera deve pmenta b o ogy embryo ogy and comparat ve struc ture of rgan systems ustrated ma n y by vertebrate examp es Pre requ te B O 187

BIO 352 Laboratory in Vertebrate Developmental Anatomy. (2)
fa
Morpho ogy of repre entat ve embryon c and adu t vertebrates 2 3 hour ab Fee Prerequ s tes BIO 187 B O 351 rec mmended

BIO 353 Cell Bio ogy. (3)
fa spr ng summer
Survey of ma or top' s n ce b o ogy c ud ng structura b ochem ca and mo e u ar aspects of ce funct on Prerequ te B O 187

BIO 360 Anima Physiology. (3)
fa and spr ng
Phys o og ca mechan sm of the h g er vertebrates Fee Prerequ s tes. B O 187 CHM 115 MAT 17

BIO 361 Animal Physiology Laboratory. (2)
fa and spr ng
Exper menta ab ratory stud es of phys o og ca mechan sms n an ma and mode sy tems ab rec tat n. P erequ s tes CHM 115; MAT 117 Pre or corequ s te B O 360

BIO 370 Vertebrate Zoology. (4)
fa and spr ng
Character st cs c ass f cat on evo ut o and natura h story of the ma or groups f vertebrate an ma 3 hour ecture, 3 hours ab Fee Prerequ te B O 187

BIO 385 Comparat ve Invertebrate Zoology. (4)
fa
Character st cs fe yc e , adaptat ons, and evo ut on of nvertebrate an ma s 3 hours ecture 3 hours ab Fee Prerequ s te BIO 187 or n tru tor approva

BIO 386 General Entomology. (4)
se e ted semesters
Form act v t es and c a f cat on of nsect 3 hour ecture 3 hours ab Fee Prerequ s te B O 187

BIO 394 Special Topics. (2–3)
se ected semesters
Top cs of current or pec a nterest n one or more aspe ts of b o ogy. Top cs vary Prerequ s te jun or stand ng

BIO 406 Computer Applications in Biology. (3)
fa
Computer ana ys s techn ques n b o ogy emphas z ng data entry management and ana ys s and graph c portraya Emp oys ma nframe and m crocomputers 2 hours ecture 3 hours ab Cross sted as PLB 432 Cred t s a owed for on y B O 406 r PLB 432. Prerequ s tes both B O 187 and MAT 117 or 210 or on y nstru tor approva
Genera Stud es CS

BIO 410 Techniques in Wildlife Conservation Biology. (3)
fa
F e d and ana yt cal techn ques used n eva uat ng p pu at on struc ture viab ty and env ronmenta mpact Lecture ab Fee Prerequ s tes both B O 317 and 320 or on y nstructor approva
Genera Stud es L

BIO 411 Advanced Conservation Biology I. (3)
fa
Pr nc p es of conservat on sc ence b o ogy of threatened spe es, management pr nc p es that meet con ervat on goa s em has z ng North Amer can ecosystems Prerequ s tes B O 317 320

BIO 412 Advanced Conservation Biology II. (3)
spr ng
G oba b od vers ty patterns, processes and conservat on g oba env ronmenta change; susta nab e use of natura resources emphas z ng nternat ona approaches to conservat on b o ogy Prerequ s tes. B 317 320

BIO 415 Biometry. (4)
fa
Stat st ca methods app ed to b o og'ca prob ems, des gn of exper ments est mat on s gnif cance ana ys s of var an e regre s n cor re at on ch square and b oassay the use of computers Does not sat sfy aboratory requ rements for the Col ege of L bera Arts and Sc ences' Genera Stud es program 3 hours ecture, 3 h urs ab Prereq u's'te MAT 210 or ts equ va ent
Genera Stud es CS

BIO 416 Professional Values in Science. (3)
once a year
Cons ders ssues re ated to values n sc ence such as co aborat n f nances ega ssues, media mentor ng ownersh p of deas sc ent f c ntegr ty D scuss on, student projects Cross sted as HPS 41 Cred t s a owed for on y B O 416 or HPS 410
Genera Stud es L

BIO 417 Experimental Design. (3)
spr'ng
F xed random m xed mode s crossed and ne ted facto a des gns ba anced and unba anced data comp ete y random zed b ocked, repeated measure des gns ANCOVA Prerequ s te. B O 4 5 or ts equ va ent

BIO 419 Research Colloquium in Biology and Society. (3–6)
fa and spr ng
Develops cr t ca th nk ng ab t es, research methods and wr t ng sk s for re ear h n the nteract ons between b o og a sc en es and so ety D cuss on Prerequ s te B O 311 or n tructor approva
Genera Stud es L

BIO 420 Field Zoology. (3)
se ected semesters
Exper ence n zoo og ca f e d techn ques Weekend or onger f e d t ps Pre equ s te: nstructor approva .

BIO 423 Population and Community Ecology. (3)
se ected semesters
Organ zat on and dynam cs of popu at n and commun t es empha s zing an ma s Theoret ca and emp r ca approaches Prerequ s te BIO 320 or nstructor approval

BIO 424 Mathematical Models in Ecology. (4)
se ected semesters
Mathemat ca mode ng of popu at ons commun t es and ecosystems nc ud ng case tud es and student des'gned pro ects 3 hours lecture 3 hours ab Prerequ s tes' B O 320, a course n ca cu us

BIO 425 Animal Ecology. (3)
se ected semesters
Phys o og ca and be av ora adaptat ons of nd v dua an ma s to both ab otic and b ot c env ronments Prerequ s te B O 320

BIO 426 Limnology. (4)
se ected semesters
Structure and funct on of aquat c ecosystems w th emphas s on fresh water akes and streams 3 hours ecture 3 hours ab or f e d tr p Fee Prerequ s te B O 320 or nstructor approva
General Stud es L

BIO 427 Fire. (3)
spr ng n odd years
nterd sc'p nary survey of f re on Earth ts h story, eco ogy and man agement Prerequ s te B O 187.

BIO 428 Biogeography. (3)
fal
Env ronmenta and h stor ca processes determ n ng d str but ona pat terns of an ma s and p ants emphas z ng terrestr a fe Prerequ s tes B O 187 or ts equ va ent un or stand ng
Genera Stud es. L

BIO 431 Human Development and Fertility. (3)
se ected semesters
G oba 'nf uences of human popu at on deve opment on the uman env ronment nc ud ng understand ng human fert ty and c n ca nf u ences on fert ty D scuss on, presentat on Prerequ s te genera b o ogy

BIO 435 Research Techniques in Animal Behavior. (3)
se ected semesters
Exper menta and f e d stud es of an ma behav or descr pt on and quant f cat on of an ma behav or and nterpretat on of behav or w th n an evo utionary framework 1 hour lecture 6 hours lab Prerequ s te BIO 331
Genera Stud es L

BIO 441 Cytogenetics. (3)
se ected semesters
Chromosoma bas s of nheritance. Cross sted as PLB 412. Cred t s al owed for on y BIO 441 or PLB 412 Prerequ s te B O 34

BIO 442 Cytogenetics Laboratory. (2)
se ected semesters
M croscop c ana ysis of me os s, m tos s, and aberrant ce d v s on 6 hours lab Cross l sted as PLB 413 Cred t s a owed for only BIO 442 or PLB 413 Pre or corequ s te B O 441 or PLB 412

BIO 446 Principles of Human Genetics. (3)
once a year
Molecu ar and ce lu ar ana ys s of the human genome Prerequ s te B O 340
Genera Stud es. L

BIO 450 Advanced Developmental Biology. (3)
spr ng
Current concepts and exper menta methods nvo v ng d fferent at on and b osynthet c act v t es of ce s and organ sms w th examp es from m croorgan sms, p ants and an ma s Prerequ s te B O 351

BIO 453 Animal Histology. (4)
spr ng
M croscop c study of an ma t ssues 3 hours ecture 3 hours ab Fee Prerequ s te· B O 187 or nstructor approva .

BIO 454 Aquatic Insects. (3)
se ected semesters
Systematics and eco ogy of aquat c nsects Prerequ site BIO 386

BIO 464 Photobiology. (3)
selected semesters
Prnc p es under y ng the effects of ght on growth, deve opment and behav or of p ants an ma s and m croorganisms Cross sted as PLB 440 Cred t s a owed for on y B O 464 or PLB 440 Prerequ s tes CHM 231 or 331 12 hours n l fe sciences

BIO 465 Neurophysiology. (3)
spring n even years
Deta ed treatment of ce u ar and organ sma neurophys o ogy and nervous system funct on. Prerequ s te. B O 360

BIO 466 Neurophysiology Laboratory. (2)
se ected semesters
ntrace u ar and extrace u ar e ectrophys o og ca record ng tech n ques h sto og ca preparat ons and dye f ng techn ques 6 hours ab Pre or corequ s te: B O 465

BIO 470 Systematic Zoology. (4)
spr ng n odd years
Ph osophy theory practice of nterpret ng an ma d vers ty nc ud ng spec es concepts spec at on nomenc ature and evo ut onary and phy ogenet c c ass f cat on emphas z ng phy ogenet cs 3 hours ec ture 3 hours ab Prerequ s tes un or stand ng 18 hours n fe sc ences
Genera Stud es L

BIO 471 Ornithology. (3)
spr ng n odd years
B o ogy of b rds 2 hours ecture, 3 h urs ab weekend f e d tr ps Fee Prerequ te B O 370 or nstructor appr va

BIO 472 Mammalogy. (4)
fa n odd years
C ass f cat on, structure hab ts eco ogy and d str but on of mamma s emp as z ng Nort Amer an forms 3 hours ecture 3 hours ab or f e d tr p weekend f e d tr ps Fee Prerequ s te B O 3 0 or nstructor approva

BIO 473 Ichthyology. (3)
spr ng n odd years
Systemat cs and b o ogy of recent a d ext nct f shes 2 hours e ture 3 hours ab or f e d tr p weekend f e d tr ps Fee Prerequ s tes both B O 370 and 425 or on y nstructor approva

BIO 474 Herpetology. (3)
spr ng n ev n yea s
Sy temat cs and b o ogy of recent and ext nct rept es and amph b ans 2 hours ecture, 3 hours ab or f e d tr p Fee Prereq s te BIO 370

BIO 480 Methods of Teaching Biology. (3)
spr ng
Methods of 'nstruct on exper mentat on organ zat on and presenta t'o of appropr ate content n b o ogy Prerequ s te 20 hours n the b o og ca sc ences

BIO 482 Advanced Methods of Teaching Biology. (3)
fa n odd years
Des gn de very and eva uat on of student entered nqu ry based essons for h gh schoo b'ology students Learn ng cyc e Prerequ s te· B O 480

BIO 484 Internship. (3)
se ected semesters

BIO 493 Honors Thesis. (1–6)
fa spr ng summer
Genera Stud es L

BIO 494 Special Topics. (1–4)
selected semesters
Top cs may nc ude the fo ow'ng:
• Ce B otechno ogy. 4

BIO 495 Undergraduate Thesis. (3)
fa spr ng, summer
Gu ded research cu m nat ng n the preparat on of an undergraduate thes s based on superv sed research done n th s and prev ous semesters Prerequ s tes at east 3 hours of B O 310 or 499 , forma conference w th nstructor nstru tor and department cha r approva

BIO 499 Individualized Instruction. (1–3)
fa and spr ng

BIO 502 Transmission Electron Microscopy. (3)
se ected semesters
Theory use and methods of prepar ng b o og ca mater a s for trans m'ss on e ectron m croscopy Lecture, ab. Mater a s fee Prerequ s te instructor app ova

L te a y an t ca nqu y **MA** mathemat c **CS** computer stat st s q a t tat ve app c t o **HU** huma t es a d f e arts **SB** soc a and beh v ora c en e **SG** nat ra en gener e u e **SQ** natu a sc e e quant tat ve **C** u t ra d ve s ty n the Un ted State **G** g oba **H** h stor ca See Genera Stud es page 83

BIO 505 Scanning Electron Microscopy. (3)
selected semesters
Theory, use, and methods of preparing biological materials for scanning electron microscopy. 2 hours lecture, 3 hours lab. Materials fee. Prerequisite: instructor approval.

BIO 508 Scientific Data Presentation. (2)
spring
Techniques necessary for presentation of scientific data used in journal publications, grant proposals, and visual presentations. Lecture, lab. Prerequisite: instructor approval.

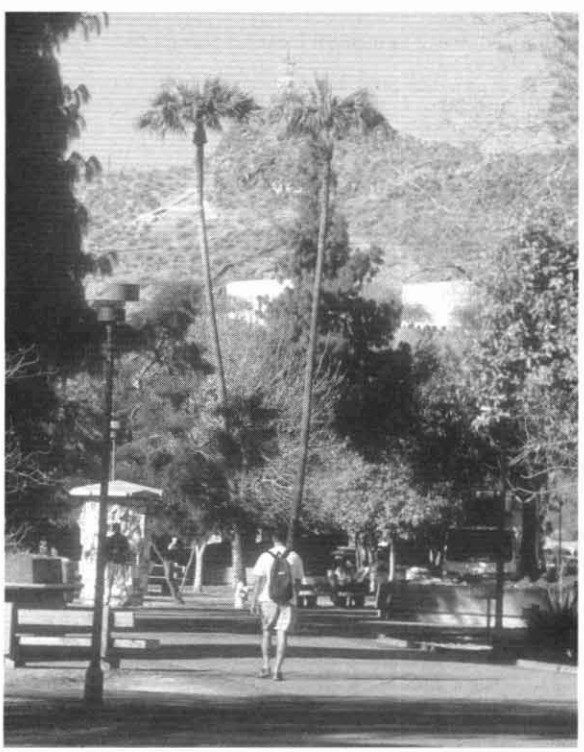
BIO 520 Biology of the Desert. (2)
selected semesters
Factors affecting plant and animal life in the desert regions and adaptations of the organisms to these factors. Prerequisite: 10 hours in biological sciences or instructor approval.

BIO 522 Populations: Evolutionary Ecology. (3)
selected semesters
Principles of population biology and community ecology within an evolutionary framework. 2 hours lecture, 2 hours recitation. Prerequisites: BIO 320, 415 (or MAT 210), 545.

BIO 524 Ecosystems. (3)
selected semesters
Structure and function of terrestrial and aquatic ecosystems, with emphasis on productivity, energetics, biogeochemical cycling, and systems integration. Prerequisite: BIO 320 (or its equivalent).

BIO 526 Quantitative Ecology. (3)
selected semesters
Sampling strategies, spatial pattern analysis, species diversity, classification, and applications of multivariate techniques to ecology. 2 hours lecture, 3 hours lab. Prerequisites: BIO 415 (or its equivalent); a course in ecology.

BIO 529 Advanced Limnology. (3)
selected semesters
Recent literature, developments, methods, and limnological theory; field and lab application to some particular topic in limnology. Prerequisite: BIO 426.



Forest Mall

Tim Trumble photo

BIO 543 Molecular Genetics. (3)
fall
Nature and function of the gene; emphasis on the molecular basis of inheritance and gene expression in procaryotes and eucaryotes. Prerequisites: BIO 340; a course in organic chemistry.

BIO 545 Populations: Evolutionary Genetics. (3)
selected semesters
Mathematical models in the description and analysis of the genetics of populations. Prerequisites: a combination of BIO 320 and 345 and 415 or only instructor approval.

BIO 547 Techniques in Evolutionary Genetics. (4)
selected semesters
Practical experience in modern techniques for the study of evolution. Lecture, lab. Prerequisites: BIO 340, 345; instructor approval.

BIO 550 Advanced Cell Biology. (3)
spring
Applications of contemporary electron microscopic and biochemical/molecular techniques for studying eukaryotic cell functions. Mechanisms of intracellular protein trafficking. Prerequisites: BIO 353 (or 360 or its equivalent or PLB 360); CHM 231 (or 331 or its equivalent).

BIO 551 Biomembranes. (3)
selected semesters
Structure and function of biological membranes, emphasizing synthesis, fluidity, exocytosis, endocytosis, and cell responses to hormones and neurotransmitters. Prerequisites: BIO 353 and CHM 231 (or 331) (or their equivalents).

BIO 552 Developmental Genetics. (3)
spring
Genetic approaches to the analysis of development during the life cycle of eukaryotic organisms, and the role of genes in the unfolding of the differentiated phenotype. Prerequisite: BIO 340.

BIO 560 Comparative Physiology. (3)
selected semesters
Analyzes function in invertebrates and vertebrates, emphasizing evolutionary trends in physiological systems. Prerequisite: BIO 360 (or its equivalent).

BIO 566 Environmental Physiology. (3)
selected semesters
Physiological responses and adaptations of animals to various aspects of the physical environment. Prerequisites: BIO 320, 360.

BIO 568 Mammalian Physiology. (3)
selected semesters
Detailed treatment of mammalian organ system functions emphasizing integrative mechanisms. Prerequisite: BIO 360 (or its equivalent).

BIO 569 Cellular Physiology. (3)
selected semesters
Emphasizes the molecular basis for cell structure and function. Prerequisites: BIO 360; a course in organic chemistry.

BIO 583 OTS: Fieldwork in Tropical Biology. (6–8)
spring and summer
Intensive field-orientated classes with Organization for Tropical Studies (OTS) in Costa Rica with emphasis on research in ecology and systematics. Lecture, lab, fieldwork. Cross-listed as PLB 583. Credit is allowed for only BIO 583 or PLB 583. Prerequisites: graduate standing; a course in basic ecology.

BIO 584 Internship. (1–12)
fall and spring

BIO 591 Seminar. (1–12)
fall and spring
May be repeated for credit. Topics may include the following:
- Adaptations. (1–3)
- Behavior. (1–3)
- Cell Biology. (1–3)
- Ecology. (1–3)
- Evolution. (1–3)
- Genetic Engineering. (1–3)
- Genetics. (1–3)
- Physiology. (1–3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Department of Chemistry and Biochemistry

www.asu.edu clas chemistry
480 965-3461
PS D102

J. Devens Gust, Chair

Regents' Professors: Ange , Buseck, Mayer C Moore, O Keeffe Pett t

Professors: A en, B rk B ankensh p Fuchs, G ck, Gust Ho oway Lohr A Moore T Moore. Munk, Petuskey Rose, Sk bo Ste m e, W ams Woodbury

Associate Professors: Kouvetak s, Wo f

Assistant Professors: Booksh, Caud e Franc sco, Fromme, Gou d. Hayes, Matyushov R chert Seo Wachter

Senior Lecturer: Wh te

Lecturer: Bauer

CHEMISTRY—B.A.

The B A de ree in Chemistry consists of 46 semester hours Requ red courses are as follows

Choose between the u sc combinat ons be ow. . . . .) or 5
CHM 11 G n a Che ist y SQ 4
CHM 115 General Che stry with Qualit t ve Ana y s SQ 5

CHM 7 G n ra Ch em stry for M ers SQ 4
CHM 118 G nera Chem stry for M jors I SQ 4
Cl oo between tl e ur e con b nations be ow 8
CHM 317 Or n c Che istry for Majors I 3
CHM 318 Or an c Chen stry for Majors I 3
CHM 319 Or an Chei istry Lab ratory f r Majo s I 1
CHM 320 Or an Chemistry abora ry f r Maj rs I 1

CHM 331 General Organic Ch en istry 3
CHM 33 Ger era Or anic Chemistry
CHM 335 General Organic Chen istry Laboratory 1
CHM 3 General Orgam Chemistry Lab ratory 1
CHM 32 Ana yt cal Chemistry 3
CHM 326 Ana yti al Chen istry Labo at ry 1
CHM 341 Ele e tary Phys a Chen stry 3
CHM 343 Phys ca Che stry Lab rat ry. 1
CHM 45 Inor a Chem stry 3
CHM ele t ves 2

M nim m t tal 30

CHM 117, 8 7, 3 8 319, and 320 re str ngly recom men ed f r qualih d st dents

Related courses must include the follow ng

MAT 270 Calculus with Analytic Geometry I *MA*[1] 4
MAT 271 Calcu us w th Analytic Geometry II *MA*[1] 4
PHY 111 General Phys cs *SQ*--[3] . . . 3
PHY 113 Genera Physics *SQ*- 3
PHY 3 Genera Physics Laboratory *SQ*--[3] 1
PHY 4 Genera Physics Laboratory *SQ*[2 3] 1

Total 16

Equiv alent courses may be taken in place of MAT 270 and 271.

More adv anced PHY courses may be taken in place of PHY 111, 2 113, ar d 114

Both PHY 111 and 113 or PHY 112 and 114 must be taken to secure SQ red t

The remaining courses to complete the major are deter m ned by students in consultation with their advisors.

CHEMISTRY—B.S.

The program consists of 46 semester hours in chemistry and 20 hours of related courses outside the major. Required courses are as follows:

Cho se bet ween the course combinations below . 9 or 8
CHM 11 General Chem stry *SQ* 4)
CHM 115 General Chem stry v th Qual tative Analysis *SQ* 5

CHM 1 3 General Chem stry *SQ* 4)
CHM 116 Gener l Chem stry *SQ* 4

CHM 7 General Chemistry f or Ma ors I *SQ** (4
CHM 118 General Chemistry for Ma ors II *SQ** 4)
Cho se between the course combinat ons below 8
CHM 17 Or anic Chemistry for Ma ors I* 3
CHM 318 Organic Chemistry for Majors II* 3
CHM 319 Organic Chemistry Laborat ry for Majors I* 1)
CHM 320 Organic Chemistry Laborat ry for Majors II* 1)

CHM 331 Genera Organic Chemistry 3)
CHM 332 Ge era Organic Chem stry 3)
CHM 335 Ge eral Organic Chemistry Laboratory 1
CHM 336 Ge eral Or an c Chen istry Laboratory (1

Total . . . . . 16 or 17

* CHM 117 18 317, 3 8 319, and 320 are strongly recom mended f r qualified students

Additiona required chemistry courses are as follows:

CHM 24 Introducti n to Physical Chemistry[1] 3
CHM 3 5 Analytical Chemistry 3
CHM 326 Analytica Chemistry Laboratory 1
CHM 327 Instrumental Analysis 3
CHM 328 Instrumenta Analysis Laboratory 2
CHM 345 Physical Chemistry I* 3
CHM 346 Physical Chemistry II 3
CHM 348 Physical Chemistry Laboratory I *L** 1
CHM 349 Physical Chemistry Laboratory II *L*[2] 1

L te acy and r t a nq y **MA** mathe at s **CS** computer stat st cs quant tat ve app at ns **HU** human t e and f ne arts **SB** soc a and be av ora ence **SG** nat ra c e e genera core cour es **SQ** natura en e qua t tat ve C u tu a d vers ty the Un ted States **G** g oba H h t a S e G e a tud es page 83

CHM 45_ I organ c Chemistry aboratory *L* . . . . . .
CHM 453 I organic Cher istry 3
CHM 460 B olog cal Cl er istry 3
Chen ist y electives ch ose fr m the ourses bel w 7
CHM 392 Introd ct n t Research Techn ques 3
CHM 424 Separat on Sc e ce 3
CHM 431 Q ial tat ve Or an c Ana ys s 3
CHM 471 So id State Chem stry 3
CHM 48 Methods ot Tea hing Chem stry 3
CHM 481 Ceochem stry 3
CHM 485 Meteorites and Co n cl er istry 3

Total 29

[1] Comp et on ot MAT 2 4 and 342 s atisfies the CHM 24 eq re n ent

[2] CHM 348 349 a 1452 must a b taken to se ure L cre l t

Additiona required related field courses are as follows.

MAT 2 1 Calcu s s th Ana ytic C on etry *MA* 4
MAT 2 1 Ca c l with Ana yt Ceo ret y II *MA* 4
MAT 2 2 Calculus s th A alyt c Ge o etry II *MA* 4
PHY 21 Un vers ty Phys cs I: Mechanics *SQ* 3
PHY 122 Un ve s ty Physics Labc ratory I *SQ* . . . 1
PHY 131 Uni e sity Ph s c II E ectricity a d Magneti m *SQ* 3
PHY 132 Univers ty Phys cs Laboratory I *SQ*[2] . . . . . .

Tota 20

Both PHY 131 and 132 must be taken to ecur SQ credit
Both PHY 131 and 132 m st be taken t s re SQ cred t

A course in a computer lang iage, such as CSE 181 Applied Problem Solv ng with Visual BASIC is strongly recommended.

Transfer students are nterv ewed and adv sed of possib e preparatory w ork. They must contact the department to arrange for the interview n adv nce of registration See "College Degree Requirements " pa e 330.

American Chemical Society Certification. A student who satisfactc rily comp etes the B S in Chem stry pro ram is certified by the Department of Chemistry and Biochemistry to the American Chemical Soc ety (ACS as having met the specific requiren ents for undergraduate professional tra n ing in chemistry Graduates meetin g ACS gu delines can receive a certificate to indicate this fact

BIOCHEMISTRY B.S.

The program cor sists of 36 semester hours in chem stry and 31 sen ester hours of related courses. Requ red courses are as follows.

Ch oose between the cour c mbinat or s below 9 or 8
CHM 113 General Chen istry *SQ* 4
CHM 115 Ge era Chem stry w th Qualitat ve Ana ys s *SQ* 5

CHM 13 General Chem stry *SQ* 4
CHM 6 Ge a al Chem st y *SQ* 4

CHM 1 General Chem stry tor Ma ors *SQ** 4
CHM 118 General Chemist y for Majors I *SQ* 4

Ch ose betv een the con binati ns of co rse below . 8
CHM 31 Organi Chen stry fo Ma or I 3
CHM 318 Organic Chen stry f r Majors I * 3
CHM 319 Orga ic Chen stry Laboratory for Major I* 1
CHM 320 Organic Chemistr Laborato y for Ma ors I

CHM 331 Genera Orga ic Chemistry
CHM 332 Genera Organic Chemi tr 3
CHM 335 Genera Or anic Chemistry Labc ratory 1
CHM 336 Cenera Or anic Chemist y Laborate r 1

Tot a . . . . 16 or 1

* CHM 7 18 317, 3 8 319 and 32(a e tronglv rec m mended for qualified tudent

Additional required chem stry courses are as follows

BCH 461 Ceneral B ochem stry 3
BC H 462 General B ochemi tr 3
BCH 463 Bi oph s al Chemi try 3
BCH 464 Bi ophys cal Chem stry Lab ato ry . . . 2
BCH 467 Analyti al B c chemistry ab ratory *L* . . . . . .
CHM 34 E en entary Phy ica Ch en istr 3
Cher stry e ective (cl o se fr m the cour s bel w 3
BCH 494 ST opic in Nucle c Acids Bi ch en stry
BCH 494 ST T pi s in Pr tei B o hem try 2
CHM 3_ Instru tal Ana ysis 3
CHM 4_4 Separat o Science
CHM 431 Qualitat ve Or a c Ana y s
CHM 453 Inorgan c Che istry
CHM 471 So id State Chen stry 3

Total 2

CHM 345 may be taken n p ace of CHM 341.

Additional required related field courses are as fo lows:

BIO 8 Ge eral B ology *SQ* 4
BIO 88 Genera B ology II *SQ* 4
BIO 4 Genera Genetic 4
BIO 353 Cel B ology 3
MAT _0 Ca culus w th Ana yt c Geon etry I *MA* . . . 4
MAT _71 Ca cu is w th Ana ytic Ge n etry II *MA* 4
PHY 111 Genera Phys s *SQ*[1] 3
PHY 11_ G r ra Phys s *SQ* 3
PHY 113 Cenera Phys cs L aboratory *SQ* 1
PHY 114 Ceneral Phys cs Laboratory *SQ* 1

Total 31

[1] Both PHY ar d 11 must b taken to secure SQ c ed t.
Both PHY 2 and 114 mu t be taker t sec ire SQ redit

Additional biolo y courses selected from BIO 343, 351, 360 441 450 and 465 are strongly recommended. Other biology courses may be substituted

Additional b ochen istry and cher istry courses, includ in CHM 392 Introduction to Research Techniques, may be taker by students and should be chosen in consultation with an advisor.

MINOR IN CHEMISTRY

A n inor in Chemistry is awarded to students who com p ete the following required courses·

CHM 113 General Chemistry *SQ* . . 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
or CHM 116 General Chemistry *SQ* 4
CHM 325 Analytical Chemistry 3
CHM 326 Analytical Chemistry Laboratory
Choose between the course combinations below 5
BCH 361 Principles of Biochemistry 3
BCH 367 Elementary Biochemistry Laboratory
CHM 231 Elementary Organic Chemistry *SQ* 3
CHM 235 Elementary Organic Chemistry Laboratory *SQ*

CHM 331 General Organic Chemistry 3
CHM 332 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory 1
CHM 336 General Organic Chemistry Laboratory 1
Choose between the course combinations below 4 or 8
CHM 341 Elementary Physical Chemistry 3
CHM 343 Physical Chemistry Laboratory 1

CHM 345 Physical Chemistry I 3
CHM 346 Physical Chemistry II 3
CHM 348 Physical Chemistry Laboratory I 1
CHM 349 Physical Chemistry Laboratory II

Minimum total 24

Equivalent courses may be taken in place of CHM 113, 115, or 116

- Both CHM 231 and 235 must be taken to secure SQ credit

SECONDARY EDUCATION—B.A.E.

Chemistry. Students may pursue one of two options for the chemistry major teaching field

Option One. The academic specialization consists of 43 semester hours in chemistry plus work in related fields. Required courses are as follows:

BCH 361 Principles of Biochemistry 3
CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
CHM 325 Analytical Chemistry 3
CHM 326 Analytical Chemistry Laboratory 1
CHM 331 General Organic Chemistry 3
CHM 332 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory . . .
CHM 336 General Organic Chemistry Laboratory 1
CHM 341 Elementary Physical Chemistry 3
or CHM 345 Physical Chemistry I 3
and CHM 346 Physical Chemistry II 3

Total 27

The remaining chemistry courses to complete the specialization are determined by students in consultation with their advisors.

Additional required related field courses are as follows:

MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 111 General Physics *SQ** 3
PHY 112 General Physics *SQ** 3
PHY 113 General Physics Laboratory *SQ** 1
PHY 114 General Physics Laboratory *SQ** 1
Total 6

Both PHY 111 and 113 or PHY 112 and 114 must be taken to secure SQ credit.

Option Two. The academic specialization consists of 30 semester hours of chemistry, which includes all of the required chemistry courses listed in option one and selection of the corresponding option in either mathematics or physics; that is, completion of an additional 30 semester hours in the chosen area as specified by the department selected.

Minor Teaching Field. The minor teaching field consists of the following required courses.

CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
Choose between the course combinations below . . . . . 6 or 8
BCH 361 Principles of Biochemistry 3
CHM 231 Elementary Organic Chemistry *SQ* 3
CHM 325 Analytical Chemistry 3
CHM 326 Analytical Chemistry Laboratory 1

CHM 331 General Organic Chemistry 3
CHM 332 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory 1
CHM 336 General Organic Chemistry Laboratory 1
CHM 341 Elementary Physical Chemistry 3

Total . . . . . 20 or 22

Both CHM 231 and 235 must be taken to secure SQ credit.

The remaining courses to complete the specialization are determined by students in consultation with their advisors.

GRADUATE PROGRAMS

The faculty in the Department of Chemistry and Biochemistry offer programs leading to the degrees of Master of Natural Science, M.S., and Ph.D. See the *Graduate Catalog* for requirements.

The department participates in the interdisciplinary program for the M.S. and Ph.D. degrees in Molecular and Cellular Biology. For more information, visit the program office in LSE 411, or call 480 965 0743.

BIOCHEMISTRY (BCH)

BCH 361 Principles of Biochemistry. (3)
Fall and summer.
Structures, properties and functions of proteins, enzymes, nucleic acids, carbohydrates and lipids; the utilization and synthesis of these materials by living systems and the relationship of these processes to energy production and utilization. Credit allowed for only BCH 361 or 461. Prerequisite: CHM 231 or 318 or 332.

BCH 367 Elementary Biochemistry Laboratory. (1)
Fall and summer.
Qualitative quantitative analyses of constituents of biological systems, enzyme activity measurements and metabolic studies. 1 hour conference, 3 hours lab. Pre- or corequisite: BCH 361 or instructor approval.

BCH 392 Introduct on to Research Techniques (1 3)
fa spr g summer
nstrumenta methods and ph osophy of research by act a part c pa t on n chem ca research projects May be repeated for tota of 6 semester hours Prerequ te adv sor and re earch superv sor approva

BCH 461 General Biochemistry. (3)
fa
Structure chem stry and metabo sm of b omo ecu es and the r ro e n the b ochem ca processes of v ng organ ms Cred t s a owed f r on y BCH 461 or 361 Prereq s te CHM 318 o 332 Corequ te CHM 341 or 346

BCH 462 General Biochemistry. (3)
spr ng
Cont n at on of BCH 461 Prerequ s te BCH 461 or nstructor approva

BCH 463 Biophysical Chemistry. (3)
spr ng
Pr nc p es of phy ca chem stry as app ed to b o og ca systems Pre requ te CHM 341 or 346

BCH 464 Biophysical Chemistry Laboratory. (2)
fa
ntroduces phys ca methods n modern b ochem stry Prerequ s te BCH 463

BCH 467 Analytical Biochem stry Laboratory. (3)
spr ng
Quant tat ve ana ys s separat on and p r f cat n of b o og ca mo e c es App es chem a and phys ca methods to the character zat on of b o og ca macromo ecu es 1 conference 1 hour ecture 5 h urs ab Prerequ s te BCH 461 Corequ te BCH 462
Genera Stud es L

BCH 494 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo ow ng
- Top cs n Nuc e c Ac ds B o hem stry 2
- Top cs n Prote n B o hem try 2

BCH 501 Current Top cs in Biochem stry. (1)
fa and spr ng
May be repeated for cred t Sem nar Prereq s te. nst uctor app va

BCH 561 Advanced Top cs in Biochem stry. (3)
spr ng
Top s se ected from emerg ng area of b ochem stry based pr mar y o current terature Prerequ s te BCH 462

BCH 563 Biophysical Chemistry (3)
se ected semesters
Phys ca c e st y of macromo ecu e e pec a y prote ns n c e c ac d nd po ysacch r des Thermodynam s hyd ody am a d spectros opy of and the r re at on to tru ture Prerequ s te BCH 462 CHM 346

BCH 568 Molecular Mechan'sms of Photosynthes s. (3)
spr ng
Structure a d funct on of photosynthet c comp exes mechan sm of energy convers n n p ant bacter a and mode system Cros ted as PLB 558 Cred t s a owed f r on y BCH 568 r PLB 558 P e requ s te nstructor approva

Omn bus Courses. For an exp anat on of our es offered but n t spec f ca y sted n th s cata og see Omn bus Course page 56

CHEMISTRY (CHM)

CHM 101 Introductory Chemistry. (4)
fa sp g summ r
E ements f gener chem stry Adapted t the eeds of student n nur ng home econom cs ag c tu e and phys ca edu at on Rec ommended for Genera Stud es cred t Norma y fo owed by CHM 231 Cred t a owed f r on y CHM 101 o 1 7 or 113 or 114 or 11~ 3 hou s ecture 1 hou d scu s on 2 hour ab Fee
Genera Stud es SQ

CHM 107 Chemistry and Soc ety (4)
fa and spr ng
Genera chem ca pr nc p es and on epts prese ted n context of s c a and techno og ca ss es e g energy po ut on g oba warm ng and others Cred t s a owed for on y CHM 101 or 107 or 113 o 114 or 117 3 hours ecture 1 hour d s uss on 2 hours ab Fee
Genera Stud es SQ

CHM 113 General Chem'stry. (4)
fa spr ng summer
Pr nc p es of chem stry Adapted to the needs of students n the phys ca b o og ca and eart sc en e Cred t s a wed for on y CHM 1 1 or 107 or 113 or 114 or 117 3 hours ectur 1 hour d s uss o 2 hours ab Fee Prerequ s tes MAT 106 r 3 semesters of h gh s hoo a gebra 1 year of h gh schoo chem stry recommended
Genera Stud es SQ

CHM 114 General Chemistry for Engineers. (4)
fa and spr ng
Emphas s toward eng neer ng Student w thout h gh s hoo chem stry or chem ca eng neer ng majors must enro n t e CHM 113 116 sequence nstead of CHM 114. Cred t a owed for on y CHM 101 or 107 or 113 or 114 r 117 and for on y CHM 114 or 115 r 116 or 118 3 hours ecture, 1 hour d s uss on 2 hours ab Fee. Prerequ s tes MAT 106 or 3 semesters f h gh schoo a gebra 1 year of h gh schoo chem stry
Genera Stud es SQ

CHM 115 General Chem stry with Qual tative Analysis. (5)
fa spr ng summer
Cont nuat on of CHM 113 Equ br um theory chem stry of meta s nonmeta s and meta o ds ntrod ces organ c chem stry Laboratory nc udes qua tat ve na ys s Cred t s a owed for on y CHM 114 or 115 or 116 or 118 3 hours ectu e ? hours d s uss on 4 hours ab Fee Prerequ s te CHM 113 or 2 years of h gh s hoo chem stry
Genera Stud es. SQ

CHM 116 General Chemistry. (4)
fa and spr ng
Cont nuat on of CHM 113 Equ br um theory ch m stry of meta s nonmeta s and meta o ds ntroduces organ c chem try Cred t s a owed for on y CHM 114 or 115 or 116 or 118 3 hours ecture 1 hou d sc ss o 2 hours ab Fee Prerequ s te CHM 113 or 2 years of h gh s hoo chem stry
Genera Stud es SQ

CHM 117 General Chemistry for Majors I. (4)
fa
Atom c and mo e u ar structure propert es and phys ca states f mat ter t ermodynam cs k net cs, a ds and bases chem ca ana ys s and to ch ometry Cred t s a owed for on y CHM 101 or 1 7 or 113 or 114 r 117 3 hours ecture 1 conference 2 hou s ab Fee Prereq s te 3 years f h gh schoo mathemat cs m n mum of 1 year of h gh schoo phys cs Prerequ s te w th a grade f B or h gher m n m of 1 year of h gh schoo chem stry
Genera Stud es SQ

CHM 118 Genera Chemistry for Majors II. (4)
spr ng
ont nuat on of CHM 117 Cred t a owed for on y CHM 114 o 115 or 116 or 1 8 3 ours e ture 1 c nfere ce 2 hours ab Fee Prereq s te CHM 117 Corequ s te MAT 2~0
Ge e a Stud es SQ

CHM 231 Elementary Organ'c Chemistry. (3)
fa and spr ng
Su vey of organ c chem stry w th emphas s on the rea t v ty f ba c f nct ona gr ups Cred t s a owed f r on y CHM 231 o 317 or 331 Prerequ s te w t a grade of B r g er CHM 101 or 114 o 115 or 116 o 117 or 1 year of h gh s hoo chem stry or nst u tor approva
G nera Stud e SQ f cred t a so ear ed n CHM 235

CHM 235 Elementary Organic Chem stry Laboratory. (1)
fa and spr ng
Organ c chem stry exper me ts n synthe pur f at on a a y and dent f cat on Lab Fee Pre or corequ te CHM 231
Genera Stud es SQ f cred t a so ea ned CHM 231

CHM 240 Introduct on to Physical Chemistry. (3)
spr ng
ntr du es mathemat ca computat ona methods n chem ca k net cs thermodynam cs quantum hem st y Mathemat a ba ed com uter aboratory 2 hours e ture 4 hour ab Fee Prerequ s te w th a grade of C or gher MAT 272

CHM 302 Environmental Chemistry. (3)
spr ng
Exp ores ma or env ronmenta ues prob ems and so ut ons from ana yt ca and chem stry perspect ves Pre equ s te CHM 114 r 115 or 116 or 118 231 or 331

CHM 317 Organic Chemistry for Majors I. (3)
fa
Structu e , rea t on mechan sms a d k et c a d sy temat synthe ses f organ c compo nds Cred t a owed for on y CHM 231 or 317 or 331 Prerequ s te CHM 115 or 118 Corequ s te CHM 319

CHM 318 Organic Chemistry for Majors II. (3)
spr ng
Cont nuat on of CHM 317. Cred t s a owed for o y CHM 318 or 332 Prerequ s te CHM 317 Corequ s te CHM 320

CHM 319 Organ c Chemistry Laboratory for Majors I. (1)
fa
Emphas zes me han sms k net c and products of organ c react ons Cred t s a owed for on y CHM 319 r 335 1 conference 3 hours ab Fee Pre or corequ s te CHM 31~

CHM 320 Organic Chemistry Laboratory for Majors II. (1)
spr ng
Cont nuat on of CHM 319 Cred t s a owed for on y CHM 320 r 336. 1 conferen e 3 h urs ab Fee Prerequ s te CHM 319 Corequ s te CHM 318

CHM 325 Analytical Chemistry. (3)
fa and summer
Pr nc p es and methods of chem ca ana ys s Prerequ te CHM 115 or 116

CHM 326 Analytical Chemistry Laboratory. (1)
fa and summer
Exper ments n chem ca ana y s 4 hour ab Fee Corequ s te CHM 325

CHM 327 Instrumental Analysis. (3)
spr ng
Pr nc p e of nstrumenta meth ds n chem a ana ys s E ectroana yt ca and opt ca techn ques Prereq s tes CHM 325 326 Pre or co equ s te CHM 346.

CHM 328 Instrumental Analysis Laboratory. (2)
spr ng
Exper ments n chem a ana ys s by e ectroa a yt ca and opt ca techn ques 6 hours ab Fee Corequ s te CHM 327

CHM 331 General Organic Chem stry. (3)
fa spr ng summer
Chem try of organ c compounds Cred t s a owed for on y CHM 231 or 317 or 331 Prereq s te. CHM 115 or 116 or 118

CHM 332 General Organic Chemistry. (3)
fa , spr ng, summer
Cont nuat on of CHM 331 Cred t s a owed for on y CHM 318 o 332 Prerequ s te CHM 331

CHM 335 General Organ'c Chemistry Laboratory. (1)
fa . spr ng summer
Microsca e organ c chem ca exper ments n separat on techn ques synthes s ana ys s and dent f cat on and re at ve react v ty Cred t s a owed for on y CHM 319 or 335. 4 hours ab Fee Corequ s te CHM 331

CHM 336 General Organic Chemistry Laboratory. (1)
fa spr ng summer
Cont nuat on of CHM 335 Cred t s a owed for on y CHM 320 or 336 4 hours ab Fee Prerequ s te CHM 335 Corequ s te CHM 332

CHM 341 Elementary Physical Chemistry. (3)
fa
Thermodynam cs equ br um states of matter, so ut ons and chem ca k net c For students n premed ca b o og ca and educat ona curr cu a Prerequ s tes. CHM 115 or 114 or 118 or 325 , 231 or 331 · MAT 271 PHY 112

CHM 343 Physical Chemistry Laboratory. (1)
fa
Phys ca chem stry exper ments red t s a owed for on y CHM 343 or both CHM 348 and 349 1 h ur confe ence, 3 hours ab Fee Corequ s te CHM 341 or 345

CHM 345 Physical Chemistry I. (3)
fa
ntrod es quantum c em stry w th app cat n to e ectron c structure and dynam cs of ato s and mo ecu e Prerequ te on y CHM 240 or both MAT 272 and 274 w th grades of C r h gher

CHM 346 Physical Chem'stry II. (3)
pr ng
ntroduces equ br um and tat st ca thermodynam cs Laws of ther mody am cs equat ons of state, mu t component chem ca and phase equ br a a d e ectrochem stry Prerequ s te CHM 345 Corequ s te MAT 274

CHM 348 Physical Chemistry Laboratory I. (1)
fa
Laboratory exper ments n spectroscopy and computat ona chem stry 4 hours ab Fee Pre or c requ s te CHM 345
Genera Stud e L f cred t a so earned n CHM 349 and 452

CHM 349 Physical Chemistry Laboratory II. (1)
spr ng
aboratory exper ments n the modynam cs e ectrochem stry and computat ona chem stry 4 ours ab Fee Pre or corequ s te CHM 346
Genera Stud es. L f c ed t a so earned n CHM 348 and 452

CHM 392 Introduction to Research Techniques. (1 3)
fa spr ng mmer
nstr menta meth ds a d ph osophy of research by actua part c pa t on n chem ca research p o e t May be repeated for a tota of 6 semester hours Prerequ s te approva of adv sor and research super v or

CHM 424 Separation Science. (3)
se ected semester
Bas c theory and pract ca a pects of gas, qu d on ex hange and ge permeat on chromatograph es and othe mpo tant du tr a and re earch techn ques 2 hours ecture 4 hours ab Fee Prerequ s te CHM 318 or 332 or 346 or nstructo approva

CHM 431 Qualitative Organic Analysis. (3)
pr ng
Systemat c dent f at on of organ c compounds 1 hour ecture, 6 ho rs ab. Fee Prerequ tes both CHM 118 or 327 and 320 o 336 or n y struct r approva

CHM 452 Inorganic Chemistry Laboratory. (1 2)
sp ng
Preparat on and ar cter zat on of typ a norgan substa ces emphas z ng meth ds and te hn ques 1 c feren e 5 hour ab Fee Prerequ s te nstructor approva .
Gene a Stud es L f c ed t a so earned n CHM 348 and 349

CHM 453 Inorganic Chemistry. (3)
fa
Pr nc p es a d app cat ons of norgan c hem stry Prerequ s te CHM 341 or 346

CHM 460 Bio ogical Chemistry. (3)
spr ng
Structure and funct on of macromo ecu es and the r nvo vement n the process ng of energy and nf rmat on by v ng ce s Prerequ s tes CHM 318, 346 453

CHM 471 Solid-State Chemistry. (3)
fa
Cry ta chemistry thermodynam cs and e ectrochem stry of so ds nonsto ch ometr c comp unds d ffus on and so d state react ons crysta growth and se ected top cs Pre or corequ s te CHM 346 or nstru tor approva .

CHM 480 Methods of Teaching Chem stry. (3)
spr ng
O gan zat n and prese tat on of appropr ate content of chem stry preparat o f reagents exper ments and demon trat ons organ za t on of sto k rooms and aborator es exper ence n prob em so v ng Fee Prerequ s te nstructor approva

L teracy a d t nqu y **MA** mat e t **CS** o p te tat t quant tat ve app cat ons **HU** uman t e a d f e a t **SB** o a a d behav ora c e ce **SG** tu a sc en e—gene a o e cou es **SQ** natu a e e q ant tat ve **C** cu tura d vers ty n the U ted State **G** g oba H h tor a See Genera tud s page 8

CHM 481 Geochemistry. (3)
spr ng
Or g n and d st but on of the chem ca e ements Geochem ca cyc es operat ng n the earth s atmosphe e hydrosphere and thosphere Cro s sted as GLG 481 Cred t s a owed for on y CHM 481 or GLG 481 Prerequ s te CHM 341 or 346 r GLG 321

CHM 485 Meteorites and Cosmochemistry. (3)
se ected semesters
Chem st y of meteor tes and the r re at on h p to the or g f the earth so ar system, and un verse Cross sted a GLG 485 Cre t s a owed for on y CHM 485 or GLG 485

CHM 494 Special Topics. (1–4)
se ected seme ters
Top cs may nc ude the fo ow ng
• Chem stry of G oba C mate Change 3

CHM 501 Current Topics in Chemistry (1)
fa and spr ng
May be repeated for cred t Prerequ s te nstructor approva

CHM 521 Chemometrics. (3)
se ected semesters
Overv ew of hemometr c too s n ana yt ca hem stry nc ud ng mu t va ate ca brat on spectra deconvo ut on and exper menta des gn 2 hours ect re, 4 hours ab

CHM 523 Advanced Analytical Chemistry. (3)
once a year
heo et ca pr nc p es of ana yt ca nstrumentat n and measure ments Prerequ s tes both CHM 325 and 346 or on y nstructor approva

CHM 525 Spectrochemica Methods of Analys's (4)
se cted semesters
Theoret ca and pract ca cons derat ons nvo v ng the use f opt a nstrument for chem ca ana yses Emphas s on state of the art trends 3 hours ecture 3 hours ab Prerequ s te CHM 346 or nstruc tor approva

CHM 526 X-Ray Methods of Analys s. (4)
se ected semesters
Theoret ca and pract ca cons derat ons nv v ng the use of x ray d f fract on and spectroscopy for chem ca and tructura ana y es 3 hours ecture, 3 hours ab Prerequ s te CHM 346

CHM 527 Electrical Methods of Chemical Analysis (4)
se e ted semesters
Theoret a and pra t ca cons derat ns of p arograph c potent o metr c amperometr c techn ques nc ud ng modern e ectrochem ca methods 2 hour ecture 6 hours ab. Prereq s te CHM 346

CHM 531 Advanced Organic Chemistry I. (3)
fa
React on mechan sms react on k net cs near free energy re at on sh p tran t on state theory mo ecu ar orb ta theory and Woodward Hoffmann ru es Prerequ tes CHM 318 or 332 , 346

CHM 532 Advanced Organic Chemistry II. (2)
spr ng
Cont at on of CHM 531 Prerequ s te CHM 531

CHM 537 Organic Reactions. (3)
spr ng
mportant ynthet c react ons of organ c chem stry emphas z ng recent y d scovered react ons of preparat ve va e Prerequ s te CHM 531

CHM 541 Advanced Thermodynamics. (3)
fa
Eq br um thermodynam cs chem ca react ons a d phase equ b a Intr duces stat st ca thermodynam cs cr t ca phenomena and k net cs Prerequ s te CHM 346

CHM 545 Quantum Chemistry I. (3)
fa
Bas c quantum theory, chem ca bond ng and mo ecu ar tructure Prerequ s te CHM 346

CHM 546 Quantum Chemistry II. (3)
spr ng
Quantum theory of rate processes Pr nc p es of spe t o opy and non near opt cs Prerequ s te. CHM 545

CHM 548 Chemica Kinetics. (2)
se ected semesters
K net theory and ate processes P ereq s te CHM 545

CHM 553 Advanced Inorganic Chem stry. (3)
spr ng
Pr nc p es of modern norgan c chem stry and the app cat ons over the ent re per od c ystem Prerequ s tes CHM 346 a d 453 o the r equ va ents

CHM 556 Topics n Inorganic Chemistry. (3)
e ected semesters
May be repeated for cred t Prereq s tes CHM 553; nst tor approva

CHM 579 Topics in Solid State Chemistry. (3)
se ected semesters
May be epeated for red t Prerequ s te nstructor appr va

CHM 582 Topics in Geochem stry and Cosmochemistry. (3)
se ected semesters
Top cs of urrent nterest for stude ts n chem try and other f e d Samp g of data and thought co cern ng phase equ br a. e ement d str but on meteor te the Earth and ther p anets May be repeated for red t Prerequ s te nstructor approva

CHM 583 Phase Equil bria and Geochemical Systems. (3)
se ected semesters
Natura react ons at h gh temperatures and pres ures cate su f de and ox de equ br a Prerequ s te nstru tor approva

CHM 593 Applied Project (1 12)
se ected semesters
Top cs may nc ude the fo w ng
• G a s B ow ng
Fee

Omnibus Courses. For an exp anat n f courses ffered b t not spec f ca y sted n th ata g, see Omn bus Co rses page 56

Department of Chicana and Chicano Studies

www.asu.edu clas chicana
480 965-5091
COWDN 224

Cordelia Candelaria, Chair

Professors: Cande ar a Mont e

Associate Professors: A dama E cobar

Assistant Professors: Garc a, Gut errez Magana

The Chicana and Chicano Studies pr ogram is an nterd s ciplinary degree progran that examines the experiences, culture, artistic endeavors and current status of people of Mexican descent living in the United States. The curricu um focuses on the practical app ication of Chicana and Chican Studies CCS for career development in se ected profes sions and service to the community based on an understand ing of the humanities, social s iences, and the arts

CHICANA AND CHICANO STUDIES—B.A.

The n ajor in Chicana and Chicano Stud es requires 45 semester hours of cc urse w ork. A minimum of 30 semester hours must be CCS, CSH, and CSS courses The cr i ning

course work must be in a related field to be approved by an advisor. All CCS majors must take 15 semester hours in the following core courses.

CCS 101	Introduction to Chicana and Chicano Studies	3
CCS 111	Introduction to Chicana and Chicano Culture	3
CCS 495	Pro Seminar	3
HST 331	Mexican American History to 1910 *SB, H*	3
HST 332	Mexican American History Since 1900 *SB, C, H*	3

Within the 45 semester hours, CCS majors must also take 18 semester hours in one of two concentrations humanities cultural studies or social sciences policy and 12 hours in the other concentration for a total of 45 semester hours.

Majors are expected to fulfill the college's language requirement in Spanish. Although the department advisor can make exceptions on a case by case basis, all majors must demonstrate proficiency in Spanish.

All Chicana and Chicano Studies majors must take an established minor or credential of at least 18 semester hours in another field.

CHICANA AND CHICANO STUDIES MINOR

The Chicana and Chicano Studies minor requires 18 semester hours of course work. All Chicana and Chicano Studies minors must take the following courses:

CCS 101	Introduction to Chicana and Chicano Studies or CCS 111 Introduction to Chicana and Chicano Culture	3
HST 347	Topics in Mexican American History *SB, C, H*	3
Total		6

Students must also take at least three credits in both CCS concentrations: humanities cultural studies and social sciences policy.

Within the 18 semester hour requirement, students must take a minimum of 12 semester hours in CCS, CSH, and CSS courses. Any courses taken in a related field must be approved by an advisor.

CHICANA AND CHICANO STUDIES (CCS)

CCS 101 Introduction to Chicana and Chicano Studies. (3)
fa
Historical and contemporary issues in the Chicana and Chicano community focus on economic sociological cultural and political status of Chicanas and Chicanos in the U.S.
General Studies C

CCS 111 Introduction to Chicana and Chicano Culture. (3)
spring
Interdisciplinary analysis of customs values beliefs systems and cultural symbols special attention is given to cultural continuity and change.
General Studies C

CCS 210 Introduction to Ethnic Studies in the U.S. (3)
fa and spring
Covers diversity of experiences and relations among racial and ethnic groups in the United States. Lecture, discussion. Cross listed as AFS 210 APA 210. Credit is awarded for only AFS 210 or APA 210 or CCS 210.
General Studies C

CCS 300 Chicana and Chicano Culture and Society. (3)
fa
Intensive analysis of how Mexican American writers artists film makers, entertainers and academicians have interpreted aspects of the Chicana and Chicano experience.
General Studies C

CCS 445 Teaching Chicana and Chicano Studies in Native Language (3)
once a year
Approaches techniques for infusion of Chicana and Chicano Studies content into elementary and secondary bilingual curriculum. Taught in Spanish. Prerequisite proficiency in Spanish.

CCS 446 Teaching Chicana and Chicano Studies in the Schools. (3)
once a year
Approaches techniques for infusion of Chicana and Chicano Studies content into elementary and secondary curriculum designed for teachers who work with Chicana and Chicano students.

CCS 498 Pro Seminar (3)
once a year
Required courses for majors on topics selected by instructor writing intensive course related to the development of interdisciplinary research skills.

Omnibus Courses. For an explanation of courses offered but not specifically listed in the catalog see Omnibus Courses page 56.

CHICANA AND CHICANO STUDIES HUMANITIES (CSH)

CSH Note 1. Completion of the First Year Composition requirement ENG 101 and 102 [or 105] or ENG 107 and 108 with a grade of C or higher is a prerequisite for all English courses above the 100 level.

CSH Note 2. A term paper or equivalent out of class written work is required in all upper division 300 and 400 level ENG courses.

CSH 210 Chicana and Chicano Poetry. (3)
spring
Writing seminar in Chicana and Chicano poetics and intensive creative writing workshop. Workshop seminar.

CSH 220 Chicana and Chicano Cultural Expression. (3)
once a year
Interrelation between economic social and political status and forms of artistic expression i.e. music, dance drama literature and graphic art.

CSH 310 Chicana and Chicano Folklore. (3)
once a year
Analyzes Chicana and Chicano folk beliefs traditions and practices.
General Studies HU C

CSH 350 Mexican and Mexican American Artistic Production. (3)
once a year
Overview of Mexican and Mexican American artistic production from colonial times to present, emphasis is regionalism and folk art.

CSH 351 Contemporary Chicana and Chicano Art. (3)
once a year
Intensive analysis of contemporary Chicana and Chicano art movement appraised within the context of contemporary American art and the art of Mexico.
General Studies HU C

CSH 363 Chicana and Chicano Literature. (3)
fa
Development of Chicana and Chicano literature study of genres and themes attention to literary antecedents. Cross listed as ENG 363. Credit is awarded for only SH 363 or ENG 363. See CSH Notes 1 2.
General Studies L/HU C

CSH 485 Chicana Writers. (3)
once a year
Critical reading of Mexican American women authors emphasis on contemporary poets 1970 poetry, novels, short stories and essays.
General Studies L/HU C

L literary and critical inquiry **MA** mathematical **CS** computer tactic quantitative practice **HU** humanties and the arts **SB** and behavioral science **SG** natural science with laboratory **SQ** natural science quantitative **C** cultural diversity in the United States **G** global **H** historical. See General Studies page 83.

CSH 498 Pro-Seminar. (3)
once a year
Required course for majors on topic selected by instructor; writing-intensive course related to the development of interdisciplinary research skills.

CHICANA AND CHICANO STUDIES SOCIAL SCIENCE (CSS)

CSS 315 Chicano Family Structures and Perceptions. (3)
once a year
Traditional and changing family relationships; emphasis on gender and intergenerational relations and impact of modern society on traditional family values.

CSS 330 Chicana and Chicano Politics and Policy. (3)
once a year
Historical/contemporary analysis of Chicana and Chicano political ideologies, attitudes, strategies, and movements; relations with governmental agencies; and public policy issues.
General Studies: C

CSS 331 Policy Issues in Chicana and Chicano Urban Settings. (3)
spring
Historical, demographic, and sociological overview of the status of Chicanas and Chicanos in urban settings as well as the public policy relevance.
General Studies: C

CSS 336 Issues in Immigration and Migration. (3)
once a year
Historical-contemporary overview of Mexican immigration into and within the U.S.; factors affecting population movement, settlement patterns, and migrants' incorporation into society.
General Studies: C, H

A student rides on a powertron

CSS 432 Issues in Chicana and Chicano Gender. (3)
once a year
Analyzes social construction of gender identities; emphasizes impact of American and Mexican cultural values on normative gender relations.
General Studies: C

CSS 490 Field Studies in the Chicana and Chicano Community. (3)
once a year
Introduces principles and methods of qualitative research applied to the Chicana and Chicano community.

CSS 498 Pro-Seminar. (3)
once a year
Required course for majors on topic selected by instructor; writing-intensive course related to the development of interdisciplinary research skills.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Computational Biosciences

Interdisciplinary Master's Degree

www.asu.edu/compbiosci

480/965-3951

PSA 216

Rosemary Renaut, Director

GRADUATE PROGRAMS

The master's degree in Computational Biosciences is administered by an interdisciplinary committee. The faculty participating in this M.S. program are drawn from departments including Biology, Chemistry and Biochemistry, Computer Science Engineering, Mathematics and Statistics, and Plant Biology.

For more information, contact the program office or refer to the *Graduate Catalog*.

COMPUTATIONAL BIOSCIENCES (CBS)

See the *Graduate Catalog* for the CBS courses.

Economics

The College of Liberal Arts and Sciences and the College of Business offer a B.A. or B.S. degree in Economics. Faculty, course descriptions, and the major requirements in the College of Business are listed under "Department of Economics," page 168. For more information, CLAS Economics majors should call the faculty liaison at 480/965-2128 or visit BAC 655.

ECONOMICS—B.A. OR B.S.

The program in Economics consists of 45 semester hours of course work, 24 of which, at a minimum, must be in economics, and the remainder in closely related fields to be selected from the "Approved List of Related Field Courses" in consultation with the faculty advisor.

The following lower division courses are required and must be counted as part of the 45 hour major:

ECN	111	Macroeconomic Principles *SB* 3
ECN	112	Microeconomic Principles *SB* 3
MAT	210	Brief Calculus *M4* 3
STP	226	Elements of Statistics *CS* 3
Total		 12

While MAT 210 meets the minimum mathematics requirement to major in Economics, all Economics majors who anticipate going on to graduate school in economics or in business or to law school are encouraged to take MAT 270 Calculus with Analytic Geometry I. Majors are encouraged to pursue further course work in mathematics. MAT 270 may be taken in lieu of MAT 210.

To qualify for upper division course work in economics, the Economics major must earn a minimum grade of "C" in each of the previously listed courses, have junior class standing (56 semester hours), and have a minimum cumulative GPA of 2.50. ECN 313 Intermediate Macroeconomic Theory and ECN 314 Intermediate Microeconomic Theory are required and should be taken after the completion of the previously listed courses and before other upper division courses in economics.

Credit earned by an Economics major in ECN 484 Economics Internship, whether as a legislative intern or through the Department of Economics Internship Program, and ECN 493 Honors Thesis), may not be used to satisfy the minimum 24 hours of economics course work requirement. However, up to six hours of ECN 484 and 493 may be used to meet the related fields requirement. See "College Degree Requirements," page 330.

Latin American Studies Certificate or Emphasis. Students majoring in Economics may elect to pursue a Latin American Studies Certificate or emphasis, combining courses from the major with selected outside courses of wholly Latin American content. See "Latin American Studies," page 338, for more information.

MINOR IN ECONOMICS

Minor in General Economics. The minor in General Economics consists of 18 semester hours of credit which includes ECN 111 and 112 plus any 12 hours of upper division economics courses for which all prerequisites have been met.

Minors in General Economics are encouraged to take calculus and statistics, which are prerequisites for ECN 313 Intermediate Macroeconomic Theory and ECN 314 Intermediate Microeconomic Theory so that these courses might be included in the minor. The College of Business does not permit its professional program students to enroll in this minor.

Minor in Economics for Students Planning a Career in Law. One of the most dramatic recent developments in law is the integration of economic analysis in legal theory and decision making. Curricula at all major law schools reflect this change. Consequently, future lawyers are being trained with courses that rely increasingly on microeconomic theory and econometrics.

The applications of economics to law have moved beyond the traditional areas of antitrust and regulation. First-year law courses now include microeconomic theory with applications to contracts, torts, criminal law, property, and constitutional law.

The minor in Economics for Students Planning a Career in Law provides an opportunity for prospective law students to take courses that provide them with analytical tools essential for the study of law. The prelaw minor consists of a minimum of 18 semester hours.

Required courses are as follows:

ECN	111	Macroeconomic Principles *SB* 3
ECN	112	Microeconomic Principles *SB* 3
ECN	314	Intermediate Microeconomic Theory *SB* 3
ECN	450	Law and Economics *L* 3
ECN	453	Government and Business. 3
Total		 15

Also required is at least one additional course from the following:

ACC	316	Management Uses of Accounting 3
ECN	471	Earnings and Employment *L SB* 3
ECN	48	Introduction to Econometrics *CS* 3
ECN	494	ST Public Choice 3
FIN	361	Managerial Finance 3

SECONDARY EDUCATION—B.A.E.

The minor teaching field consists of 21 semester hours. ECN 111 Macroeconomic Principles and ECN 112 Microeconomic Principles and MAT 210 Brief Calculus are required. The remainder must be approved by the advisor in consultation with the student.

Social Studies. For more information, call the Office of Student Services in the College of Education at 480 965 5555.

GRADUATE PROGRAMS

The faculty in the Department of Economics offer programs leading to the M.S. and Ph.D. degrees. See the *Graduate Catalog* for requirements.

For faculty and course descriptions see "Department of Economics," page 168.

Literacy and critical inquiry **MA** mathematics **CS** computer statistics quantitative applications **HU** humanities and fine arts **SB** social and behavioral science **SG** natural science and quantitative **CU** cultural diversity in the United States **GB** Global Historical Perspective. See General Studies page 83

Department of English

www.asu.edu clas english
480 965-3168
LL 542

Daniel Bivona, Chair

Regents' Professors: Dub e, R'os

Professors: Adams, Bender Bjork, Boyer, Brack Br nk, Cande ar a Car son Crow ey, Done son Gut errez, He ms, Keh Lester L ghtfoot Major, A N sen D N sen, Rhodes R chard Roen Sands Sens bar Tob n

Associate Professors: Bates B vona Cast e Chancy Corse DeLamotte, M. Gogg n Go dberg, Horan, Luss er Mahoney M Na y M er Morgan, Ne son Perry Pr tchard, Ramage Savard, Schwa m, Tohe van Ge deren, Voaden

Assistant Professors: B as ngame, Fox Fuse, P Gogg n Harr s, Johnson, M un Webb Peterson

Senior Lecturers: Cook Cooper, Duerden Dugan Dwyer, Heenan Norton Sudo Wheeler

Lecturers: B nk ey, Duttagupta, Ray Stanc ff

Academic Professional: G au

ENGLISH—B.A.

The faculty in the Department of En lish offer courses in comparative literatur , creative writ ng, Eng sh as a second language, English education, English lin u stics, literature and anguage, and rhetor c and composition Undergraduate degrees include the B A. degree in Et glish, w th a c ncen tration in either linguistics or literature and a Secondary Educ ation Bachelor of Arts in Education degree. The faculty a so offer a Wr t ng Cert ficate Studei ts interested in cre ative writing are ei couraged to use electives to pursue a cre ative writing emphasis Students should wc k with advisor to design an in ividual progran ot study that takes fu l advantage of th diversity within the department as well is interdisc plinary and multicultural contexts available in the colle e and university.

The B.A. degree in Et glish with a concentration n lin guistics consists of 42 semester hours. Required c urses are as follows:

ENG 2 Cr t c Read g an Writing Ab out
L t r ature *L HL* 3
ENG 213 Intr luctor t t e Study of L n ge 3
ENG 2 1 S rvey of Et gl h L Literature *HL H* 3
or ENG 2 Su vey of En h L teratu *HL H* 3
r ENG 24 Literature of the U ted St tes to 186 *HL* 3
r ENG 242 Literatu es of the ited St tes 186 Pre t *HL* 3
ENG 3 2 English n Its Soc al Setti g *L HL SB* 3
ENG 313 Phonol gy and M phology *L* 3
ENG 314 Modern Gra ar. 3
ENG 413 Hi t ry of the E g l Lan a age *HL* 3
ENG 414 Studies n Lin uistics epeated for a tot f nine se ster h rs 9

Twelve additiona hours are electives, chosen in con ulta tion w th the student's advisor These courses n ust be at the 20) level or above. At le st one must be a three credit course in a mo lern langu age other than English at the 4( ) evel or above. A grade of C or h gher is required in all courses taken for the n jor. A *u s may be used t sat isfy ne e than ne requi ement*

The B A degree in Eng sh with a concentration in lite ra ture consists of 45 sem ester h ours. Required c u ses are as follows:

ENG 2 (Critical Re ding a l Writ ng Ab ut Literat re *L HL* 3
ENG 21 Survey of Et gl sh Lit rature *HL H* 3
ENG 22 Survey of Et glish l iterature *HL H* 3
ENG 241 Literatures f the Unit d States to 186(*HL* 3
ENG 242 Literatures f the Un t l St ate 186 Pr se *HL* 3
ENG 4 1 Sh kespea e *HL* 3

Courses taken to fulf ll the areas and p riods listed below can be used to satisfy more than one c f these requiremel ts

Upper division course in critica theory 3
Upper division course in ender, American ethnic literatures, and or postcol onial stu ies 3)
Course n the history and or structure of language 3
Upper divisio course in literature befor 1660, exclusive of ENG 421 3
Upper division course in l terature between 1660 nd 1900 3)
Upper divisio course in literature after 1900 (3

Add tional hours needed to complete the 45 hours are electives ch sen from the departn ent s offerings at the 2( ) level and ab ve. At least 18 of the 45 hours must be taken at the 30) or 400 evel. A grade of C or higher s required in all courses taken for the major.

MINORS

The minor in En lish with a concentration in lin u stics consists of 24 semester h ours Required our es are as fo lows.

ENG 200 Crit cal Re l g a l Wr t n Ab ut Lit rat re *L H* 3
ENG 213 Introduct r t t e Study of Lan ge 3
ENG 221 Survey f Engl h L terature *HL H* 3
> ENG 222 Survey of E gli Lit rature *HL H* >
> ENG 24 Liter tu s of the nited St tes to 186 *HL* >
or ENG 24 Literatures f the Un t l States 186 Pre t *HL* 3
ENG 312 Et sh in t S c a Setti *L HL SB* 3
ENG 314 M der Gr m at ... 3
ENG 413 H story of th English Lan a e *HL* 3

The six add t onal hours are electives chosen fr m the depart ent's offerings, with at least one c urse three

hours required at the 300 or 400 level. A grade of "C" or higher is required in all courses for the minor.

The minor in English with a concentration in literature consists of 24 semester hours. These courses are required:

ENG 2[illegible] Critical Reading and Writing About Literature *L HL* 3
ENG 221 Survey of English Literature *HL H* 3
or ENG 222 Survey of English Literature *HL H* 3
ENG 241 Literatures of the United States to 1860 *HL* 3
or ENG 242 Literatures of the United States 1860–Present *H* 3
ENG 321 Introduction to Shakespeare *HL* 3
or ENG 421 Shakespeare *HL* 3

Also required are two upper division courses in literature (six hours) and two electives (six hours) chosen from among the department's offerings, with at least one course three hours at the 300 or 400 level. A grade of "C" or higher is required in all courses taken for the minor.

WRITING CERTIFICATE

The Writing Certificate consists of 19 semester hours. Initial entry into the program requires a minimum GPA of 3.00 in English 101 and 102, 105, or 107 and 108. Students must also have completed at least 30 hours of course work and must have a minimum GPA of 3.00. Required courses are as follows.

ENG 216 Persuasive Writing on Public Issues *L* 3
or ENG 415 Creative Nonfiction 3
ENG 301 Writing for the Professions *L* 3
ENG 312 Document Production *L* 3
ENG 472 Rhetorical Studies *L* 3
ENG 484 Writing Internship 3
ENG 495 PS Writing Certificate Portfolio 1

Total 16

Also required is an additional writing course in English, three hours, or a writing or design course, three hours, selected from an approved list of courses from across campus. All students are required to submit a portfolio before receiving the certificate.

SECONDARY EDUCATION—B.A.E.

The major teaching field consists of 45 semester hours in English. Required courses are as follows:

ENG 2[illegible] Critical Reading and Writing About Literature *L HL* 3
ENG 222 English Prose Style *L* 3
or ENG 215 Strategies of Academic Writing *L* 3
or ENG 216 Persuasive Writing on Public Issues *L* 3
or ENG 321 Writing Reflective Essays *L*
ENG 221 Survey of English Literature *HL H* 3
ENG 222 Survey of English Literature *HL H* 3
ENG 241 Literatures of the United States to 1860 *HL* 3
ENG 242 Literatures of the United States 1860–Present *HL* 3
ENG 312 English in Its Social Setting *HL SB* 3
or ENG 314 Modern Grammar 3)
ENG 421 Shakespeare *H* 3
ENG 431 Literature for Adolescents *HL* 3
ENG 486 Methods of Teaching English: Composition *L* 3
ENG 487 Methods of Teaching English Language 3

Total 33

Also required is one course in women's literature or American ethnic literatures. Nine additional hours are electives chosen from Department of English offerings, six hours of which must be in the upper division. ENG 471, 480, and 482 must be taken before student teaching.

The minor teaching field consists of the following required courses.

ENG 201 Critical Reading and Writing About Literature *L HL* 3
ENG 215 Strategies of Academic Writing *L* 3
or ENG 216 Persuasive Writing on Public Issues *L* 3
or ENG 321 Writing Reflective Essays *L* 3
ENG 321 Introduction to Shakespeare *L HL* 3
or ENG 421 Shakespeare *HL*
ENG 410 Symbols and Archetypes in Children's Literature *L HL* 3
ENG 471 Literature for Adolescents *HL* 3
ENG 480 Methods of Teaching English Composition *L* 3
ENG 482 Methods of Teaching English Language *L* 3
Choose from among the courses below 3
ENG 221 Survey of English Literature *HL H* 3
ENG 222 Survey of English Literature *HL H* 3
ENG 241 Literatures of the United States to 1860 *HL* 3)
ENG 242 Literatures of the United States 1860–Present *HL* 3
ENG 312 English in Its Social Setting *HL SB* 3
ENG 357 Short Story *H* 3
A course in women's literature or American ethnic literatures 3

Total 24

These courses are also recommended for Elementary Education majors.

GRADUATE PROGRAMS

The faculty in the Department of English offer programs leading to the M.A. degree in English (with concentrations in comparative literature, English linguistics, literature and language, and rhetoric and composition), Master of Fine Arts degree in Creative Writing (options include fiction, nonfiction, poetry, and screenwriting), Master of Teaching English as a Second Language degree, and Ph.D. degree in English with two concentrations, one in literature and one in rhetoric, composition and linguistics. See the *Graduate Catalog* for requirements.

ENGLISH (ENG)

ENG Note 1. Completion of the First Year Composition requirement (ENG 101 and 102 or 105) or ENG 107 and 108 with a grade of C or higher is a prerequisite for English courses above the 100 level.

ENG Note 2. A term paper or equivalent out of class written work is required in all upper division 300 and 400 level ENG courses.

L literacy and critical inquiry **MA** mathematics **CS** computer/technological/quantitative applications **HU** humanities **FA** fine arts **SB** social and behavioral sciences **SG** natural sciences and engineering **core course** **SQ** natural sciences/quantitative **C** cultures and diversity **United States** **G** global **H** history See general Student page 83

ENG Note 3. Eng sh ma ors and m nors are expected to have om p eted ENG 20 before tak g 40 eve terature courses

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ENG 101 First-Year Composition. (3)
fa spr ng summer
D scover ng orga z ng and deve op ng dea n re at on t the wr ter s purpo e sub ect and aud ence Empha zes modes of wr tten d s ourse and effect ve u e of rhet ca pr n p es Fore gn student see ENG 107 Prerequ s te ee n vers ty Test ng Requ rement page 68 and F rst Year C mpos t on Requ ement, page 79

ENG 102 First-Year Composition. (3)
fa spr ng summer
Cr t ca read ng and wr t n empha s on strateg es of acade c d course Requ re research paper Fo e gn st dents ee ENG 1 8 Prereq s te w th a grade of C or g er ENG 101

ENG 105 Advanced First-Year Composition. (3)
fa and spr ng
C ncentrated ompos t on ourse for student w th supe or wr t ng sk s ntens ve read ng re earc papers og ca and rhetor ca effec t veness Cred t s a owed for on y ENG 105 or F rst Year C mp t o Prerequ s te see Un ver ty Te t ng Requ rements page 68 and F rst Year Compos t n Requ rement page 9

ENG 107 English for Fore gn Students. (3)
fa and spr ng
For st dents from non Eng s peak ng ountr es who have stud ed Eng sh n the r nat ve countr es but who equ re pract ce n the d oms of Eng sh Intens ve read ng wr t ng and d scuss on Sat sf es the graduat on requ rement of ENG 101

ENG 108 English for Foreign Students. (3)
fa and spr ng
For f re gn students cr t ca read ng and wr t ng, strateg es of aca dem c d scou se Requ res research paper Sat sf es grad at on requ rement of ENG 102 Prerequ s te w th a grade of C or h gher ENG 107

ENG 114 English Grammar and Usage. (3)
fa and spr ng
Fundamenta s of Eng sh grammar word and phrase tru ture and of Eng sh usage punctuat o grammat ca orrectness

ENG 200 Critical Reading and Writing About Literature. (3)
fa and spr ng
ntrodu es the term no ogy method and bject ves of the study of t erature w th pract ce n nterpretat on and eva uat on See ENG Note 1. Prerequ s te Eng sh major or m nor
Genera Stud es L HU

ENG 201 Wor d Literature. (3)
fa
C ass ca and med eva per ods Se ect ons from th g eat terature of the wor d n trans at on and ectures on t e c tura background See ENG Note 1.
Genera Stud es. HU, H

ENG 202 World Literature. (3)
sp ng
Rena ssance and modern per ods Se ect ons from the great terature of the wor d n trans at on and ectures on the cu tura ba kground See ENG Note 1.
Genera Stud es H H

ENG 204 Introduction to Contemporary Literature. (3)
once a year
Poetry f ct on drama and poss b y other genres See ENG Note 1
Genera Stud es HU

ENG 210 Introduction to Creative Writing. (3)
fa and spr ng
Beg nn ng wr t ng of poetry f ct on, drama or m xed genre Separate sect ons for ea h genre Each genre may be taken once See ENG Note 1

ENG 212 English Prose Sty e. (3)
se ected semesters
Ana ys s and pract ce of wr t ng va ous c ass ca and modern prose sty es See ENG Note 1 Prerequ s te preferab y Eng h major or bot approva of adv so and nstr cto Prereq s te w t a grade of B or h gher ENG 102 or 1 5
G era Stud es L

ENG 213 Introduction to the Study of Language. 3)
fa and spr g
Lang age as de phonet cs phono ogy morpho gy and sy tax the ex con anguage a qu s t on so o g st cs See ENG Note 1

ENG 215 Strategies of Academ c Wr'ting. (3)
fa and sp ng
Advance u se n techn q es f ana yz g a d wr t ng academ expos tory prose Wr t ng s research ba ed See ENG N te 1
Genera Stud es L

ENG 216 Persuasive Writ ng on Public Issues. (3)
fa a d spr ng
Advanced course n techn ques of ana yz ng and w t g pers a ve argun ent address ng top cs of current pub c nterest Papers are research based See ENG Note 1
Genera Stud es L

ENG 217 Writing Reflective Essays. (3)
fa and pr ng
Cr t ca exam nat on of the nf uences d sco rse ha format on of dent ty na rat ve ana y es of se f and u t re See ENG Note 1
Genera Stud es L

ENG 218 Writing About Literature. (3)
fa and pr ng
Adva ced wr t ng co rse equ g ana yt ca a d expos tory essays about f ct o p etry and drama For non Eng sh ma ors See ENG Note 1
Genera Stud es L

ENG 221 Survey of Eng ish Literature. (3)
fa and spr ng
Med eva Rena ssance and 18th century terature Emphas zes major wr ters and the r works n the r terary and h stor a contexts See ENG Note 1
Genera St d es HU H

ENG 222 Survey of English Literature. (3)
fa and pr ng
Romant c V ctor an and 20th century terature Emphas zes major wr ter and the r works n the r terary and h sto ca contexts See ENG Note 1
Genera Stud es HU H

ENG 241 Literatures of the United States to 1860. (3)
fa and spr ng
Survey of terary movements and genres from co on zat on to the C v War See ENG Note 1
Genera Stud es HU

ENG 242 L teratures of the United States, 1860–Present. (3)
fa and spr ng
Survey of terary movements a d genre from the C v War to the present See ENG Note 1
Genera Stud es HU

ENG 245 Popu ar Cu ture Issues. (3)
fa and spr ng
Se ected top cs n var ous forms of popu a c ture re ated to wr tten texts May be repeated for cred t when top s vary See ENG Note 1
Genera Stud es L

ENG 301 Writing for the Profess ons. (3)
fa and spr ng
Advanced pract ce n wr t ng and ed t ng expos tory prose Pr mar y for p eprofess ona majo s See ENG Notes 1 2
Ge era Stud es L

ENG 303 Classical Backgrounds of Eng ish Literature (3)
se ected semesters
Read ngs of Greek and Lat n terature n trans at on as they re ate to terat re n Eng sh See ENG Notes 1 2
Genera Stud es HU

ENG 310 Intermediate Creative Writing (3)
fa and spr g
Separate sect ons fo f ct on and poetry May be taken o e for poetry once for f ct on Lect re, wr t g ass gnme t d scuss on cr t c n See ENG Note 1 2. P ereq s te ENG 210 or st tor approva

ENG 312 English in Its Socia Setting. (3)
fa and spr ng
ntroduces the soc o ngu t c tudy of the Eng h anguage See ENG Notes 1, 2
G nera Stud es HU SB

ENG 313 Phonology and Morpho ogy. (3)
spr ng
ntroduces Eng sh morpho ogy phono ogy etymo ogy a d ph et a pects of rhyme a te at on and other ound ba ed terary dev ces See ENG Note 1 2
Genera St d es

ENG 314 Modern Grammar. (3)
fa and spr ng
Modern descr pt ve mode of E g sh grammar See ENG Notes 1 2

ENG 315 Medieva Literature in Translation (3)
once a year
Med eva terature nsu ar and co t nenta trans at on from Beowu f to Ma ory exc ud ng Chaucer emphas z ng u tura and nte e t a back rounds Lecture d us on See ENG N tes 2

ENG 321 Introduction to Shakespeare. (3)
fa a d spr ng
Shakespeare a or omed es, h stor es and traged es See ENG Notes 1 2
Genera St d e L HU

ENG 325 Restorat on and the 18th Century. (3)
once a year
W ters and movements n nondramat c teratu e of the restorat on and ear y 19th entury ecture. d s u o See ENG Note 1 2

ENG 326 English Drama 1660–1800 (3)
once a year
Eng sh drama 1660–1800 ee ENG Notes 1 2
Genera St d es HU

ENG 328 The Novel to Jane Austen. (3)
s ected s mesters
From or g s f p se f ct on through the 18t ce tury See ENG N tes 1 2 3
Genera Stud es HU, H

ENG 329 19th Century Brit sh Fiction. (3)
s ected semester
c udes such authors as Austen D ckens E ot and C ad See ENG Note 1 2

ENG 331 American Drama. (3)
on e a year
Majo works n the deve opment of Amer ca drama f m ts beg n n ngs to the present See ENG N tes 1 2
Genera Stud es L H

ENG 332 Major American Novels. (3)
once a year
Ma or Amer can nove stu ed n the r ethn ca y d ver e terary tor ca and cu tura contexts See ENG Notes 1 2
Genera Stud e L

ENG 333 Amer can Ethnic L terature. (3)
once a year
Exam nes Amer ca s mu t ethn dent ty thro gh work of terature that dep ct Amer can et n c gender and as sens b t es Cross sted as AFH 333 Cred t a owed for o y AFH 333 or ENG 333 See ENG Notes 1 2
Genera Stud es L H C

ENG 335 Amer'can Poetry. (3)
se ected semesters
Theme and deve opments n Amer can poetry May be repeated fo cred t when top cs vary Lecture d c ss on See ENG N tes 1 2

ENG 342 20th-Century British and Ir sh Literature. (3)
se ected semesters
Major works n the deve opment of teratu e s nce 1900 stud ed n the r h st r ca and cu tura context Lecture d c s on See ENG Notes 1 2

ENG 345 Selected Authors or Issues. (3–4)
se ected semesters
D fferent top cs may be offered F m top c w t a ay carry 4 cred t May be repeated for cred t when top c vary See ENG Note 1 2

ENG 352 Short Story. (3)
fa and spr ng
Deve pment of the h rt t ry a a terary form ana y s of ts te n ue f om the w rk of representat ve authors See ENG Note 1 2
Genera St d es HU

ENG 353 African American L terature: Beginnings Through the Harlem Renaissance. (3)
fa
H stor a s rv y f Afr a Amer ca tera y trad t ons and c tura o text f s avery through the 1 30s Cross sted a AFH 353 Cred t s a wed for n y AFH 353 or ENG 353 See ENG Note 1 2
Genera Stud es H C

ENG 354 African American L terature: Harlem Renaissance to the Present. (3)
spr ng
H stor ca s rvey of Afr can Amer can terary trad t ons and cu tura o text f the 20s to the present Cross sted as AFH 354 Cred t s a wed for y AFH 354 or ENG 354 See ENG Notes 1 2
Genera Stud es HU C

ENG 355 European Dramatic Traditions. (3)
se ected emesters
Deve pment f European drama s nce Ae hy us See ENG Notes 1 2
Genera Stud es H

ENG 356 The Bib e as Literature. (3)
fa a d spr ng
Read gs t e Jew sh and hr st an r pt res n modern trans a t o S e ENG Notes 1 2
Genera Stud es HU

ENG 357 Introduction to Folk ore (3)
se ected semesters
S vey of the h tory genre , and dynam cs of fo k ore w th empha s o ra tr d t ns See ENG Notes 1 2
Genera St d e H

ENG 359 American Ind an Literatures. (3)
e cted emesters
e ected ora tr d t ons and ontemporary works by Amer can d a autl or See ENG Notes 1 2
Genera St d e L HU C

ENG 360 Western American Literature. (3)
o ce a yea
r t ca exam nat on of deas and trad t o of the terat re of the west ern Un ted State n ud g the nove See ENG Notes 1 2, 3
Genera St d e L HU

ENG 361 Silent Film. 4)
fa
Deve opment of mot n p tures from 1850 through 1930 3 hours ec ture s e n ngs See ENG Notes 1 2
Gene a St d es H

ENG 362 Sound Fi m Genres. (4)
spr ng
Exam ne the western the horror f m the c medy and other genres 3 hours ectu e s reen ngs See ENG Notes 1 2
Gene a Stud s HU

ENG 363 Chicana and Ch cano L'terature. (3)
fa
Deve opment of Ch cana and C cano terature study of genres and themes attent on t terary antecedent Cros sted as CSH 363 Cred t a wed for on y CSH 36 or ENG 363 See ENG Notes 1 2
Genera Stud es L HU C

ENG 364 Women and Literature. (3)
se ected eme te s
Approaches to ssues of gender and representat on n terature by an ab ut w men See EN Notes 1 2 3
Genera Stud es HU

L t a y and cr t ca qu ry **MA** ath tc **CS** mp te tat t c qua t tat ve a p t n **HU** u a te n f ne art **SB** soc a and beha a e e **SG** natu a sc en e ge era ore ou e **SQ** atura s e e quant t t e **C** cu ura d ve ty n the ted St tes **G** g oba **H** h to a Ge e a tud e page 3

ENG 372 Document Production (3)
fa and spr ng
nt duce docume t de g a d product n Pra t ce n r t que and n w t ng the content of pub cat ns Le ture d scuss on See ENG Notes 1 2 Prerequ te nstru tor appro a
Genera Stud es L

ENG 374 Technical Editing. (3)
fa and spr ng
Fundamenta s f ed t ng techn ca and profes a mater a s Ro e of ed tors n ana yz ng rev ng and po sh g manuscr pt Suc essfu wr ter ed tor d a ogues See ENG N te 1 2 Prerequ s te ENG 102 or ts qu va ent

ENG 385 Career Development for Eng ish Majors. (3)
se ected semesters
Theoret a and pract a aspects of career p ann ng re ated to sk s a d nterest deve oped Eng sh stud es Lecture, d sc ss n work s p See ENG Notes 1 2

ENG 400 History of Literary Criticism. (3
e ected seme ters
Ma or cr t cs and r t ca trad t ons the Wester wor d See ENG Notes 1 2 P erequ s te 6 h u s terature or n tru tor appr va
Genera Stud s L HU H

ENG 401 Topics in Critical Theory. (3)
se ecte semesters
Ma r cr t ca c oo of recent de ades p t o n a st psychoana yt c deco struct on t fem n t new h stor c t May be repeated for cred t when t p cs vary ecture d scuss on See ENG Notes 1 2 Prerequ te 6 hours n terature or n tructor approva

ENG 409 Advanced Screenwriting. (3)
se ected sen esters
App es the pr n p es ta ght a omp ete feature engths reenp y See ENG Notes 1 2 Prerequ s te nstructor approva

ENG 411 Advanced Creative Writ ng (3)
fa and pr g
Poetry f ct on and dram for e pe enced wr te emphas z ng nd v d a sty e Ea h genre may be take once See ENG N tes 1 2 Prerequ s te ENG 310 r n tructor approva

ENG 412 Creative Nonfiction. (3)
se ected semesters
Lectures d scu s on and cr t c m c cern ng techn ques f wr t ng creat ve n nf t on f r pub cat See ENG N tes 1 2 Prerequ s te ENG 310 or 411 or structor approva

ENG 413 History of the Eng ish Language. (3)
once a yea
Deve opment of Eng sh from the ear e t t mes to the moder per od See ENG Notes 1 2 Prerequ te un or stand ng or st u tor approva
Genera Stud es HU

ENG 414 Studies in Linguist cs. (3)
fa and spr g
Re at on p of ngu st c to t rat re ge der power and ther soc a s ue May be epeated for c ed t See ENG N tes 1 2 Prerequ s te un or tand ng

ENG 415 Topics in Med eva Literature and Culture. (3)
se ected semeste s
nterd s p nary appr ac to med eva terature emphas z ng cu tu a and stor ca context May be repeated for cred t when top s vary See ENG Notes 2 3 Prerequ s te ENG 221 nstructor approva
Genera Stud e H

ENG 416 Chaucer n Middle Eng ish. (3)
on e a year
Year y a ternate between Chaucer s *The Canterbury Ta es* and *Tro us and Cr eyde* May be repeated f r cred t when top cs vary See ENG Notes 1 2 3 Prerequ te ENG 221 or nstructo approva
G era Stud es HU

ENG 418 Renaissance L terature (3)
once a year
Se ecte top s aut or c ntext and themes n Rena s ance tera ture S e ENG Notes 1 3 Prerequ s te ENG 221 or structor app ova
Genera Stud es L HU

ENG 419 English Literature in the Early 17th Century. (3)
once a year
T p cs aut rs and themes n Eng sh te at re 1603 1660. See ENG Notes 1 2, 3 Prerequ s te ENG 221 or nstructor appr va
Genera Stud es L HU

ENG 421 Shakespeare. (3)
fa and spr g
A se e t on of Shake peare s w rks n d fferent genres See ENG Notes 1 2 3 Prerequ te ENG 221 or nstructor ap rova
Ge era Stud es HU

ENG 422 Studies in Shakespeare (3)
o ce a year
Top s for c o e exam nat on n se ected dramat and or nondramat c works May be repeated for cred t when top cs vary See ENG Notes 1 2 3 Prerequ s te ENG 421 or n tructor app ova
Genera Stud es HU

ENG 423 Renaissance Drama. (3)
spr ng
Top cs authors and themes n the rama of the T dor and ear y Stuart per ds ee ENG Notes 1 2 3 Prerequ s te ENG 221 or nstructor approva
Gene a Stud es L HU

ENG 424 Milton (3)
once a year
Se ected p ose a d p etry emphas z ng *Parad se Lo t Pa ad se Rega ned* and *Samson Ag stes* See ENG Notes 1 2 3 Prerequ s te ENG 221 or n truct r app ova
Genera Stud es HU

ENG 425 Studies in Romantic sm. (3)
fa
Romant c sm n cont nenta Br t h and Amer can terature and u ture May be repeated f red t when top cs vary Lecture d s uss on See ENG Notes 1 2 Prerequ te ENG 222 or 241 or nstructor appr va
Genera Stud es HU

ENG 427 Studies in 18th-Century L'terature and Cu ture. (3)
se ected semesters
L terary soc a a d u tura sues of the per od stud ed n an nterd s c p nary format May be repeated for c ed t when top cs vary See ENG Notes 1 2 3 Prerequ s te ENG 221 or 222 or nstructor appr va
Ge era Stud es HU

ENG 429 Studies n European Literature and Culture. (3)
se ected semester
L terary u tura . and h stor ca ues May be repeated for red t when top cs vary Lecture d cuss on See ENG Notes 1 2 3

ENG 430 Studies in Victorian L terature and Culture. (3)
once a year
L terary soc a . a d cu tura ssue of the per od stud ed a nterd s p nary format May be repeated for red t when top cs vary See ENG Notes 1 2 3 Prerequ s te ENG 222 or nstructor approva
Genera St d s L HU

ENG 434 Stud'es in the Literature and Culture of the Americas. (3)
s e ted emesters
L te ature and cu ture of North Amer ca South Amer ca and the ar bbean May be repeated for red t when top cs vary Lecture d cus on See ENG Notes 1 2 3 Prerequ s te ENG 241 or 242 or nstr ctor approva

ENG 436 Studies n Anglophone L terature and Culture. (3)
se ected semesters
terary oc a and cu tura ssue of Eng h speak ng former co on a terr t es May be repeated for cred t when top vary Lecture d s u s on See ENG Notes 1 2, 3 Prerequ s te ENG 222 o 242 or n tructor approva

ENG 440 Studies in Amer'can Literature and Culture. (3)
once a year
Var ous genres the r terary po t ca theoret ca and h stor ca con text May be repeated for cred t whe top cs vary See ENG Notes 1 2, 3 Prerequ s te ENG 24 or 242 or nstructo appr va
Gene a St d es. HU

ENG 442 Stud es in 20th-Century British and Irish Literature and Culture. (3)
once a year
Major terary ge res nove poetry and drama n the r cu tu a and h tor ca contexts May be repeated for cred t when top cs vary See ENG N tes 1 2, 3 Prerequ s te ENG 222 or n tru tor appr va

ENG 444 Studies in American Romanticism. (3)
once a year
F ct on poetry and essays of such neteenth century authors as Hawthorne Emer on Me v e Th reau Fu er Wh tman and D ck n son See ENG Notes 1 2 3 Prerequ s te ENG 241 or nstructor approva
Genera Stud es HU

ENG 445 Studies in American Realism. (3)
once a year
Wr ters and nf uences that shaped the deve opment of terary rea sm May be repeated for cred t w en top cs vary See ENG Notes 1 2 3 Prerequ s te ENG 242 r n tructor approva
Genera Stud es. L HU

ENG 446 Studies in Modernism. (3)
se ected semesters
Cu tura h stor a , and terary prob em n Amer can and European modern sm May be repeated f r cred t when top cs va y Lecture d s cuss on See ENG Notes 1 2 3 Pre equ s te ENG 222 or 242 or nstructor approva

ENG 448 Stud es in Irish Literature and Culture. (3)
se ected semesters
Themes and prob ems perta n ng to r sh terature f lm and soc a and cu t ra h story May be repeated for cred t when top cs vary Lec ture d scuss on See ENG Notes 1 2 3 Prerequ s te ENG 222 or 242 or nstructor app va
Ge era Stud es HU

ENG 452 Studies in the Novel. (3)
se ected semesters
May be repeated for cred t when top cs vary See ENG Notes 1 2 3 Prerequ te ENG 221 or 222 or 241 or 242 or nstructor approva
Genera Stud es HU

ENG 453 Studies n the Amer can Novel. (3)
fa and spr ng
Poet c and po t cs of the nove 18th through 21st centur es May be repeated for cred t when top cs vary See ENG Notes 1 2 3 Prerequ s te ENG 241 or 242 or nstructor approva
Genera Stud es HU

ENG 455 Forms of Verse: Theory and Pract'ce. (3)
se ected semesters
Types h story ana ys s of trad t ona poet c forms and contemp rary adaptat ons Wr t ng of poetry n forms such a onnet v ane e ses t na See ENG Notes 1 2 Prerequ s te ENG 310 or nstructor approva .

ENG 457 Studies in Amer can Poetry. (3)
se ected semesters
May be repeated for cred t when top s vary See ENG N tes 1 2 3 Prerequ s te ENG 41 or 242 or nstructor approva
Genera St d es H

ENG 459 Studies in African American Caribbean Literatures. (3)
se ected semesters
Stud es n Afr can Amer can or Car bbean teratures accord ng to genre per od the ry or se ected authors May be repeated for red t when top cs vary Cro s sted as AFH 459 Cred t s a owed for on y AFH 459 or ENG 459 See ENG Notes 1, 2 3

ENG 461 Studies in Women and Literature (3)
se ected semesters
Advan ed top cs n terature by or about women May be repeated for cred t when topics vary See ENG Notes 1, 2 3
Genera Stud es HU

ENG 464 Studies in Drama. (3)
se ected semesters
Se ected top cs n the h story and theory of the genre See ENG N tes 1 2 3 Prerequ s te ENG 221 or 222 or 241 or 242 or nstruct r approva
Genera Stud es· HU

ENG 465 Studies in Film. (3–4)
se ected semesters
Adva ced top cs n c nema Lecture v ew ng d scuss on. See ENG Notes 1 2

ENG 469 Science and Literature. (3)
se ected semesters
H tor ca and theoret ca nks between sc ence a d terature from Franc s Bacon to the present, exam ned n u t ra context May be repeated for cred t when top cs vary Le ture d s uss on See ENG Notes 1 3

ENG 470 Symbols and Archetypes in Children's Literature. (3)
fa
Var ous r t ca approaches and recurr ng themes stud ed n re at o to c ass ca and contemporary ch dren s terature Lecture d scuss on read ng See ENG Notes 1 2 3
Genera Stud es L HU

ENG 471 Literature for Adolescents. (3)
fa and spr ng
Prose and poetry that meet the nterests a d capab t es of u or h gh and h gh schoo students Stresses recent terature Requ res pass ng grade of at east C before students are perm tted to student teach n E g s See ENG Notes 1 2 3
Genera Stud es HU

ENG 472 Rhetorical Studies. (3)
fa and spr ng
Deve opments n theory and pract ce of major rhetor ca 'nqu r es Sem nar, workshop See ENG Notes 1 2. Prerequ s te jun or stand ng.
Gene a Stud es L

ENG 480 Methods of Teach'ng English: Composition. (3)
fa or spr ng and summer
Methods of nstruct on, organ zat n and presentat on of appr pr ate content n the teach ng of compos t on a d other wr t ng k s See ENG Notes 2
Gene a Stud es L

ENG 482 Methods of Teaching English: Language. (3)
fa or spr ng a d summer
Methods of nstru t on organ zat on and presentat on of appropr ate content n anguage and usage for jun or and sen or h gh schoo s ec ture d scuss on, ab See ENG Notes 1 2
Genera Stud es L

ENG 484 Internship. (1 12)
fa and spr ng
Se ected from the fo ow ng a eas May be repeated for cred t. See ENG Notes 1 2. Top cs may nc ude the fo ow ng.
- Genera 1 12
- Serv ce Learn ng. 3
- W t ng Cert f cate 3

ENG 493 Honors Thesis. (1–6)
se ected semesters
Genera Stud es L

ENG 494 Special Topics. (1–4)
se ected semesters
See ENG Notes 1 2 Top cs may nc ude the fo ow ng
- Sc ence and L terature Across the Cu tura D v de

ENG 498 Pro-Seminar. (1–7)
fa and spr ng
Se ected from the fo ow ng areas May be repeated fo cred t whe top cs vary See ENG Notes 1 2 Top cs may nc ude the fol ow ng·
- ntroduct on to Graduate Stud es 1
- ssues n Creat ve Wr t ng 3
- Wr t ng Cert f cate Po tfo o 1

ENG 500 Research Methods. (3)
once a year
Methodo ogy and resource mater a s for research Ana ys s of cr t c sm and scho arsh p nclud ng eva uat on of source

L teracy and cr t ca nqu ry **MA** mathemat s **CS** computer stat st cs uant tat ve app at o s **HU** huma t e a d f e art **SB** o a d be av ora sc ences **SQ** nat a ence gene a re cou se **SQ** nat ra c ce—qua t tat ve **C** u tu a d ver ty n the Un ted tate **G** ob **H** h tor a See Ge era Stud e page 83

ENG 501 Introduction to Comparat ve L terature. (3)
e ected seme ters
Prob ems methods, and pr nc p es strated by e ected t ca es ays and tera y text

ENG 502 Contemporary Cr tical Theory. (3)
once a year
Adva ed urvey of major scho s of 20th ent ry terary and r t ca theory Lecture d u s on r sted a H M 549 Cred t a owed for n y ENG 502 r HUM 549

ENG 507 O d English. (3)
se ected semesters
E ements of O d Eng sh grammar, w t e e ted read g

ENG 508 O d English Literature. (3)
se ected semesters
nten ve tera y ngu st'c a d cu tura study of O d Eng sh te ature May be repeated for cred t when top ary Prereq s te. ENG 507

ENG 509 Middle English. (3)
s ect d semesters
Study of the pr nc pa d a ect of the anguage w th se e ted read g Prerequ te graduate stand ng

ENG 512 The Teach ng of Composition. (3)
se ected seme ters
Theory and pra t ce of teach ng wr t ng at a eve s Emphas ze cur rent research Prerequ s tes teach ng exper e e nstruct r appro a

ENG 515 Middle English L terature. (3)
se ected s m st rs
Eng s terature from t e 12t through the 15th c nt r xc u ve of Chaucer Prerequ s te ENG 5 9 or nstruct approva

ENG 517 Contemporary Rhetorical Theory. (3)
once a yea
nve t gate the work of uch mportant etor a t eor t a Burke Tou m n Pere man G tes and C ous

ENG 520 Renaissance Literature. (3)
se ected seme ter
Poet y and prose of t e En sh Rena sance exc ud ng drama

ENG 521 Shakespeare. (3)
once a year
Se ect f c med es tor es and traged es presented the text of terary h story and cr t a theor es w th an emphas s n c a s a and med eva backgrounds

ENG 525 American Literary Criticism. (3)
se ected semeste s
Ana ys s and d s ss on of ead ng h stor ca and cr t ca nterpreta t ons of Amer an terature fr m the beg nn ngs t the p e e t

ENG 530 Classical Rhetoric and Written Composition. (3)
fa
Re at on h p of ma or texts n c ass ca rhet c to deve opments n compo t on the ry terary theory and p a t e t rough the 19th cen tury

ENG 531 Rhetorical Theory and Literary Critic sm (3)
spr ng
ntens ve study of major rhet r ca theor ts f the 20t century n such areas as terary cr't c sm d sc urse the ry and omp s t o theory

ENG 532 Composition Theory. (3)
se e ted semesters
ntens ve study n the rhetor a tegor es of nvent on arrangement sty e a ms modes, and forms f wr tten d scourse

ENG 545 Studies in English L terature. (3)
se ected seme ters
Se ected authors ssues May be repeated fo cred t

ENG 547 Studies in Amer can Literature. (3)
se ected seme te s
Se ected authors o ssues May be repeated f r re t

ENG 549 Studies in Comparative Literature. (3)
e ected semesters
Se ected authors o ss e May be repeated for cred t

ENG 550 Contemporary Comparat ve Literature. (3)
se e ted semest rs
Comparat ve stud es n modern ter ture n E g sh and t er tera tu es n tran at n May e repeated for cred t when top s vary

ENG 559 Advanced Study in Afr'can American Caribbean Litera tures. (3)
se ected semesters
Advan ed study n Afr can Ame can or Car bbean teratures theory, nd r t c sm May be repeated f r cred t when top cs vary

ENG 560 Studies in Dramatic Forms (3)
se ected semesters
Se ected top s n dramat c and c nemat c terature, h st ry cr t sm the ry and cro sd sc p n ry study May be repeated for cred t whe top c vary Lecture stud o

ENG 571 Advanced Study in Literature for Adolescents. (3)
se ected semesters
H tory and cr t c sm of ado escent terature Prerequ s te. ENG 471 or nstructor app ova

ENG 573 Censorship and Literature. (3)
se ected semesters
H story of ce sorsh p pr mar y n the n ted States and s gn f cant u t dec s ons that affected w ter and books

ENG 580 Practicum. (1 12)
se ected semesters

ENG 591 Seminar. (3)
fa and sp g
Se ect d top c regu ar y ffered n the var ous areas f Eng sh st d e

ENG 594 Conference and Workshop. (1 12)
se ected semesters

ENG 598 Special Topics. (1–4)
e ected sem sters

ENG 599 Thesis. (1–12)
e e ted emesters

Omn'bus Courses. For an exp anat on of courses offered but n t spec f a y ted n th s cata g see Omn b s Cour es p ge 5

LINGUISTICS (LIN)

See the *Graduate Catalog* for the LIN courses.

WRITING ACROSS THE CURRICULUM (WAC)

WAC 101 Introduction to Academic Writing. (3)
fa and spr ng
omb e c as r om and s pp ementa nstruct o to teach academ c genre of wr t ng, nc ud ng def n t on summary and an ys s

WAC 107 Introduction to Academic Writing for International Students. (3)
fa a d spr ng
F r st dent from non Eng sh speak ng countr es C mb nes ass ro m and supp ementa nst t on w th ntens ve read ng wr t ng, and d scuss o

Omnibus Courses. For an exp anat on of c ur es ffered b t not pec f ca y sted n th s cata og see Omn bus C urses page 56

Department of Exercise Science and Physical Education

www.asu.edu clas espe
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PEBW 201

Philip E. Martin, Chair

Regents' Professor: Landers

Professors: Darst, Krahenbuhl Mart'n, Matt Pangraz Ste mach

Associate Professors: H nr chs Morgan Treasure W s

Assistant Professors: Etn'er, Huey, Robertson Sante o

Senior Lecturer: Landers

Lecturer: Pr de

EXERCISE SCIENCE PHYSICAL EDUCATION—B.S.

The B S. degree in Exercise Science/Physical Education consists of 42 semester hours. including 21 semester hours of required EPE core courses (EPE 110 may be repeated for credit . The remaining 21 semester hours of EPE and other courses are prescribed by the specific concentration the student selects.

The required EPE core courses are as follows:

EPE	1 0	Movement Analysis Lab ratory 6
EPE	20	Introduction to Exercise Science and Physical Education 3
EPE	335	Bi mechanics 3
EPE	340	Physiology of Exercise 3
EPE	345	Motor and Developmental Learning 3
EPE	352	Psychosocial Aspects of Physical Activity 3
Total		 21

Each EPE core course has specific prerequisite courses that must be taken before taking the respective core course. These prerequisite courses include the following.

BIO	201	Human Anatomy and Physiology I *SG* . . . 4
BIO	202	Human Anatomy and Physiology II 4
CHM	101	Introductory Chemistry *SQ* 4
MAT	17	College Algebra *MA* 3
PGS	101	Introduction to Psychology *SB* 3
PHY	11	General Physics *SQ* 3
Total		 21

* Both PHY 111 and 113 must be taken to secure SQ credit

All prerequisite and EPE courses must be completed with a minimum grade of "C." The requirements for the specific concentrations are described below.

Majors must elect either the exercise science or physical education concentration.

Exercise Science Concentration. Candidates for the exercise science concentration must complete 21 semester hours beyond the core courses in the major field, at least 12 of which must carry EPE prefixes, be upper division courses, and concern the theoretical subjects of the core The remaining nine semester hours may carry either EPE prefixes or prefixes from related disciplines selected with the advice and consent of a faculty advisor. Activity courses may not be used to fulfill part of the 21 semester hour requirement. No more than six semester hours may be in independent study courses.

Physical Education Concentration. Candidates must complete 21 semester hours beyond the EPE core courses, 12 of which must carry EPE prefixes from the required course list below.

EPE	361	Physical Education in the Secondary School . . . 3
EPE	3 6	Physical Education for the Elementary Sch o . 3
EPE	382	Physical Education for the Atypical Student . . . 3
EPE elective*		. . 3
Total		 1

See advisor for approved electives

The remaining nine semester hours of related course work can carry either EPE, psychology, special education, child development, and or education prefixes. Activity courses (EPE 110 may be used to fulfill part of the 21 semester hour requirement additional four semester hours maximum No more than six semester hours may be taken in internship. Internship experiences may only be in elementary and secondary school teaching and coaching settings A maximum of six semester hours may be in independent study.

EXERCISE SCIENCE PHYSICAL EDUCATION MINOR

The minor in Exercise Science/Physical Education consists of the core sequence in exercise science and physical education as follows, plus all prerequisite courses:

EPE	110	Movement Analysis Laboratory 6
EPE	2 0	Introduction to Exercise Science and Physical Education 3
EPE	335	Bi mechanics 3
EPE	340	Physiology of Exercise 3
EPE	345	Motor and Developmental Learning 3
EPE	352	Psychosocial Aspects of Physical Activity . . 3
Total		 21

SECONDARY EDUCATION—B.A.E.

Physical Education. Candidates for the B.A.E. degree are required to complete the following courses in physical education in addition to the required EPE core courses.

Literary and artistic inquiry **MA** mathematics **CS** computer statistics quantitative applications **HU** humanities and fine arts **SB** social and behavioral science **SG** natural science general course **SQ** natural science quantitative **C** cultural diversity **G** global **H** historical See General Studies page 83

EPE 361 Physical Education in the Secondary School	3
EPE 376 Physical Education for the Elementary School	3
EPE 382 Physical Education for the Atypical Student	3
EPE 480 Methods of Teaching Physical Education	3
EPE elective*	3
Total	15

See an advisor for approved electives.

Students must also complete a four semester Physical Education Teacher Certification Program professional sequence in the College of Education (23 semester hours). Entry into this degree program requires filing an application, 56 semester hours of completed university study and a minimum GPA of 2.50. See "College of Education," page 185, for additional requirements.

GRADUATE PROGRAMS

The faculty in the Department of Exercise Science and Physical Education offer programs leading to the Master of Physical Education degree and the M.S. degree in Exercise Science/Physical Education. The department also participates with the Graduate College in the program leading to the Ph.D. degree in Exercise Science and with the College of Education and the Graduate College in the program leading to the Ph.D. degree in Curriculum and Instruction with a concentration in physical education. See the *Graduate Catalog* for requirements.

EXERCISE SCIENCE/PHYSICAL EDUCATION (EPE)

EPE Note 1. A $50 towel and locker fee is required each semester by students using towel and locker facilities for physical education classes and intramural activities.

EPE Note 2. Physical education activity classes EPE 105, 205, 305, 310 may not be taken for audit. Excessive absences and/or tardiness are considered disruptive behavior.

EPE 100 Introduction to Health and Wellness. (3)
fall, spring, summer
Current concepts in health, exercise and wellness. Emphasis placed on personal health theories, attitudes, beliefs and behaviors. Cross listed as EXW 100, HES 10. Credit allowed only for EPE 100 or EXW 100 or HES 10.
General Studies SB

EPE 105 Physical Education Activity. (1)
fall, spring, summer
Beginning instruction in a wide variety of sports such as aerobics, aquatics, racquet sports, physical conditioning and golf. 3 hours per week. Y grade only. May be repeated for credit. Fee. See EPE Notes 1, 2.

EPE 110 Movement Analysis Laboratory. (1–2)
fall, spring, summer
Practical application of biomechanical, physiological, psychological and learning principles in the analysis of skill acquisition and performance. May be repeated for credit. Fee. See EPE Note 1. Prerequisite: EPE 105 proficiency, ESPE major.

EPE 191 First-Year Seminar. (1–3)
fall and spring

EPE 200 Introduction to Exercise Science and Physical Education. (3)
fall, spring, summer
Introduces the disciplines and professions associated with ESPE including an overview of historical and philosophical foundations.

EPE 205 Physical Education Activity. (1)
fall, spring, summer
Intermediate level. Continuation of EPE 105. 3 hours per week. May be repeated for credit. Fee. See EPE Notes 1, 2.

EPE 283 Prevention and Care of Athletic Injuries. (3)
fall and spring
Taping, injury recognition, emergency care and observation procedures in athletic training. Prerequisites: BIO 201, 202.

EPE 290 Sports Officiating. (3)
fall
Rules and mechanics of officiating used in football, basketball, and volleyball.

EPE 292 Sports Officiating. (3)
spring
Rules and mechanics of officiating used in softball, slow and fast pitch baseball and track and field.

EPE 305 Physical Education Activity. (1)
fall, spring, summer
Advanced level. Continuation of EPE 205 with instructor approval. 3 hours per week. May be repeated for credit. Fee. See EPE Notes 1, 2.

EPE 310 Collegiate Sports. (1)
fall and spring
Participation in men's or women's intercollegiate competition. May be repeated for 4 hours, 1 per year. Y/E grade.

EPE 334 Functional Anatomy and Kinesiology. (3)
spring
Muscles, bones, joints and nerves and how they produce movement. Emphasizes muscle origins, insertions, actions and innervation. Lecture, lab. Prerequisite: BIO 211.

EPE 335 Biomechanics. (3)
fall, spring, summer
Basic anatomical and mechanical principles applied to human movement. Emphasizes kinematics and kinetics. Lecture, recitation, lab. Fee. Prerequisites: BIO 201, MAT 117, PHY 111.

EPE 340 Physiology of Exercise. (3)
fall, spring, summer
Physiological mechanisms of acute responses and chronic adaptations to exercise. Lecture, recitation, lab. Fee. Prereq: sites BIO 201, 202, HM 111.

EPE 345 Motor and Developmental Learning. (3)
fall, spring, summer
Principles of motor skill acquisition across the lifespan focusing on the learner and the learning environment. Lecture, recitation, lab. Fee. Prerequisites: BIO 201; PGS 101.

EPE 348 Psychological Skills for Optimal Performance. (3)
fall, spring, summer
Applies psychological techniques and theory to improve effectiveness and performance in sport and related areas.
General Studies SB

EPE 352 Psychosocial Aspects of Physical Activity. (3)
fall, spring, summer
Interrelationship between physical activity and psychosocial variables including socialization, cultural values, aggression and motivation, including the psychological benefits of physical activity and exercise adherence. Lecture, recitation. Prerequisite: PGS 101.
General Studies SB, C

EPE 361 Physical Education in the Secondary School. (3)
fall and spring
Current trends and theories such as effective programs, coed, segregated issues, contracting, curriculum and administration.

EPE 370 Advanced First Aid. (3)
selected semesters
Assessment, management, treatment of wounds, injuries, shock, poisoning, burns, sudden illness, emergency response and cardiopulmonary resuscitation. Lecture, lab. Fee.

EPE 376 Physical Education for the Elementary School (3)
fall and spring
Scope and values of physical education in the elementary school. Methods, materials and practice in teaching activities for primary, intermediate and upper grade

EPE 382 Physical Education for the Atypical Student. (3)
fa and spr ng
Tea h ng nd v duals w th hand capp ng cond t ons phys ca sk and act v t es.

EPE 400 Teachng Phys cal Activity Concepts. (3)
fa and spr ng
Ana yzes and cr t q es teach ng concepts pr c p es and sk s out ned n Ar zona Phys ca Act v ty Standards Eva uates nat ona gu de nes for pr m t ng phys ca act v ty Prerequ s tes ENG 101 or 107 102 or 108 EPE 200 or ts equ va ent .
Genera Stud es L

EPE 412 Biomechanics of the Skeletal System. (3)
fa
B omechan cs of t ssues structures and major jo nts of the musc loske eta sy tem D scuss on of njury mechan ms Lectu e d scus s on some abs Prerequ s te EPE 335 or nstru tor approva

EPE 413 Qualitative Analysis in Sport Biomechanics. (3)
spr ng
Deve ops systemat c approa h for detect ng and orrect ng errors n human performance us g anatom ca and mechan ca pr c p es Lec ture, ab. Prerequ s te EPE 335

EPE 414 Electromyographic Kinesiology. (3)
fa
Muscu ar ontr but ons to human movement musc e mechan s, e e trophys o og ca bas s and pract ca pp cat on of e ectromyography Lecture d scuss on Prerequ s tes. EPE 335 340. nstructor appr va
General Stud es L

EPE 440 Exercise Biochemistry. (3)
fa
Study of b oenerget c and etabo sm of ce u ar ke eta musc e heart and ver rgane es and prote ns dur ng exer se Prerequ te EPE 340

EPE 441 Physiology of Women in Sport. (3)
spr ng
Phys o og a aspects of wo en engag ng n phys ca act v ty Empha s zes factors affect ng performan e and hea th throug out fe Prereq u s te EPE 340
Genera Stud es L

EPE 443 Exercise Endocrinology. (3)
spr ng
D s uss ons of current re earch and theory concern ng hormona changes du ng exerc se Lecture d cuss on Prerequ s te EPE 340 or nstructor approva
Genera Stud es L

EPE 444 Metabolic Adaptations to Exercise Training. (3)
fa spr ng summer
Exam nes phys o og c adaptat ons to exer se tra n ng as they re ate to metabo sm and t ss e funct ons Prerequ s te. EPE 340

EPE 448 Applied Sport Psychology. (3)
spr ng
Psycho og ca theor e and techn que app ed to a spo t to enhance the performance and persona growth of ath etes and coaches ec ture d cuss on Pre equ te EPE 352 or ts equ va ent
Genera Stud es L

EPE 452 Exercise Psychology. (3)
spr ng
Co tempo a y research and theory as re ated to human behav or and hea th n an exer se sett ng Prerequ s te. EPE 352
Genera Stud es SB

EPE 460 Theory of Strength Training. (3)
spr ng
Research and theor e on deve op g muscu ar strength programs fo deve op ng muscu ar strength Lecture d scuss on Prerequ s tes EPE 335 340
Genera Stud es. L

EPE 478 Student Teachng in Secondary Schools. (3–12)
fa and spr ng
Pract ce of teach ng Relat onsh p of pract ce and theory n teach ng Prerequ s te two comp ete semesters of b ock or ts equ va ent

EPE 480 Methods of Teaching Physical Educat on. (3)
fa and spr ng
Methods of struct o organ zat on and presentat n of appropr ate content n e ementary and secondary phys ca ed cat on P erequ s tes EPE 361 376 Corequ s te student teach ng or nstructor approva .

EPE 484 Internship. (6)
se ected semesters

EPE 485 Advanced Techn ques of Athletic Training. (3)
spr ng
Advanced ourse n athlet c tra n ng des gned for students seek ng NATA cert f cat on Empha zes therape t moda t es and rehab ta t on procedures Prerequ s tes EPE 283 370 CPR cert f cat on

EPE 500 Research Methods. (3)
fa
ntrodu e the bas c aspects of research nc ud ng prob em se e t on terature rev ew, nstrumentat on data and ng, methodo ogy and the wr t g of research repo ts and art c es

EPE 501 Research Statistics. (3)
spr ng
Stat t ca pro edures· samp ng techn ques exerc se test ng exerc se pre cr pt on, hypothes s test ng and exper menta des gn a they re ate to re earch pub cat ons

EPE 505 Applied Exerc se Physiology Techniques. (3)
fa
nvest gat ve techn ques sed in the app ed exerc se phys o ogy abo ratory Emphas zes pu monary funct on body compo t on, and ar d oresp ratory asses ment Lecture ab Fee Prerequ s te EPE 340.

EPE 510 Introduct on to Biomechanics Research Methods. (3)
fa
App es mechan cs to human movement ana y s c udes ons der at on of two d mens ona mag ng techn ques force mea urement e ectromyography and data process ng methods Lecture, d scuss on some abs Prerequ s te· EPE 335 or nstructor appr va

EPE 520 Sport Psychology. (3)
fa
Current research n sport p ych ogy w th an emp as s on perfor mance e hancement nc udes quest onna re psychophys o og ca and be av ora esearch methods Lecture d scuss on Prerequ s tes· EPE 448 500

EPE 521 Motor Development, Control, and Learning. (4)
spr ng
heory and resear h on motor sk acqu s t on c ud ng earn ng con tro and deve opment e , growth ch dren and exer ise and deve op ment earn ng Lectu e d scuss on ome abs Prerequ tes EPE 345 500 501

EPE 522 Exercise Psychology. (3)
spr ng
Contemporary research and theory as re ated to human behav or and hea th an exerc se sett ng Lecture d scuss on. Prerequ s te EPE 500

EPE 530 Exercise Physiology. (3)
fa
Immed ate and ong term adaptat ons to exerc se w th spec a refer ence to tra n ng and the ro e of exer se n card ovascu ar hea th Pre req s te EPE 340

EPE 531 Physiology of Women in Sport. (3)
spr ng
Phys o og a aspects of women engag ng n phys ca act v ty Empha s zes factors affect g perfo mance and hea th thr ughout fe. Prereq u s te EPE 34

EPE 561 Administration of Athletics. (3)
se ected semesters
Manag ng an ath et c program nc ud ng f na c ng budget p c es stag ng and promot on of ath et c conte ts s hedu es, tr ve nsur ance and c rrent ath et c trends

L teracy an t a q ry **MA** mathemat **CS** o puter tat st cs q ant tat ve a p at o **HU** human t e an f n art **SB** c a and behav ora ence **SG** at ra e ce—g nera core u e **SQ** atura c e e—q a t tat v **C** cu tura d ver ty the ted States **G** g oba **H** h to ca ee Genera Stud e age 83

EPE 570 Programs and Specia Top cs in Adapted Physical Education. (3)
fa
Contemporary adapted deve pmenta remed a a d orrect ve phys ca educat p og ams, und st nd ng of pr n p es prob ems and re ent deve opme t n th area

EPE 572 Trends and Issues in Phys cal Education. (3
spr ng
teratu e esearc and pra t es n contemporary phy ca edu a t n nc ud ng f nan es T t e X. tea ng a d oa ng p o oph e schoo rgan zat on and nontea g p y a ed cat p ograms

EPE 573 Curr cu um and Instruct on in Secondary Physical Education (3)
fa
Cu rent c rr cu um and n tru t on pra t e and re earch n sec d ary s hoo phys ca educat on Prerequ te ESPE n a or or tea ng exper ence

EPE 576 Phys ca Education for E ementary School Chi dren. (3)
fa
Current pract ces and resear h perta g t e ementary schoo phy ca educat on pr gram

EPE 578 Student Teaching n Secondary Schools (6–12)
fa and spr ng
Pract ce of teach ng Re at on p of the ry and pract e n teach ng Pre equ te comp et on of a requ red cour e w rk or t equ va ent pr or to student teach g

EPE 599 Thesis. (1 12)
se ected seme ter

EPE 610 Advanced Topics n Biomechanics. (3)
spr ng
Three d mens ona mag g tec n ues data a a ys s theo y and nte grat n of b omecha cs research t c ude or na esea h project Le ture d scuss o some ab Prerequ s te EPE 510 nstru tor approva

EPE 621 Motor Learn ng Control. (3)
fa
D scuss on of o tempo a y resear h ssues n motor earn ng and contro nc udes ehav ora and neur phys g ca ssues. Lecture d scuss on Prerequ te EPE 521

Omnibus Courses. Fo an exp a at f co rses offered but not spec f ca y ted n th s cata og ee Om bus C urses age 56

HEALTH SCIENCE (HES)

HES 100 Introduction to Health and Wel ness. (3)
fa spr ng summe
Current concepts n hea th exerc se and we ne Emphas s p aced on persona hea th theor es att tudes be ef a d behav ors Cross sted as EPE 100 EXW 100 Cred t s a owed for on y EPE 10 or EXW 100 or HES 100
Genera Stud es SB

Omnibus Courses. For an e p anat on of course offered but not spec f ca y sted n th s cata og see Omn bus Cour es, page 56

Department of Family and Human Development

www.asu.edu clas fhd
480 965-6978
COWDN 106

Richard Fabes, Chair

Professors: Chr stopher, Fabe Gr ff n Hoover Ladd, Mart n, Roosa

Associate Professors: Bou n Johnson Dumka W son

Assistant Professors: Han sh, u, Madden Derd ch Sp nrad Updegraff

Senior Lecturer: We gand

Lecturer: Bodman

FAMILY AND HUMAN DEVELOPMENT—B.S.

For the B S de ree in Fami y and Hum n Developmen t at ASU Main, students must pursue the c oncentration in family studies child development.

Family Studies Child Development

The concentration in family stud es chi d development consists of the follow ng core cours es:

CDE	232	H man Devel pment *SB* 3
CDE	43	Infan t/Toddler Development n th Fan ily *SB* . . . 3
CDE	498	Pro Seminar 6
		or FAS 498 Pro Sem nar 6
FAS	331	Marr age an d Fa ily Re ati nships *SB* 3
FAS	36	Introd ct n t Fam ly Child Research Meth ds *L* . . . 3
FAS	37	Family, Ethnic, and Cultur l Divers ty *SB* . . 3
FAS	431	Parent Adoles ent R lationsh ps *SB* . . 3
FAS	435	Advanced Marr age a d Fam ly Relati ship *L Sb* 3
FAS	44	Fundamentals f Marr age an d Fam ly he apy . . . 3
Total		 3

In addit on, 12 hours of electives must be t ken from the fol ow ing:

CDE	33	Early Ch ldh d Intervent on 3
CDE	338	Child Development Pra ti u . . 3–4
CDE	437	Observational and Nat ra istic Meth ds of Studyin Children *L SB* 3
CDE	444	Children and Poverty 3
CDE	498	Pro Semi ar. 3
		or FAS 498 Pro Se i ar 3
		or FAS 499 Indiv idual z d Instr t ct 3
FAS	3 1	Introd ct n t Parent t 3
FAS	33	Pe s nal Growth i Hu an Rel t n ip *SB* . . 3
FAS	332	Hu an Sexual ty *SB* 3
FAS	39	S pervise Re earch Expe ence 1 3
FAS	43	Fa ily Deve pment . . . 3
FAS	484	Intern sh p. 3

FAMILY AND HUMAN DEVELOPMENT MINOR

The minor in Family and Human Development consists of 18 semester hours in which students specialize in family studies child development.

At least 12 of the 18 hours must be in upper division courses.

Students take the following courses.

CDE 232	Human Development *SB*	3
FAS 331	Marriage and Family Relationships *SB*	3
FAS 440	Fundamentals of Marriage and Family Therapy	3
Total		9

Three courses (or nine semester hours) must be selected from the following and at least one course must be a CDE course:

CDE 337	Early Childhood Intervention	3
CDE 430	Infant/Toddler Development in the Family *SB*	3
CDE 444	Children and Poverty	3
CDE 498	Pro Seminar	3
	or FAS 498 Pro Seminar	3
FAS 360	Family, Ethnic, and Cultural Diversity *SB, C*	3
FAS 431	Parent Adolescent Relationships *SB*	3

SECONDARY EDUCATION—B.A.E.

Family and Human Development. Applications are not being accepted at this time. The major teaching field consists of 42 semester hours in family and human development and six hours in interior design. Major courses required are as follows:

CDE 232	Human Development *SB*	3
CDE 337	Early Childhood Intervention	3
FAS 330	Personal Growth in Human Relationships *SB*	3
FAS 331	Marriage and Family Relationships *SB*	3
FAS 431	Parent Adolescent Relationships *SB*	3
FRD 451	Field Experience	1–12
HEE 461	Presentations in Home Economics	3
HEE 480	Methods of Teaching Home Economics	3–4
HEE 481	Teaching Occupational Home Economics	3
NTR 10	Introductory Nutrition	3
NTR 142	Applied Food Principles	3
Total		31–43

Also required are two interior design courses.

The College of Education has additional requirements for teacher certification: Arizona Educator Proficiency Exam professional knowledge only; 35 hours within the Initial Teacher Certification program.

GRADUATE PROGRAMS

The faculty in the Department of Family and Human Development offer programs leading to the M.S. and Ph.D degrees. See the *Graduate Catalog* for requirements

CHILD DEVELOPMENT (CDE)

CDE 232 Human Development. (3)
fall spring summer
Lifespan development from conception through adulthood with emphasis on family influences. Recognizes individual variations in the universal pattern of development. Prerequisites PGS 101, SOC 101
General Studies SB

CDE 338 Child Development Practicum. (2–4)
fall and spring
Supervised practicum in Child Development Laboratory preparing students for work in child care centers and agencies serving young children and families. Lab. Pre- or corequisite CDE 337

CDE 430 Infant/Toddler Development in the Family. (3)
fall and spring
Examines the development of infants toddlers the socialization processes of families and the interactions of these processes Prerequisite CDE 232 or its equivalent
General Studies SB

CDE 437 Observational and Naturalistic Methods of Studying Children. (3)
selected semesters
In depth examination of implementing observational and naturalistic studies of children in a variety of settings 2 hours lecture, 3 hours lab Prerequisites CDE 436 hours in psychology
General Studies LSB

CDE 444 Children and Poverty. (3)
fall
Impact that poverty has on children and their families 2 hours lecture 3 hours lab. Prerequisites CDE 232 or its equivalent 6 hours in upper division social science.

CDE 498 Pro-Seminar. (1–7)
fall and spring

CDE 499 Individualized Instruction. (3)
fall and spring

CDE 531 Theoretical Issues in Child Development. (3)
fall
Major developmental theories related research and their application to family interaction Prerequisites both CDE 436 and 437 or their equivalents or only instructor approval.

CDE 533 Research Issues in Child Development. (3)
spring
In depth exploration and critique of research focusing on child development in a family setting Prerequisites CDE 531, FAS 500

CDE 534 Applied Child Development. (3)
spring
Integrates child development family theory and research to understand developmental problems and provide a foundation for intervention Prerequisites CDE 531 FAS 500

CDE 634 Advanced Applied Child Development. (3)
spring
Advanced training in research and theory based approaches to developing and evaluating prevention programs for children at risk Prerequisite CDE 534 or instructor approval

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog see Omnibus Courses page 56

FAMILY STUDIES (FAS)

FAS 301 Introduction to Parenting. (3)
fall and spring
Integrated approach to understanding parenting and parent child interactions Teevs in course. Prerequisites PGS 101 SOC 101 or its equivalent

FAS 330 Personal Growth in Human Relationships (3)
fall spring summer
Personal development and behavior as related to competency in interpersonal relationships with in the family Processes of family interaction. Prerequisites PGS 101, SOC 101 or its equivalent
General Studies SB

Literacy and critical analysis **MA** mathematics **CS** computer statistics quantitative applications **HU** humanities **SB** social and behavioral sciences **SG** natural sciences genera- re- orse **SQ** natural science quantitative **C** cultural diversity in the nite States **G** global H h t ca ee Gene a St d s page 8

FAS 331 Marriage and Fami y Re ationships. (3)
fa spr ng summer
s ues cha enges and oppo tu t es re at ng to present d y marr age and fam y v ng Facto s nf uenc ng nterre at ns w th n the fam y Prerequ s te a cou se n psycho ogy or so o ogy
Genera Stud es SB

FAS 332 Human Sexuality. (3)
fa and spr ng
Re at nsh p of sex a ty to fam y fe and to ma or soc eta s ues Emphas zes deve op ng hea thy pos t ve and re pons ve ways of nte grat ng exua and ot er aspects of human v ng Prerequ s te PGS 101
Genera Stud es SB

FAS 361 Introduction to Family Child Research Methods. (3)
fa and pr ng
Exam es ba c methods app ed to fam y h d re earch, cr t ques cur ent researc t rature and app es meth ds urrent top cs Pre equ s tes CDE 232 FAS 331
Genera St d es L

FAS 370 Family, Ethnic, and Cultura Diversity. (3)
fa a d spr ng
ntegrat ve approa h to understan ng h stor ca and cur ent ssues re ated to the struct re a d ter a dynam cs of d ve se Amer can fam es Lect re d scu s on Cros sted as AFS 370 Cred t s a owed for on y AFS 370 or FAS 370 Prerequ te PGS 101 or SOC 101
Genera Stud es SB C

FAS 390 Superv sed Research Exper ence. (1 3)
fa spr ng summer
Pract ca , f stha d exper ence w th n curre t facu ty research projects n fam y stud es or ch d deve opment Y grade n y may be repeated f r t ta of 6 hours. P erequ tes FAS 361; 3.00 GPA n ma or, pprova of superv ng facu ty membe before reg strat on

FAS 431 Parent-Ado escent Re ationships. (3)
fa
Dynam cs of t e re at nsh ps between parent and ado escents Deve opmenta c aracter t cs f ado e cence and the o respond ng adu t stage Prerequ s tes CDE 232 FAS 331
Genera Stud es SB

FAS 432 Family Development. (3)
se ected semesters
Normat ve change n fam es over t me from format on unt d s o u t on Emphas zes the mar ta ubsystem n m dd e and ater years Prerequ s tes both CDE 232 and FAS 331 or on y nstructor approva

FAS 435 Advanced Marriage and Fami y Relationships (3)
fa and sp ng
Re ent research, ssues and tre ds re at ng to marr age and fam y nteract on nf uence of fam y ompo t on, hys ca e v ronment, fam y patterns and va ues on fam y dy am cs Prerequ s tes. FAS 331 361
Genera Stud es L SB

FAS 440 Fundamentals of Marriage and Fam ly Therapy. (3)
fa and spr ng
ntroduce the fundamenta or entat ons of marr age a d fam y ther apy

FAS 484 Internsh p. (1 3)
fa and spr g

FAS 498 Pro-Seminar. (1–7)
fa and spr g

FAS 499 Individualized Instruction (3)
fa pr ng mmer

FAS 500 Research Methods. (4)
fa
Purpose of research Exper menta de gn meth ds of data co ec t on and thes s prop sa deve opment nc udes pract a app cat o research abo atory 3 hours ecture 3 hour ab

FAS 530 Introduction to Marriage and Family Therapy. (3)
fa
ntrod ces majo ma r age a d fam y therapy or entat ons Rev ews h story theory app cat on, and outcome research for ea h or enta t n Prerequ s te adm ss on to graduate progr m n Fam y and Human Deve opment w th a concenfrat on n fam y stud es r nstruc tor approva

FAS 531 Family Theory Development. (3)
spr ng
H stor ca and current app oaches to theory deve opment eva uat n and app at on n fam y stud es Prerequ te FAS 435 or nstructor approva

FAS 536 Dysfunctional Marriage and Family Relationships. (3)
fa
Cr t ca rev ew of current theory and emp r ca ev dence onne t ng mar ta and fam y nteract on pattern w th aberrant behav or Prereq u s te PGS 466 or PSY 573 or t equ va e t or n tructor approva

FAS 537 nterpersonal Relationsh ps. (3)
fa
Cr t ca exam nat on of current theoret ca and resea ch deve opments n the area of nte persona re at onsh ps Emphas ze app cat ons for re earch and ntervent on Prerequ te FAS 435 or ts eq va ent or nstructor approva

FAS 538 Advanced Techniques in Marriage and Family Therapy. (3)
spr ng
dept rev ew of assumpt on and advanced techn ques asso ated w th contemporary marr age and fam y therapy app aches Prerequ s te a graduate eve course n mar age and fam y therapy o struc tor approva

FAS 539 Research Issues in Family Interaction. (3)
fa
Cr t ca rev ew of c rre t and past research n the area of fam y dynam cs Emphas zes nteract na processes w th n the fam y Pre requ s te FAS 435 or ts eq va ent or nstructor approva .

FAS 540 Assessment in Marr'age and Family Therapy. (3)
spr ng
Assessment and utcome eva uat on of coup es and fam e nvo ved n mar ta and fam y therapy Lecture ab Prerequ s tes FAS 50 or ts equ va ent PSY 530 nstructor approva

FAS 580 Marriage and Family Therapy Practicum. (1 12)
fa and spr ng
Superv sed ca exper ence n marr age and fam y therapy nc udes deve opment of assessment and outcome eva uat on sk s Lectu e ab T p c may nc ude the fo ow ng
- F r t semester 3
- Second semeste 3
- Th rd semester 3

Prerequ s te nstructor approva

Omnibus Courses. For an exp anat on of ourses offered but not spec f a y ted n th s ata og see Om bus Courses page 56

FAMILY AND HUMAN DEVELOPMENT (FRD)

FRD 451 Field Experience. (1–12)
se ected sem sters
Superv sed f e d p acement n the a ea of student s oncentrat on w th a commun ty bus ness or agency Students must make arrangements w th nstructor 1 emester n advance of enro me t Prerequ s tes comp et on of 60 hours nstructor approva

Omnibus Courses. For an exp anat on of c rses offered but not spec f ca y sted n th s cata og see "Omn bus Courses page 56

HOME ECONOMICS EDUCATION (HEE)

HEE 461 Presentations in Home Econom'cs. (3)
se ected semesters
Presentat on and demonst at on techn ques teach ng home eco nom s. Deve opment of aud ov sua mater a s for home econom cs content area Prerequ s tes n or stand ng nstructor approva

HEE 480 Methods of Teach ng Home Economics. (3–4)
se ected semester
nstruct on organ zat on presentat on and eva uat o of ub ect mat te n home econom cs HEE students reg ster for 4 emester hours D etet c students reg ster for 3 emester hour .

HEE 481 Teaching Occupational Home Economics. (3)
se ected semesters
Career r entat on re ated to home econom cs co perat ve work re ated nstruct n programs and youth c ub adv ement asso ated

w th secondary home economi c programs Poss b e f e d tr ps Pre requ s te Fam y and Human Deve opment ma or or m nor

Omnibus Courses. For an exp anat on of courses offered but not pec f a y sted n th s cata g, see Omn bus Cour es page 56

Department of Geography

geography.asu.edu
480 965-7533
SCOB 330

Breandán Ó hUallacháin, Chair

Professors: Arreo a Ba ng Braze Burns, Cerveny Dorn, Gober, O hUallachá n, Pasqualett Zehnder

Associate Professors: Fa , Kuby McHugh

Assistant Professors: Edsa E s L, Wentz

Lecturer: Shaeffer

Geography is a discipl ne that integrates the physical and human dimensions of the world in the study of places, people, and environments. The mission of the Department of Geography is the creation, dissemination, and application of geographic knowledge and scholarship in a liberal arts and sciences tradition.

Undergraduate students may choose to pursue a B A. degree in Geography, B.S. degree in Geography, B.A.E. degree in Secondary Education, or minor in Geography. A grade of "C" or higher is necessary in all requ red Department of Geography courses. Both B.A. and B.S. degrees in Geography consist of a minimum of 45 semester hours. A minor consists of 18 semester hours

GEOGRAPHY—B.A.

A student choosing a B.A. degree in Geography may be interested in a liberal arts and sciences focus on the breadth of the field. A B.A. degree may also focus on a geographic regic n. In either case, the student crafts an individualized program of study in consultation with an advisor.

The B A. degree consists of courses in core geographic knowledge 10–11 semester hours) geographic skills 12 hours), a regional course (three hours , and electives (12 l ours), for a minimum of 37 hours in geography At least 18 hours in geography must be in upper division courses. The remaining nine hours are made up of electives from geography courses or related fields of study, chosen in consultation with an advisor.

Core Geographic Knowledge

GCU 102 Introduction to Human Geography *SB*	3
GCU 121 World Geography *SB, G*	4
GPH 111 I troduction t Physical Geography *SQ* or GPH 411 Phys ca Geo aphy	4
Total	10–11

Core Geographic Skills

GCU 495 Quantitative Meth ds in Ge raphy *CS*	3
GCU 496 Geograph c Research Meth ds *L*	3
GPH 371 Cart raphy *CS*	3
GPH 491 Ge graph c Field Methods	3
Total	12

Geographic Region

Ch ose one of the courses below, in sultation with an adviso 3

GCU 32_ Geography of U S and C nada *SB G*	3
GCU 323 Geography of Latin Americ a *SB G*	3
GCU 325 Geography of E trop *SB G*	3
GCU 326 Geography of A a *SB, G*	3
GCU 327 Geography of Africa *SB G*	3
GCU 328 Geography of Middle East an l North Africa *SB, G*	3
GCU 332 Geography of Aust al a and Ocea a *SB G*	3
GCU 344 Geo raphy of Hispanic Americans *SB C*	3
GCU 421 Geography of Arizona and Southwestern United States *SB C*	3
GCU 423 Geography of S uth Americ a *SB G*	3
GCU 424 Geography of Mex co a d M dd e America *SB G*	3
GCU 425 Ge graphy of the Mexican American B rderland *L SB G*	3
GCU 426 Geography of Russia and Surround ngs *SB, G*	3
GCU 433 Geography of S uth east Asia	3
GPH 433 Alpine and Arctic Environments *G*	

A student can design in consultation with an advisor, a general B.A. degree in Geography. In addition, there are three cooperative programs whereby a student receives a B.A. degree in Geography and an emphasis in Asian Stud ies, Southeast Asian Studies, or Latin American Studies.

Asian and Southeast Asian Emphasis. Students ma cring in Geography may elect to pursue an Asian or Southeast Asian emphasis combining courses from the major with selected courses of wholly Asian or Southeast Asian content. The Asian program requires 30 semester hours of Asian content courses, selected from the list drawn up by the Center for Asian Studies. Also required is knowledge of an Asian language: this is deemed to be fulfilled by 20 semester hours or equivalent in Chinese, Indonesian, Japanese, Thai, or Vietnamese The Southeast Asian Studies Certificate is awarded to Geography students who emphasize regional studies specialization in Geography and one year of Indonesian, Tha , or Vietnamese For more i formation, see "Asian Studies," page 336, and "Southeast Asian Studies," page 339.

Latin American Studies Emphasis. Students ma orin_ in Geography may elect to pursue a Latin American studies concentration combining courses from the major w th selected outside courses of wholly Latin American content. At least 30 upper division semester hours of the program must be in Latin American content courses, including 15 hours in geography or in courses approved by the Depart

L teracy a d cr t a qu y MA mathemat cs CS computer st t s qu nt tat ve pp cat o s HU humant e a d f e a t SB c and behav ra sc en es SG nat ra ence genera ore our SQ atura s ence—qua t tat ve C u tura d ver ty n the n t d Stat G g ob H h tor a See Gene a Stud e page 8

nent of Geography advisor and 15 in other disciplines. A reading knowledge of Spanish or Portuguese is required and a reading knowledge of the other language is suggested. The program must be approved by the Latin American Studies Center. See "Latin American Studies," page 335, for more information.

GEOGRAPHY—B.S.

The B.S. degree consists of classes in core geographic knowledge (10–11 semester hours), core geographic skills and core geographic techniques (15 hours), and electives (15 hours) for a minimum of 37 hours in geography. At least 15 hours in geography must be in upper division courses. The remaining nine hours are to be made up of electives from geography courses or related fields of study, chosen in consultation with an advisor.

Core Geographic Knowledge

GCU 102 Introduction to Human Geography *SB*	3
GCU 121 World Geography *SB, G*	4
GPH 111 Introduction to Physical Geography *SQ* or GPH 411 Physical Geography 3	4
Total	11

Core Geographic Skills

GCU 495 Quantitative Methods in Geography *CS*	3
GCU 496 Geographic Research Methods *L*	3
GPH 371 Cartography *CS*	3
GPH 491 Geographic Field Methods	3
Total	12

Core Geographic Techniques

Choice of three hours to be chosen in consultation with an advisor	3
GPH 372 Air Photo Interpretation	
GPH 373 Geographic Information Science I *CS*	
GPH 411 Cartographic Design *CS*	

Students seeking the B.S. degree take the required core of eight courses. The remaining four courses (12 hours) of geography electives and nine hours of geography or related fields of study vary among the options available for a B.S. degree in Geography. There are two specific departmental concentrations: meteorology climatology and urban studies. In addition, a student can design, in consultation with an advisor, an individualized B.S. degree emphasizing other areas within the major.

Meteorology Climatology Concentration. See an undergraduate advisor in the Department of Geography for the latest National Weather Service certification requirements. The required courses for the meteorology climatology concentration include a minimum of 39 semester hours in geography plus eight hours of related mathematics.

Core Courses

GCU 102 Introduction to Human Geography *SB*	3
GCU 121 World Geography *SB, G*	4
GCU 495 Quantitative Methods in Geography *CS*	3
GCU 496 Geographic Research Methods *L*	3
GPH 111 Introduction to Physical Geography *SQ* or GPH 411 Physical Geography 3	4
GPH 371 Cartography *CS*	3
GPH 373 Geographic Information Science I *CS* create other three hour techniques course if GPH 373 is taken to meet a core requirement	3
GPH 491 Geographic Field Methods	3
Total	25–26

Required Meteorology Courses

GPH 213 Introduction to Climatology	3
GPH 215 Introduction to Climatology Laboratory	1
GPH 409 Synoptic Meteorology I	4
GPH 410 Synoptic Meteorology II	4
GPH 413 Physical Climatology or GPH 413 Meteorological Instruments and Measurement 3 or GPH 414 Climate Change *G* 3	3
Total	15

Mathematics and Physics-Related Courses

MAT 270 Calculus with Analytic Geometry I *MA*	4
MAT 271 Calculus with Analytic Geometry II *MA*	4
MAT 272 Calculus with Analytic Geometry III *MA*	4
PHY 121 University Physics I: Mechanics *SQ*	3
PHY 122 University Physics Laboratory I *SQ*	1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3]	3
PHY 132 University Physics Laboratory II *SQ*[3]	1
Total	12

Three semester hours in transfer courses can also fulfill this requirement.

[2] Both PHY 121 and 122 must be taken to secure SQ credit.

[3] Both PHY 131 and 132 must be taken to secure SQ credit.

Urban Studies Concentration. The required courses for the urban studies concentration are as follows:

Core Courses

GCU 102 Introduction to Human Geography *SB*	3
GCU 121 World Geography *SB, G*	4
GCU 495 Quantitative Methods in Geography *CS*	3
GCU 496 Geographic Research Methods *L*	3
GPH 111 Introduction to Physical Geography *SQ* or GPH 411 Physical Geography 3	4
GPH 371 Cartography *CS*	3
GPH 373 Geographic Information Science I *CS* or another three hour techniques course if GPH 373 is taken to meet a core requirement	3
GPH 491 Geographic Field Methods	3
Total	25–26

Required Urban Geography

Choose one of the courses below	3
GCU 351 Population Geography *SB, G*	
GCU 357 Social Geography *SB* 3	
GCU 364 Energy in the Global Arena *SB, G* 3	
GCU 441 Economic Geography *SB* 3	
GCU 442 Geographical Analysis of Transportation *SB* 3	
One upper division or graduate level GCU course chosen in consultation with an advisor	3
Choose two of the courses below.	6
GCU 359 Cities of the World I *SB, G, H*	
GCU 360 Cities of the World II *SB, G* 3	
GCU 444 Geographic Studies: Urban Transportation *SB* 3	

GCL 494 ST G ɔgraphy t Phoenix 3
GCL 36 L rban Ge ɜgraphy *SB*
GCL 484 Hun an Geograph Internsh p 3
r ɔne upper di sion ele tive urs outs d
the department n a relate l field of tu dy
cl se n c nsultat o s th an advis or 3

L rban geography total 9

Th ɔe semester h rs in transfer courses can a fu fill th is requ ement

MINOR IN GEOGRAPHY

A minor in Geography is awarded to students who complete a minimum of 18 hours in geography. A letter grade of "C" or higher is required for all courses taken for the minor.

The following lower division courses are required.

GCL 102 Introducti r to Hun ar Geography *SB* 3
GPH 111 It troducti n to Physical Ge graphy *SQ* 4
or GPH 41 Phy ical Ge ography 3

Tota 6–7

The remain ng courses are selected n con unction with an advisor. At least one course should be a ge ɔgraphic skl l, for example, n ap reading (GPH 271 , cartography GPH 371 , air photo interpretation GPH 372 , geographic field methods GPH 491 , or a class in geographic information science GPH 373 . At least four courses sh ould be upper division classes in human, physical, or regional geography

SECONDARY EDUCATION—B.A.E.

The Department of Geography, in conjunction with the College of Education, offers courses toward a Bachelor of Arts in Education degree. The B.A E. degree consists c f 45 semester hours, of which a minimum of 30 must be in geography and 15 in a related teaching field or fields. The following courses are required:

GCU 102 Introducti n to Human Geo raphy *SB*. 3
GCU 121 World Geography *SB G*^ 4
GPH 111 Introduction to Phys ca Ge graphy *SQ* 4
or GPH 411 Physical Geography 3

Total 10–11

* Three semester hours in transfer courses can also fulfill this requirement.

In conjunction with an advisor, students choose remaining credits from three groups of human, physical, and regional courses

CULTURAL GEOGRAPHY (GCU)

GCU 102 Introduction to Human Geography. (3)
fa l and spr ng
Systemat c study of human u e of the earth Spat a organ zat on of econom c soc a po t ca and perceptua env ronments
Genera Stud es. SB

GCU 121 World Geography. (4)
fa and spr ng
De cr pt on and ana ys s of area var at o s soc a eco om c and po t ca phenomena n ma or wor d reg ons
Genera Stud es SB. G

GCU 141 Introduction to Economic Geography. (3)
fa
Product on d st but and c n umpt on of var ous types of com mod t e of the wor d and re at ons ps to the act v t es of humans
Genera Stud es SB, G

GCU 200 Orientation to Geography. (1)
fa
Ba c ntrodu t on to the Department of Geography fac ty u dergrad uate graduat n requ rements nd poss b e jobs and sk s n geogra phy Cross sted as GPH 20 Cred t s a owed for on y GCU 200 or GPH 200

GCU 240 Introduction to Southeast Asia. (3)
fa
nte d sc p nary tr uct n to the cu tures re g on po t ca sys tems geography and h story f Southeast A a Cros sted as ASB 240 HST 240 POS 240 REL 240 Cred t s a owed for on y A B 240 or GCU 240 or HST 240 or P S 240 o REL 240.
Genera Stud es. G

GCU 253 Introduction to Cu tura and Historical Geography. (3)
se ected semesters
Cu tura patte ns c ud g suc phenomena a anguage re g on, and var ous a pects of mater a u ture Or g ns and d ffus on and d v on of the wor d nt cu tura areas
Genera Stud es SB G

GCU 294 Spec al Topics. (4)
once a year
Top s nc e g oba aware ess

GCU 322 Geography of U.S. and Canada. (3)
fa
Spat a d str but on of re evant phys ca econom c, and cu tu a phe nomena n the Un ted St tes and Canada
Ge era Stud e SB C

GCU 323 Geography of Lat n America. (3)
fa
Spat a d str but on of re evant phys a econ m c, and cu tura phe nomena n South M dd e and Car bbean Amer ca
Genera Stud es SB G

GCU 325 Geography of Europe. (3)
once a year
Broad and systemat c overv ew of Europe emphas z ng phys ca eco nom and cu tura phenomena
Genera Stud e SB G

GCU 326 Geography of Asia (3)
fa
Spat a d str but on of re evant phys ca econom c and cu tura phe nomena n As a exc ud ng t e former Sov et Un on
Genera Stud es· SB G

GCU 327 Geography of Africa. (3)
se ected semeste s
Spat a d str but on of re evant p ys ca econom c and cu tura phe- nomena n Afr ca
Genera Stud es: SB, G

GCU 328 Geography of Middle East and North Africa. (3)
se ected semesters
Spat a d str but on of re evant phys ca econom c and cu tura phe nomena n the M dd e East and North Afr ca Prerequ s te GCU 121 or n tructor approva
Genera Stud es SB G

GCU 332 Geography of Austral a and Ocean a. (3)
once a year
Spat a d str but on of re evant phys ca econom c a d cu tura phe nomena n Austra a New Zea and and Pac f c s ands
Gene a Stud es SB, G

L teracy and cr t a qu ry **MA** mathemat **CS** computer stat st s q a t tat v app at on **HU** h man t e and f ne art **SB** o a and be av ora e ce **SG** at ra e ce—ge e a ore urses **SQ** natura e e quant tat ve **C** tur d ver t n t e Un ted States **G** g oba H h tor c See Ge er St d e g 8

GCU 344 Geography of H spanic Amer cans. (3)
sp ng
Exam nes the home ands m grat ns ett ements ands ape ro es and e ected u tura trad t ons of H span c Ame cans
Genera Stud es SB C

GCU 350 The Geography of World Cr ses. (3)
fa and spr ng
Contemporary wor d r ses v ewed from a perspe t ve f geogr ph oncepts and techn q es
Genera Stud es SB G

GCU 351 Popu ation Geography. (3)
fa
Demograph c patterns· spat a tempora and tru tura nvest gat of the re at ons p of dem graph c var ab es t cu t ra e om and e v ronmenta factor
Genera Stud es SB G

GCU 352 Political Geography. (3)
se ected seme ter
Re at onsh p between the s ophys a env o ment and the state
Ge era St d es SB G

GCU 357 Social Geography (3)
once a year
Env onmenta percept on of nd v dua s and gr ps Stresse the pa t a aspe t of s a a d p ys a env ronments
Genera Stud es SB

GCU 359 Cities of the World I (3)
fa
H stor a evo ut on of rban patter s and tructure n the M dd e Ea t nd a Southeast A a Ch na Japan a d Europe
Genera Stud e SB G H

GCU 360 Cities of the World II (3)
spr ng
H stor ca evo ut on f urban pattern a d stru ture n at Ame a North Amer a Sub Sa ar n Afr and Austr as a
Genera Stud e SB G

GCU 361 Urban Geography. (3)
fa a d pr ng
Externa spat a re at on f c t te a ty structure and spat a a pects of urban prob em n var ou part of the wor d part u ar y n the Un ted States
Genera Stud e SB

GCU 364 Energy in the Global Arena (3)
spr ng
Produ t on tran portat n and c sumpt on of energy empha ng the e ectr power ndustry and ts e v r nmenta p ob ems
Genera Stud es SB G

GCU 394 Special Topics (1–4)
fa a d spr ng

GCU 414 Teaching Geography Standards (3)
fa and summer
t od ct on to Ar zona Geogr phy Standards for K 12 educators emphas z g ex t ng curr cu a and ustrated w th be t pra t e by ma ter teachers nternet

GCU 421 Geography of Arizona and Southwestern United States (3)
fa and spr ng
Geography of the S uthwe t w th an e phas s on Ar z na D v ded nt phy a geog a y h st ry pe p e a d eco omy
Genera Stud es SB C

GCU 423 Geography of South America. (3)
se ected semeste
Prerequ s te GC 323 r nstr cto app ova
Genera Stud es SB G

GCU 424 Geography of Mexico and Midd e America. (3
once a yea
Ce t a Amer ca and Mex o Prereq s te GC 2 or nst uctor approva
Ge era Stud es SB G

GCU 425 Geography of the Mexican American Borderland. (3)
spr ng
Geography of a b nat ona a d b cu tura reg on Exam nes sett eme t boundary s ues ethn c subreg o popu at on ha ge nd tr a deve opment and urban g wth Fee
Gen ra St d es L SB. G

GCU 426 Geography of Russia and Surround ngs. (3)
se ected semesters
Exam nes the eography of Ru a and ot er p st S v et tate Pre requ te GCU 121 or structor app ova
Genera Stud es SB G

GCU 433 Geography of Southeast Asia (3)
p g
Exam nes t e b ophy ca a d soc a feat res of Sout e st A a nat on a d peop es P erequ te GCU 3 6 or n tructor appr va

GCU 441 Econom c Geography (3)
onc a year
Spat a d str but n of p mary seconda y and tert ary e o o c and product on a t v t es Prerequ s te GC 141 or nst tor approva
Genera Stud s SB

GCU 442 Geographical Analysis of Transportation. (3)
fa
Netw rks modes econom cs and f ow at the urban nat ona a d te at o a sca e Prereq s te G U 141 or 441
Ge e a Stud es SB

GCU 444 Geographic Stud es in Urban Transportat on. (3)
spr ng
Current rban tra sp tat n ss e n metropo tan P oen x Lectu e tean pro e t Prereq s te GC 361
Genera Stud es· SB

GCU 453 Recreational Geography. 3)
se ected s m t s
Exam e prob em urround ng t e organ zat o and use of s ace f r ec eat on ntr du es ge graph c f e d s rvey methods of data co ec t on and ana ys s Po b e Satu day f e d tr p

GCU 455 H storica Geography of U.S. and Canada. (3)
se ected seme ter
Geograph ca perspect ve on th ev ut on f the n ted States a d Ca ada fr m pre Co umb an t mes to ear y 20th ent ry
Genera Stud es SB H

GCU 474 Pub ic Land Pol cy. (3)
se e ted emeste s
Geogr ph a pe t of feder pub c a d po cy ma agement a d s es mp a zes we tern w derness and re our e deve pment p b em
Gen ra St d es SB

GCU 484 Human Geography Internship. (3)
fa and spr ng

GCU 494 Special Topics. (1–4)
o e a year
op may n de the fo ow ng
• Ge graphy of P oe x

GCU 495 Quantitative Methods in Geography (3)
fa and sp ng
Stat t a techn que app ed t the ana y s of spat a d tr but n and e at o h ps introdu es mode s and theory ge graphy Pre e u te MAT 119
Genera Stud es CS

GCU 496 Geograph c Research Methods. 3
fa a d pr ng
S ent f c te hn ues used geograp c re ear P erequ te GC 49 G H 371 491
Genera Stud es L

GCU 515 Human Migrat on (3)
fa
E nom c po t a o a an geograph c fa tors nder y ng pop t on movements M grat n se e t v ty stream and ou ter str am a o m gr t on and grat n de s on mak ng ecture e r re e u te GC 351 r nstr ctor pprova

GCU 526 Spatial Land-Use Analys s. (3
se ected seme ter
Determ nat on c a s f t on and ana y of spat a var at n n and use patterns xam ne the pro es es affe t ng and u e change Prerequ te 15 hours n geography or nstructo approva

GCU 529 Contemporary Geographic Thought. (3)
fa
Comparat ve eva uat on of current ph osophy ncern ng the nat re and trends of geography. P ereq s tes 15 hou s n ge graphy st tor appr va

GCU 585 Advanced Research Methods in Geography. (3)
sp ng
Spec a zed esear h te hn ques nd methodo og e n econom po t ca r c tura ge g aphy

GCU 591 Sem nar. (1 3)
fa spr ng summer
Se ected t p cs e onom c p t ca or cu tura geography P ss b e f ed tr ps T p may nc ude the f ow ng
- Transpo tat o System Prosem nar
- Urban Geog aph c nformat on Sy tems

GCU 596 H'story of Geographic Thought. (3)
se ected semesters
H to ca deve opment of geograpl c thought fr m pre Greek days to t e ear y 0th century

GCU 598 Special Topics. (1–4)
se ected seme ters
Top cs may nc de the f ow ng
- Geography of the Mex an Amer an Border and 3 Fee

GCU 599 Thesis. (6)
fa and pr ng

Omnibus Courses. F a exp a at on f o rses ffe ed but not spec f ca y ted th s cata og ee Om b s C u se page 56

PHYSICAL GEOGRAPHY (GPH)

GPH 111 Introduction to Phys cal Geography. (4)
fa and spr ng
Spat a and fun t na re at n h p among c mates a dform so s water and p ant Cred t s a wed for n y GPH 11 or 411 3 h urs e t re 3 hou s b f ed t ps Fee
Genera Stud es SQ

GPH 200 Orientation to Geography. (1)
fa
Ba c ntrod ct n to the Department f Geography fa u ty undergrad uate graduat on requ rements and po b e ob and k s n geogra phy Cro s sted as GC 2 0 red t a wed f r n y G U 20 or GPH 200

GPH 210 Society and Environment. (3)
fa
Exam nes the ntera t on between soc a proce es key env r nmen ta ssues nd nat re s ro e a a resou ce at g ob and reg ona sca es
Genera Stud es G

GPH 211 Landform Processes. (3)
spr ng
Geograph c har cter t s of andf rms and earth surface pro e se em has z ng eros on transportat on depo t n, and mp at ons f r huma management of the env ronment Fee Prerequ s tes ENG 1 1 or 105 GPH 111
Ge era Stud es L

GPH 212 Introduction to Meteorology. (3)
fa
Fundamenta s of weather and c mate c ud g bas c atmospher c pro e es and e ement St dent who e curr cu a requ re a abora t y our e must a so reg ster for GPH 214 Prereq te GPH 111 or nstru t r approva
Genera Stud es SG f red t a so earned n GPH 214

GPH 213 Introduction to Climato ogy. (3)
spr ng
Fundam nta s of meteor g a c mato og ca ana ys s nc ud ng ter m no ogy and symbo ogy Recommended for meteor ogy mato ogy program tudent Prerequ s te nstructor approva

GPH 214 Introduct on to Meteorology Laboratory. (1)
fa
ntrod ces bas c meteoro og ca c mato og ca data and mea ure ments Suggested con urre t enro me t n GPH 212 3 hours ab
Genera St d es SG f cred t a so ea ned n GPH 212

GPH 215 Introduction to C imatology Laboratory. (1)
pr ng
F nd ment of meteoro g a mato og ca map ana ys s and nterpretat on. Recommended for meteoro ogy mato ogy program stude t . May be tak concurre t y w th GPH 213 Prerequ te nstruct approva

GPH 271 Maps and Map Reading. (3)
once a year
Map types ses m tat o s and evo ut on. Commun cat on v a paper and d g ta med u Nav gat on nterpretat on, project ns ources, ymbo s ass f cat on, ase hand ng

GPH 314 Global Change. (3)
fa
Re pon e of Earth natura systems atmo phere hydrosphere tho p ere b osphere t pa t envr nmenta change and effects of pot t a future c anges
G era Stud es H G

GPH 370 Geographic Information Technologies. (3)
fa and spr ng
nt du e m de geograp c nf rmat on techno og es nc ud ng cart graphy G S rem te ens ng g oba pos t on ng ystems and stat st ca a a yse Lecture ab
Genera Stud es CS

GPH 371 Cartography. (3)
fa and spr ng
Ph osophy and pra t ca aspect f map p oduct o emp oys commu cat s y b m data man pu at n, present t on dec s on mak ng genera zat on nework etter ng d g ta med a Prerequ s te GPH 111
Genera Stud e CS

GPH 372 Air Photo Interpretation. (3)
on e a year
Subset remote sens g n udes ph to raphy f ms aer a geometry age mpo ent stereoscopy photogrammetry ground truth ng nterpret p y ca cu tura e onom c te g nce nformat on Prereq u s te GPH 21 r a cour e n Cu tura Geography GCU or nstructor approva

GPH 373 Geographic Information Science I. (4)
once a year
H tory and bas c aspects of G S nc ud ng map and data f e structure onv rs on a d synthe w th a computer zed env ronment Prereq u te GPH 7
Genera Stud es S

GPH 381 Geography of Natural Resources. (3)
onc a year
Nature and d str but n f natura re our es and t e prob em and pr nc p e a oc ated w th the r use
Genera Stud e G

GPH 394 Specia Topics (1–4)
fa and spr g
T may ud the fo w ng
- Ge graph c nformat n S en e 3

GPH 401 Topics in Physical Geography. (1 3)
once a year
Open t st de t qua f ed to pur ue ndependent tud es Poss b e f ed tr p Prerequ s te n tructo appro a

GPH 405 Energy and Environment (3)
spr ng
S ur e regu atory and tec n ca co tro s d str but o a d n e q ence f the s pp y and human use of energy Prerequ s te a course n phys ca or fe s ences or nstr ctor approva

L t cy rt a q ry **MA** the at **CS** p t tat t c q a t tat ve app t n **HU** h m n e and f e art **SB** a and be a a ce e **SG** atu a e e enera e cour e **SQ** atu a ce e q a t t e **C** u tura d ver ty n the Un ted State **G** g ba H h tor c e enera tud e page 83

GPH 409 Synopt c Meteorology I. (4)
fa
D agnost c techn ques and synopt f re ast ng nc d s te hn q e of weather ana ys s map terpretat on a d sate te a d adar ana y s s Prereq s tes MAT 270 PHY 131 132

GPH 410 Synopt c Meteorology II. (4)
spr ng
D agnost c techn que and syn pt fore ast ng nc udes techn ques of weather ana y s map nterpretat on a d sate te a d rada ana y s s Pre equ s te GPH 409

GPH 411 Physical Geography. (3)
once a yea
ntroduces phys graphy and t e phy ca e ement of the env ron ment Cred t s a owed for on y GPH 411 r 111 F ed tr p

GPH 412 Physical Climatology. (3)
once a year
Phys ca processe n the earth atmo phere ystem on reg ona and g oba s a es c ncepts and ana ys s of e ergy moment m and mass ba ances Prerequ s tes both GPH 212 and 213 or on y nstructor approva

GPH 413 Meteorological Instruments and Measurement. (3)
once a year
Des gn and operat on of ground base and aero og a weather mea surement systems Co ect on reduct o storage et eva an ana y s s of data F ed tr ps Prerequ tes both GPH 212 and 213 or on y nstructor approva

GPH 414 Climate Change. (3)
spr ng
Survey of three c mate research areas pa eoc mat gy the r e e g greenhouse warm ng numer ca mode g Prerequ s te GPH 212 or nst uctor approva
Genera Stud es G

GPH 418 Landforms of the Western United States (3)
once a year
Stud es andforms and geomorph pro esses n t e western Un ted States n ud ng ecture topograph ca maps aer a photog aphs sat e te magery and f ed tr ps Lecture t ca nqu ry aboratory, f e d work Fee Prerequ s tes GPH 211 or ts equ va e t a Genera Stu es course
Genera Stud es L

GPH 422 Plant Geography. (3)
se ected semesters
P ant ommun t es f the wor d and the r nterpretat on emphas z ng North Amer can p ant a s c at ons Cro s ted as P B 422 Cred t s a owed for on y GP 4 2 or PLB 422 Prerequ s tes preferab y both PLB 200 a d 201 or on y B O 187 o on y GPH 111

GPH 433 Alpine and Arctic Env ronments. (3)
se ected semesters
Reg ona study of advantages and m tat n of the natura e v r n ment upon present and future pr b em nvo v ng re ource d tr bu t n h man act v t e and reg ona and nterreg ona ad ustment F ed tr ps Prereq s te GP 111 r nstructo appr va
Genera Stud e G

GPH 471 Cartograph c Des gn. (3)
fa
Advanced des gn us ng de ktop mapp ng Cartog aph c dec s on mak ng qua tat ve and quant tat ve yn b de gn pro ect n co or Pre requ s tes GPH 3?1 r structor approva
Gene a Stud es. S

GPH 473 Geographic Information Science II. (3)
fa
G S as a bas s fo m cr comp ter spat a ana ys s a d synthes s n ude d g t z ng databa e orga zat o pat a retr eva and grap cs Lecture ab. P equ s tes GPH 373 or nstructo approva CSE 100
Genera Stud es CS

GPH 474 Dynamic Meteoro ogy I (3)
fa
arge sca e atmo pher mot on k n mat s Newton aw w d equat n baroc n cs vort c ty and the m d at tude depres on Prereq u s tes. GPH 213 15. MAT 271 PHY 131 132

GPH 475 Dynamic Meteoro ogy II. (3)
sp ng
Top cs n c mate dynam s Genera c rcu at on numer a mode ng te e on e t o phenome a a d surface atmo phere nteract on Pre requ s te GPH 474 or nstru tor approva

GPH 481 Environmental Geography. (3)
once a year
Prob ems of e v ronmenta q a ty c ud ng uses of spat a ana ys s resear h des g a d f e d work urban and rur systems F e d tr ps Prereq s te nstructor approva

GPH 483 Geographic nformation Analys s. (3)
fa
Ba c of spat a data ana y Top cs n ude po nt pattern ana ys s spat a auto orre at n spat a regress on an k r g ng Lecture ab Prerequ s tes both ne 200 e e or above urse n geography r b o ogy r p ant b o ogy or g o ogy o p a n ng and one ba c stat st cs course GCU 495

GPH 484 Physical Geography nternship. (3)
fa a d spr ng
Ass st teac ng s xth grade student a s mp f ed ve s on of GPH 11 us ng hand on act v t es

GPH 491 Geographic F e d Methods. (3)
sp ng a d summer
F e d te h que nc ud ng u e of aer a photos arge sca e maps and fract ona code system of mapp ng urban and ru a f e d ana ys s to be done off ampus Fee Prerequ s tes GCU 102 121 GPH 111

GPH 494 Special Topics. (1–4)
se ected semesters
T p cs may nc ude t e fo w g
• Geograph c nformat on Ana ys

GPH 511 Fluvia Processes. (3)
once a yea
Geograp a aspect of pro es es of r ver eros transportat on ed mentat on emphas z ng spat a chara ter t c of f rces res s tance andforms sed ment, nc udes computer app cat ns Prereq tes b th GPH 111 r GLG 01 and 211 or GLG 362 or on y nst uctor appr va

GPH 533 Snow and Ice. (3)
spr ng
Pro e es d str b t on c mat c nteract o s of n w e emphas z ng ma s ba ance, snow strat g aphy metamorp sm and g ac er snow p ck mato ogy ctu e f d work Prerequ s te nst ctor approva

GPH 573 Geographic Information Science III. (3)
spr g
n depth ok at programm ng w th n G Focuses on programm ng and meth do ogy ut z ng spec f s ftware a d ba c c nt f c com put ng Le ture ab Prereq s te GPH 473 or n tructor pprova

GPH 575 Geographic App ications of Remote Sensing. (3)
se ected s me ters
ses mag ng and n mag ng methods of remote cqu t on f data n ud g sate te sen or a rb rne rada u t and sca n ng n ve t ona photograph c ensors and gro nd based equ pment F e d tr p Prerequ te G 585 r GPH 491 GPH 372

GPH 591 Seminar. (1 3)
fa and spr ng
Se ected top cs n p ys a ge graphy Poss b e f e d tr p

GPH 596 Advanced Spatial Stat stics. (3)
spr ng
Mu t va ate a d advanced stat st a techn ques n d ng B x Jen k mode ng and pe tra na y s Req res p ect pape and pre sentat n Sem nar Prerequ s te GC 495 or ts equ va ent

GPH 598 Special Topics. (1–4)
se ected semesters
Top cs may nc ude the fo w ng
• ntermed ate eograph nf mat on Sy tem

GPH 599 Thesis. (6)
fa a d spr ng

Omnibus Courses. For a exp a at o of courses offered but not pe f a y sted n t s cata og see Omn bu Cour es page 56

Department of Geological Sciences

geology.asu.edu
480 965-5081
PS F686

Simon Peacock, Chair

Regents' Professors: Buseck Gree ey, Moore

Professors: Burt Chr stensen Farmer, F nk, Ho oway, Knauth Lar mer Peacock Reyno ds Shock Stump, Tyburczy, W ams

Associate Professors: Arrowsm th Lesh n, O Day Sharp

Assistant Professors: Fouch, Garnero Tang

GEOLOGICAL SCIENCES—B.S.

The B S. degree in Geological Sciences requires 39 semester hours including the following core courses or their equivalents:

GLG 1 01 Intr duct on to Geolc y I Phys c t SQ, G	3
GLG 102 Introduction to Ge olo_y II Histor cal SG,' H	3
GLG 103 Introduction to Geoloo y I Labc ratory SQ .	1
GLG 104 ntroduction to Geology II Laboratory SG"	1
GLG 310 Stru tural Ceology	3
GLG 321 M neral ogy	3
GLG 400 Gec o_y Cc oqu um.	1
GLG 424 Petrology	3
GLG 435 Sediment lo y	3
GLG 451 Field Geology	3
GLG 452 Field Geolo y II	3
T ta	27

[1] Both GLG 10 and 103 must be taken to secure SQ cred t
Botl GLG 1 2 and 104 must be taken to secure SG credit

In addition, two of the following four branch courses must be taken

GLG 335 Pa eontology	3
GLG 4 8 Geophysics	3
GLG 470 Hydrog ology	3
GLG 481 Gec chemistry	3

To complete the total required hours, other upper division courses in geological sciences excluding GLG 300 and 304 or courses in related fields listed as approved by the department may be taken. See "College Degree Require ments," page 330

Supporting courses required in related fields include:

CHM 11 Genera Chemistry SQ	4
CHM 116 Genera Chemistry SQ	4
MAT 27 Calculus w th Ana ytic Ge metry I MA	4
MAT 271 Calculu w th Ana ytic G metry II MA	4
MAT 2 ? Calcu u with Analyt Ge metr III MA or MAT 2 4 E ementar Differential Equations MA 3	4
PHY 121 niversity Phys c Mechan cs SQ	3
PHY 122 Un versity Ph ys es a c ratory I SQ	1
PHY 131 n versity Phy cs II Electricit nd Ma n eti n SO	3
PHY 132 University Physics Laborato y I SQ	1
ta	28

Both PHY 12 and 1?_ must be taken tc secure SQ credit
[2] B oth PHY 3 and 32 must be taken t secure SQ c ed t

MAT 290 Calcu us I and MAT 291 Calculus II may be substituted for MAT 270, 271, and 272.

MINOR IN GEOLOGICAL SCIENCES

A minor in Geological Sciences is awarded t students who complete a minimum of 21 hours of geolog cal science courses Required courses are as follows

GLG 101 Introdu ti n t Geology I Physica SQ G	
GLG 102 I troduction tc Ce ology I H storical SG' H	
GLG 103 I troducti n to Geology Lab rat ry SQ	
GLG 104 Intr oduction to G ology I Lib ratory SG'	
GLG 310 Stru tural Ceo ogy	3
GLG 321 M nera o y	3
GLG 400 Ce o_y C quium	
Tot t	15

B th GLG 10 ar d 103 mu t be take n to sc ure SQ cr d t
- Both GLG 1 ?? an 1 104 n ust be take to secur SC cr t

The rema nin six sen ester ho rs may be chosen among other uppe division geological sciences courses, except GLG 300 and 400 after consultation with a departm ental adv sor

GRADUATE PROGRAMS

The facu ty in the Department of Geologica Sciences offer progra s leading to the de_rees of Master of Natura Science M S., and Ph D See the *Gra t te Cat log* for requirements.

GEOLOGICAL SCIENCES (GLG)

GLG 101 Introduction to Geology I (Physical). (3)
fa spr ng summ
Bas pr c p es of geo ogy geo hem stry and geophys cs Rocks, m nera s weather ng earthquakes mounta n bu d ng vo canoes water and g a er Po s b e weekend f e d tr ps
Genera Stud es SQ f c ed t a so ea ned n GLG 103 G

GLG 102 Introduction to Geology II (Histor cal). (3)
spr ng
Bas c pr nc p es of app ed geo ogy and the se of these pr nc p es n the te pretat on of geo og h story. Po s b e weekend f e d tr ps Fee Prerequ s te GLG 101
Genera Stud es SG f ed t a so ea ned n GLG 104 H

L teracy nd r t q ry **MA** the at **CS** c mp te tat t quant tat ve a p c t **HU** h an te and f e a t **SB** soc a a d be av ora en e **SG** at r e e ge e e use **SQ** t a e e q a t tat v e **C** t d ver ty the ted St te G g ba H h tor ca ee Genera t d e p ge 83

GLG 103 Introduction to Geology I Laboratory. (1)
fa spr ng summer
3 ho r ab some f e d tr ps Fee Corequ s te G G 101
Genera Stud s. SQ f cred t a so earned n GLG 101

GLG 104 Introduction to Geology II Laboratory. (1)
pr ng
Lab atory te hn q es nvo v ng map terpretat on cross sect ons a d fos ls 3 hours ab p b e f e d tr p Prerequ s te GLG 103 or ts eq va ent Corequ te GLG 102
Genera St d es SG f cred t a o earned n GLG 102

GLG 105 Introduction to Planetary Science. (4)
spr ng
So r sy tem ob ects and t e r geo g evo ut on s rfaces nteriors and atmo pheres week y aboratory f r data ana ys s and exper ments Lecture ab weekend f e d tr p
Genera Stud e SG

GLG 110 Geologic Disasters and the Environment. (3)
fa
Ge g ca stud e as they app y to nte a t ons between humans and earth nc udes geo og ca pr cesse a d hazards resources and g oba change
Genera Stud es SG f cred t a so earned n GLG 111 G

GLG 111 Geologic D'sasters Laboratory. 1)
fa
Bas c geo og a proces es and concept Emphas zes geo ogy re ated env ronmenta prob ems Ca e h tor es f e d stud e ab Corequ s te GLG 110
Genera Stud es SG f cred t a so earned n GLG 11

GLG 294 Special Topics. (1–4)
se cted semesters
Top cs may nc ude the fo ow ng
- Geo ogy f the P anets
  Fee

GLG 300 Geology of Arizona. (3)
once a year
Bas c and h tor a geo gy f s s m n ng energy resources env ronmenta prob em and cape deve pment and meteor te cast n examp es from A zona Ma ors who have taken GLG 101 for red t may ot en

GLG 304 Geology of the Grand Canyon. (2)
se ected seme ters
Rev ews the d scovery h sto y or g n, and geo ogy of the Grand Can yon of t e Co orad R ver A zona Requ res 6 day f e d tr p down the r ver f r t 6 days after commencement n May at student s expen e Requ re f e d re earch and term paper on tr p

GLG 310 Structural Geology. (3)
spr ng
Geo og c st uctures and the mechan ca processe nvo ved n the r format on 2 h u s ecture 3 h u s ab Po s b e f e d tr ps Fee Pre requ s tes GLG 01 MAT 27 or 290

GLG 321 Mineralogy. (3)
fa
Crysta chem stry crysta g aphy m nera dent f cat on or g n and cc r ence of m nera s y temat c m nera ogy 2 hours ecture, 3 hours ab p s b e f e d tr ps Prerequ s tes HM 113 MAT 270 or 290 Pre r corequ s te CHM 116

GLG 335 Paleontology (3)
fa
ntroduce concept and ana yt ca te h que n b ogeo ogy pa eob o ogy pa eoe o ogy and pa eoenv menta rec struct o from t e fos record 2 h urs ecture 3 hour ab Fee Prerequ s te both GLG 102 and MAT 270 or 290 or on y nstructor appr va

GLG 362 Geomorphology. (3)
se ected semesters
Land fo ms and processes wh ch eate and mod fy them Laboratory and f e d study of phys ograph c features 2 hour ecture 3 hours ab poss b e weekend f e d t ps Prerequ te G G 101 Pre or corequ s te G G 10

GLG 400 Geology Col oquium (1)
fa and spr ng
Presentat on of re ent esearch by facu ty and g ests Requ res wr t ten as gnme ts 1 emester hour requ r d f r Geo og ca Sc e ces majors may be repeated for a tota of 2 semester hours P erequ te 2 o rses n the department r nstructo approva

GLG 405 Geology of the Moon. (3)
se ected semesters
Current theor es of the or g n and evo ut on of the m on through ph toge og ca ana yses and cons derat on of geochem ca and ge phys ca constra nts Po s b e f e d tr ps to exam e Ar zona geo gy Fee Prerequ te GLG 105 or nstructor appr va

GLG 406 Geology of Mars. (3)
se e ted semesters
Geo og ca evo ut on of Mars through ana yses of spacec aft data the oret ca mode ng and tudy of terrestr a ana ogs emphas zes urrent work Poss b e f e d tr p to exam ne Ar zona geo ogy Fee Prerequ s te GLG 105 or nstructor approva

GLG 410 Computers in Geology. (3)
fa
Geo og ca comp ter sk s c ud ng data pro ess ng v sua zat on presentat on numer ca ana ys s oftware and hardware app cat ons 2 hours ecture 3 hours ab Prerequ s tes both GLG 1 1 and an upper d v s on course n geo ogy or on y nstructor approva
Genera Stud es CS

GLG 412 Geotectonics. (3)
se e ted semesters
Earthquakes earth s nter or format on of cean c and cont nenta crust and p ate tecton cs Emphas zes current work Prereq s te. GLG 310

GLG 416 Field Geophysics. (3)
pr ng
Methods of app ed geophys ca exp orat on se sm c ref act on grav ty e ectr ca res st v ty, geomagnet cs nc udes survey p a n g data acqu s t on process ng ana ys' and nterpretat on e t re f e d exerc ses Prerequ site a our e n geo ogy or nstr t r approva

GLG 418 Geophysics. (3)
fa
So d earth geophys cs; geomagnet sm grav ty e smo ogy heat f ow Emphas zes crust and upper mant e Prerequ s tes a comb nat on of GLG 310 and MAT 272 and PHY 131 or on y nstructor appr va

GLG 419 Geodynam cs. (3)
se ected semesters
Empha zes app cat on of ont nuum pr nc p e to geo og a prob ems nc ud ng thosphe c stre ses heat transfer f u d mechan s and rock rheo ogy Prerequ s te PHY 131

GLG 420 Volcanology. (3)
once a year
D str but on of past and present vo can sm types of vo can c act v ty mechan sm of erupt on, form and stru ture of vo anoes and geoc em stry of vo can act v ty Poss b e weekend f e d tr ps Fee Pre equ s te GLG 424

GLG 424 Petrology. (3)
fa
Or g n of gneous and metamorph c ro ks Opt ca m nera ogy hand spec men de t f cat on and th n sect on ana ys s 2 h urs ecture 3 hours ab poss b e weekend f e d tr ps Fee Prerequ s te· GLG 321

GLG 435 Sedimentology. (3)
spr ng
Or g n transport depos t on and d agenes s of sed ments and sed mentary rocks Phys ca an ys s hand spec men exam nat on and nterpretat on f rocks and sed ments 2 hours ecture 3 hours ab. poss b e weekend f e d tr ps Fee Prerequ s tes GLG 102, 321

GLG 441 Ore Deposits. (3)
se ected semesters
Or g n oc urrence structure, and m nera ogy of ore depos ts P ss b e weekend f e d tr ps Fee Prerequ te GLG 424 or n tru tor approva

GLG 451 Field Geology I. (3)
spr ng
Geo og ca mapp ng techn ques ng topograph c maps and aer a photos nte s ve f e d ba ed nstruct on Lab Prereq s tes GLG 31 321
Genera Stud es L

GLG 452 Fie d Geology II. (3)
summer
Cont nuat on of GLG 451 Lab Prerequ s te GLG 451
Genera Stud es L

GLG 455 Advanced Field Geology. (3–4)
once a year
Geo og c mapp ng n gneou sed mentary and metamorph c terra ns of the Bas n and Range prov nce of Arizona May be repeated for cred t Weekend f e d tr ps Fee Prerequ s te· structor approva

GLG 456 Cordilleran Reg onal Geology. (3)
se ected semesters
Systemat c coverage thr ugh pace a d t me of the geo og ca deve opment of western North Amer ca, emphas z ng the western Un ted States Fee Prerequ s te sen or ma or or graduate st dent n Geo og ca Sc ences or nstructor approva

GLG 461 Geomicrobiology. (3)
spr ng
Past and present nteract ons among m crob a fe geo og ca mater a s and b ogeochem ca cyc es nvo v ng carbon su fur phosphate n trogen, and m nera s Cross sted as M C 461 Cred t s a owed for on y GLG 461 r MIC 461 Prereq s tes ntroductory courses n chem stry a d m crob o ogy or geo og a sc ences , nst tor approva

GLG 470 Hydrogeology. (3)
spr ng
Geo ogy of groundwater oc urrence aqu fer and we hydrau cs water chem stry and qua ty contam nant transp rt, remed at n Emphas zes quant tat ve methods Prerequ s tes GLG 101 or 103 MAT 270 PHY 121

GLG 481 Geochemistry. (3)
spr ng
Or g n and d str but n f the chem ca e ements Geochem ca cyc e operat ng n the earth s atmosphere ydrosphere and thosphere. Cros sted as CHM 481 Cred t s a owed for on y CHM 481 o GLG 481 Prerequ te CHM 341 or 346 or GLG 321

GLG 484 Geology Internship. (3)
fa and spr ng
Ass st n teach ng f fth grade tudents a s mp f ed vers on of GLG 103 s ng hands on act v t es

GLG 485 Meteorites and Cosmochemistry. (3)
se ected semesters
Chem stry of meteor tes and the r re at onsh p to the or g n of the earth so ar system and un verse Cross sted as CHM 485 Cred t s a owed for on y CHM 485 or GLG 485

GLG 490 Topics in Geology. (1–3)
fa spring summer
Spec a top cs n a range of f e ds n geology May be repeated for cred t Fee Prerequ s te nstructor approva

GLG 495 Undergraduate Thesis. (3)
fa spr ng summer
Gu ded research cu m nat ng n the comp et on and presentat on of an undergraduate thes s based n uperv sed research depe dent study Prerequ s te GLG 499 hours forma conference w th nstructor nstructor and department cha r approva

GLG 499 Individualized Instruction. (1–3)
se ected semesters

GLG 500 Geology Colloquium. (1)
fa and spr ng
Presentat on of recent research by fa u ty and nv ted guests 1 semester requ red for a Geo og ca Sc ences graduate students May be repeated for a tota of 2 emester hou s Requ res research paper Prerequ s te nstructor approva

GLG 501 Geology of Arizona. (3)
once a year
Bas c and h stor ca ge ogy, foss s, m n ng energy resource env ronmenta prob ems andscape deve opment and meteor tes cast n examp es from Ar zona Requ res research paper

GLG 504 Geology of the Grand Canyon. (2)
se ected semesters
Rev ews the d covery h tory or g n and geo ogy of the Grand Ca yon of the Co orado R ver n Ar zona Requ res 6 day f e d tr p down the r ver f r t 6 days afte commencement n May at student s expense Requ res f e d research and term paper on tr p

GLG 510 Advanced Structural Geology (3)
s ected emesters
Mechan cs of rock deformat on emphas z ng re at onsh p between f e d observat on theory and exper ment Stress stra n s mp e const tut ve re at nsh ps, fa ure cr te a and the ba s of cont nuu meth ods Poss b e f e d tr ps Fee Prerequ s tes both GLG 31 and 424 or n y nstru t r approva

GLG 520 Advanced Phys'cal Volcano ogy. (2 3)
se ected seme ters
Se e ted vo can g c top cs, nc ud ng exp os ve er pt on proce ses ava f ow me han cs, and ntrus ve mechan sms Poss b e f e d t ps Fee Prerequ s te GLG 42 or nstructor approva

GLG 524 Advanced Igneous Petrology. (3)
se e ted s m st s
Theoret ca and pract ca aspects of the genes s of gneous rocks. Study of se ected tes Mode n abo at ry te hn que 2 hour ec ture 3 ho rs ab poss b e weekend f e d tr ps Fee Prerequ s te GLG 4 4

GLG 581 Isotope Geochemistry. (3)
se ected semesters
Geo hem stry and cosmochem stry of stab e and rad oact ve sot pe geochro o ogy otope equ br a Prerequ s te nstructor approv

GLG 582 Phys'ca Geochemistry. (3)
se ct d semester
App e t erm dynam c and k net c pr nc p es to geoc em ca pro cesses Prerequ s te CHM 341 or 346 or GLG 321

GLG 591 Seminar. (1 3)
fa spr ng summer
Top s n a range of f e ds n geo gy May be repeated for red t Fee Prerequ s te nstruct r app ova

GLG 592 Research. (1 12)
fa pr ng summer

GLG 598 Special Topics. (1–4)
fa spr ng summer
Spec a t p c n ge g ca sc ences May be repeated for cred t Top cs may nc ude the fo ow ng.
- Advanced F e d Ge gy 1 3
  Fee
- C ast c Sed mento ogy and Petro ogy 1 3
  Fee
- Cord eran Reg ona Geo ogy 1 3
  Fee
- F ndamenta P anetary Geo ogy 1 3
- Geo gy f Mars 1 3
  Fee
- Methods n Ge sc en e Teach ng 1 3
- Ore Dep s ts 1 3
  Fee
- Orogen ystems 1 3
- Petr ogy Petrog aphy 1 3
  Fee
- Pr nc p es of Strat graphy 1 3
  Fee
- Remote Sen ng 1
- Sed mento ogy 1 3
  Fee
- Vo cano ogy 1 3
  Fee

Prerequ te tructor approva

GLG 599 Thesis. (1–12)
fa spr ng sum er

GLG 792 Research. (1–12)
fa sp ng summer

GLG 799 D'ssertation. (1–15)
fa sp ng summer

Omnibus Courses. For a exp anat on of courses offe ed but not spec f ca y sted n th s ata g see Omn bus Course page 56

L teracy and cr t a nqu ry **MA** athemat s **CS** mp ter tat t u nt tat ve p at **HU** huma te a d t e a t **SB** a and ehav a e **SG** atu a e e gen a co co r es **SQ** natura en e—quant tat v **C** u tura d v ty n the ted St te **G** g oba **H** t r a See Genera Stud es ge 83

Department of History

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480 965-5778
SS 204

Noel J. Stowe, Chair

CORE FACULTY

Regents Professor verson·
Professors. Ade son, Bata den Burg Davis Fuchs, Gratton, Green, K e nfe d Lavr n, MacK nnon, Rosa es. S mpson Stowe, Tambs, T man Trennert Warn cke
Assoc ate Professors Barnes Carro , E Hame , Gray Gu ett Kahn Long ey, Powers, Rush, Samue son, Sm th, Soerge , Stoner Thornton VanderMeer Warren F nd ey·
Ass stant P ofessors Kap an, Koopmans, Manchester, Thompson Wh taker W son;
Sen or nstruct ona Profess ona Luey

AFFILIATED FACULTY

Chicana And Chicano Studies
Assoc ate Professor Escobar

Biology
Professor Pyne

Women's Studies
Professor. Rothsch d

HISTORY—B.A.

The B.A. degree in History consists of 30 semester hours in history and 15 hours in closely related fields, as approved by an undergraduate advisor in consu tation with the stu dent At least 18 hours in history courses and nine hours in related fields must be in upper division course work, with at least 12 of the upper division HST hours taken in residence at ASU Main. HST 300 Historical Inquiry and HST 498 History Pro Seminar are required for all degree candidates. Honors students may substitute HST 493 Honors Thesis for HST 498.

Students are required to complete course work in two dif ferent areas of concentration One concentration must be defined geographically: Asia, Europe, Latin America, or the United States. The second concentration may be thematic or geographic Students completing a thematic concentration must complete two courses outside the field of their geo graphic concentration. At least two history courses in either concentrati in must include topics outside the United States and Europe. Students must complete at least one course n the HST 302 306 "Studies in History' sequence

The major ncludes the to lowing:

1. one concentration of 18 hours 12 hours HST and six hours related field ,
2. one concentration of 15 hours 12 hours HST and three hours related field),
3. HST 300, three hours n ay be within a concentra tion :
4. HST 498, three hours may be w thin a concentra t on),
5. elective related field courses, six hours
6. two HST courses with content outside Europe and the United States may be within a concei tration :
7. two HST courses in th ematic concentration outside the geographic concentration; and
8. at least one course in the HST 302 306 "Studies in History" sequence as part of one concentration

A n inimum GPA of 2.25 n the 30 hours of history course work is required.

Asian Studies Certificate. Students majoring in History may elect to pursue an Asian Studies Certificate combining courses from the major with selected outside courses of wholly Asian content See "Asian Studies," page 336, for more information.

Jewish Studies Certificate. Students ma oring in History may elect to pursue the Jewish Studies Certificate con bin ing courses from the ma or with selected outside courses of wholly Jewish content. See "Jewish Stu lies," page 338, for more information

Latin American Studies Certificate. Students majoring in History may e ect to pursue a Lat n American Studies Cer tificate combining courses from the ma or with selected out side courses of wholly Lat n Amer can content See "Latin American Studies, page 338, f or more information.

Medieval and Renaissance Studies Certificate. Students ma oring in History may elect to pursue the Medieval and Renaissance Studies Certificate by successfully completing the requirements See "Medieval and Renaissance Studies," page 338, for more information.

Russian and East European Studies Certificate. Stu dents majoring in History may elect to pursue the Russian and East European Studies Certificate combining courses from the major with selected outside courses of wholly Rus sian and East European content See "Russian and East European Studies," page 338, for more information

Southeast Asian Studies Certificate. Students majoring in History may elect to pursue the Southeast Asian Studies Certificate combining courses from the ma or with selected outside courses of wholly Southeast Asian content See "Southeast Asian Studies," page 339, for more information.

Women's Studies Certificate. Students majoring in His tory may elect to pursue a Women's Studies Certificate by successfully completing the requirements See "Women's Studies," page 339, for more informat on

MINOR IN HISTORY

The History minor consists of 18 semester hours of course work, at least 12 hours of which are in upper division ce urse work. Students earning a minor in history must com

plete one 12 hour HST concentration geographic or the mat c), HST 300, and 498 The Departmei t of History requires a grade of at least "C ' in al courses in the m nor. A minimum of six upper div s on hours in the minor must be taken in res dence at ASU Main.

SECONDARY EDUCATION—B.A.E.

History. The major teaching field c ns sts f 42 semester hours, of which at least 30 must be in history courses. At least 18 must be in upper d v s on courses. At least 15 must be in U.S. history The remaining history and related area courses must be selected in consultation with an adv sor from the Department of History. All degree candidates must complete the following four course n ethods block·

HST 30 Histor ca Inquiry *L SB H* 3
HST 48 Meth ds ot Teaching History Classroon Res urces 3
HST 481 Meth ds of Tca h ng History Commu ity Reso irces 3
HST 498 PS H st ry Pr Se inar *L* . 3

Students should complete HS 30) before enrolling n HST 480, 481 and 498 A min mum GPA of 2 50 n history courses is required for admission to student teaching and for graduation. HST 480 and 481 may nc t be counted as part of the 42-hour requirement for the academic special zation.

GRADUATE PROGRAMS

The faculty in the Department of History offer programs leading to the M.A. and Ph D. degrees. A Scholarly Publ sh ing Certificate is a so available. See the *Graduate Catal g* for requirements.

HISTORY (HST)

HST 101 Global History S nce 1500. (3)
fa and spr g
Survey of Afr ca the Amer a and Eura a changes n commun ca t on, commun t es dem graphy conom cs env ronme t po t cs re g on techn gy warfare a d women. Lecture CD ROM e ectron c for m d sc ss on
Genera Stud es G H

HST 102 Western Civil'zation (3)
fa and pr ng
Or g ns and deve opment of Western oc et es and nst tut ons f om the anc e t w d thr ugh the M dd e Ages
Gene a Stud es SB H

HST 103 Western Civ l'zation. (3)
fa and spr ng
O g ns and deve pme t of Weste soc et e and n t tut ons from B ack Death t rough the Re a ssa e and Reformat on t t e E g t enme t
Genera Stud s· SB H

HST 104 Western Civ lization (3)
fa and spr ng
Or g s an d ve pment f Weste oc et es and nst tut ns from the F ench Revo t t the p ese t
Ge era Stud es SB G H

HST 105 Slavic Civ'l zation (3)
fa spr ng s mmer
D ve opment f S av tu e and soc et e from med eva Byza t um t the pre ent ntrodu t on to modern Euras a Lecture d cus s on e ectron c forum
Ge era Stud es SB H

HST 106 Asian Civi izat ons. (3)
once a year
C v zat ons of na Japan and nd a from ant qu ty to the 17th cen t ry
Genera Stud es SB G H

HST 107 As'an Civ'lizations. (3)
once a year
C v zat ons f Ch na Japan nd a and S utheast As a from t e 17th entury to t e present
Genera Stud es SB G H

HST 108 Introduct on to Japan. (3)
fa
H stor c su vey of t e peop e cu ture po t s and e onomy of Japan supp emented by aud ov sua presentat ons ntended for non maj rs
Genera Stud es. SB G H

HST 109 The United States to 1865. (3)
fa and spr ng
Growth of the Repub c from the co on a per od th ugh the C v War
Ge era Stud es SB H

HST 110 The United States Since 1865. (3)
fa and spr ng
Growth of the Repub c from the C v War to t e present
Genera Stud es SB H

HST 200 Historical Themes. (3)
once a year
Genera ntrodu t on to se ected themes n history May be repeated for c ed t when top cs vary
Genera Stud es SB H

HST 201 Historical Themes in As a. (3)
once a year
Genera ntroduct'o t se ected themes n As an h story May be repeated f r cred t when top s vary
Genera Stud es SB H

HST 202 Histor cal Themes n Europe (3)
once a year
Genera ntrod ct o to se e ted themes n European h story May be repeated for re t when top cs vary
Gene a Stud es SB H

HST 203 Histor ca Themes n Lat n America. (3)
once a year
Gene a ntr duct n to se e te themes n Lat n Ame c n h st y May be repeated f r cred t when top cs vary
G nera Stud e SB H

HST 204 Historical Themes in the Un'ted States. (3)
once a year
Genera ntrodu t on t se ected themes Un ted States h story. May be repeated f r cred t whe top s vary
Genera Stud es SB H

HST 210 Amer'can Social History. (3)
on e a year
Ame an soc ety from the o on pe od t the p esent Ethn c ty, ace age and sex as facto s h st r ca exper e ce Prerequ s te ENG 1 or 105
Genera Stud es L SB H

HST 211 Amer can Jew'sh History. (3)
se e ted semesters
C rono og ca ana ys s f Jews and da sm n Amer an h story and etters
Gen ra Stud es SB H

HST 212 American Military History. (3)
se ected emesters
Study of t e e of t e m tary n Amer an fe dur g war and peace f m co on a t me to the pre ent d y 3 h urs e t re conferen e.
Gene a St d es SB H

L ter cy and r t a n y MA mat m t cs CS c n puter stat st q a t t t pp cat HU f nan te a d f e a t SB a and beha r e SG at e e ge e r o r e SQ at a e —qu t t ve C u t er ty the t d State G g b H h t r ee e era tu page 3

HST 240 Introduction to Southeast As'a. (3)
fa
nterd sc p na y nt duct on to the u ture e g ons po t ca sys tems geography and h story of Southeast As a Cr s sted as ASB 240 GCU 240 POS 240 REL 240 Cred t s a wed f r n y ASB 240 or GCU 240 or HST 240 or POS 240 or REL 240
Genera Stud es G

HST 294 ST: Selected Topics in History. (3)
se ected semesters
Fu descr pt n f t p cs for any emester ava ab e n the Depart ment of H st ry ff ce May be repeated f cred t

HST 300 Historical Inquiry. (3)
fa and spr ng
H stor ca meth ds and cr t a nqu ry re ated to pa t cu r events a d processes Top cs vary Requ ed c urse fo ma o s Prerequ te f r HST 498 D sc s sem nar ecture P erequ s te ENG 102 H s to y ma r
Genera Stud es SB H

HST 302 Studies n History. (3)
once a year
Spec a zed top cs n h st ry Exp res c untr es cu tures and s ues n h story and the r nterpretat n n h st r ca scho arsh p
Genera Stud es SB H

HST 303 Studies in Asian H story. (3)
once a year
Spec a zed top cs n A an h story Exp ores countr es cu tures and ssues n h story and the r nterpretat on h st r a scho arsh p
Genera Stud es SB H

HST 304 Studies in European History (3)
once a year
Spec a zed t p cs n European h story Exp ores countr e cu tures and ssues n h story and the r nterpretat on n h stor a scho arsh p
Gene a Stud es SB H

HST 305 Studies in Latin Amer can History. (3)
once a year
Spec a zed t p cs n Lat n Ame can h tory Exp es c u t es, cu tu es and ssues n h t ry, and the r nterpretat on n h tor ca sch arsh p
Genera Stud es SB H

HST 306 Studies in United States History. (3)
onc a year
Spe a zed t p s n Un ted States h sto y Exp ore reg s, cu tures and ss es n h sto y a d the r nterpretat on n h stor ca scho arsh p
Genera Stud es SB H

HST 309 Exploration and Empire. (3)
once a year
Survey f Eur pean d c ve y exp orat on and mper a sm n the ear y moder a d m de n per ods
Gen ra Stud es L H

HST 310 Fi m as History (3)
once a yea
S rvey of mov ng mage med a as recorder object and wr ter f h s tory
Genera Stud es HU

HST 313 American Cu tura History to 1865. (3)
fa a d spr ng
Cu ture nc ud ng eas dea s the arts and soc a and ec nom c standards from the nat on s co on a and ear y nat ona per ods
Genera Stud es SB, H

HST 314 American Cultura History Since 1865. (3)
fa a d spr ng
Cu t re c ud g eas dea s the arts and oc a and e nom c standards from the age of ndustr a sm to modern S
Gene a Stud es. SB, H

HST 315 Political History of the United States. (3)
once a year
Amer can po t a h to y n e ndependence, focus ng p st 1865 Eva uates ma or t ends n ssues p es de t a eadersh p, e ect ons and state po t cs Lectu e d c ss n
Genera Stud es SB H

HST 316 20th-Century U.S. Foreign Relations. (3)
once a year
U S re at o s w th fore gn powers from the ate 19th ent ry t the pre ent
Genera Stud es SB G H

HST 318 United States Labor H story (3)
se ected semesters
Amer can workers fr m the c n a per od to the present nc ud g farmers s aves housew ves the sk ed and un k ed un on zed and n nun on zed
Genera Stud es· SB H

HST 319 U.S Urban History to 1850. (3)
once a year
H st ry of the c ty n Amer can fe fr m the c a period t the m d 19th century
Genera Stud es SB H

HST 320 U.S Urban History Since 1850. 3)
once a year
H tory of the c ty n Amer ca fe from the m d 19th centu y t the present
Genera Stud es SB H

HST 321 Constitutional History of the United States to 1865. (3)
fa
Or g n and deve opment of t e Amer can const tut o a system from co on a per od thro gh the C v War
Genera Stud es SB H

HST 322 Constitutional History of the United States Since 1865. (3)
spr ng
Deve pment of the U S const tut ona sy tem from Rec nstr ct on to the present
Genera Stud es SB H

HST 325 Immigration and Ethnicity in the United States. (3)
fa a d spr ng
Or g ns h stor ca deve pment and f ture of a mu t ethn c soc ety, 1492 to 2050 Prerequ s te HST 109 r 110.
Genera Stud es SB C H

HST 327 Women in U.S. History, 1600–1880 (3)
fa and spr ng
Exam nes Amer a women of d verse rac a , e g ous and ethn c groups and c asses f cuses on chang ng def n t on f women s r es
Genera Stud es SB, C H

HST 328 Women in U.S. History, 1880–1980. (3)
fa and spr ng
Exam ne Amer can women of d verse rac a , re g us and ethn c groups and c as es focuses on chang ng def n t ons of women s ro es
Genera Stud es SB, C H

HST 329 Women in 20th Century U.S. West. (3)
once a year
Exam nes how women of var ous cu tures have ontended for and shaped the U.S. West nc ud ng the We t f 'mag nat n Lecture d s cuss on
Gene a Stud s C H

HST 330 Mexican Women in the United States: Conquests and M grat'ons (3)
once a yea
Ove v ew of Ch cana h story fr m Mesoamer an or g ns to the present focus ng on Mex can wome n the western U S Lectu e d s cuss on
Genera Stud es L/SB C H

HST 331 Mexican American History to 1900. (3)
once a yea
Mex an Amer can h story f om pre H span or g ns to f t er our-neys n rt through 19th century fe n the U S Southwest
Ge era Stud es SB H

HST 332 Mexican American History Since 1900 (3)
once a yea
T aces the fo mat n of Mex can Amer can co mun t es a ross the ru a an urban U S and exam nes 20th ce tury mm grat on from Mex co
Genera Stud es SB C, H

HST 333 African American History to 1865. (3)
once a year
The Afr can Ame c n n Amer can h story thought and cu ture fr m s avery to 1865 Cross sted a AFS 363 Cred t s a owed for on y AFS 363 or HST 333
Genera Stud es SB C H

HST 334 African American History Since 1865. (3)
once a yea
The Afr can Amer can n Amer can h story thought and cu ture fr m 1865 to the present Cross ted as AFS 364 Cred t s a owed for on y AFS 364 or HST 334
Genera Stud es SB C. H

HST 337 American Indian H story to 1900. (3)
fa and spr ng
C tura econom c po t ca and soc a c nt nu ty and hange of Amer an nd an ommun t es to 19 0
Genera Stud es SB C H

HST 338 American Indian History Since 1900. (3)
fa and spr ng
Cu tura econom c po t ca and soc a ont u ty and change of Amer an nd an commun t e from 1900 to the present
Genera Stud es SB C H

HST 341 The U.S. West in the 19th Century. (3)
once a yea
So a , po t a and econom c development of the trans M ss ss pp We t beg nn ng w th t e Lou s ana Purchase and end ng n 19
Genera Stud es SB H

HST 342 The U.S. West n the 20th Century. (3)
fa and spr ng
Ro e f the western states n U S h story s n e 1890 emphas z ng po t s the env ronment, ndustry and ab r and ethn c m nor t e
Gene a Stud es SB H

HST 343 The American Southwest (3)
once a year
Deve opment of the reg on from 1848 to the present
Genera Stud es L SB H

HST 344 Arizona. (3)
fa and sp ng
Emergence of the tate from ear y t mes to the p esent
Genera Stud es SB H

HST 347 Ancient Greece (3)
fa
H tory and c v zat on of the Greek wor d from 650 B C E to the death of A exander the Great
Gene a St d es SB H

HST 348 Rome. (3)
sp ng
H story and c v zat on of Rome from the beg nn ng of the Repub c to the end of the Emp e
Genera Stud s SB H

HST 349 The Early Middle Ages. (3)
fa
Po t ca o oeco om and u t ra deve opments of Western Europe from the 5th thr ug 10t entur es
Genera Stud es· SB H

HST 350 The Later Middle Ages. (3)
spr ng
Po t ca soc oeconom c and cu t ra deve opments of Western E rope f om the 11th through 15th centur es
Gene a Stud es SB H

HST 351 Renaissance Europe. (3)
fa
Cu ture of the Rena ssance n ta y and Northern E rope from the 14th to the ear y 16th entur es.
Genera Stud es L SB H

HST 352 Europe's Reformations. (3)
sp ng
Causes and mp cat ons of the major Protestant Catho c and Rad ca re g ou reformat ons n 16th a d 17t century Europe
Genera Stud es L SB H

HST 353 The Old Regime in Europe. (3)
fa
So ety and cu t re of Europe dur ng the 17th and 18th entur es
Genera Stud es SB H

HST 354 Revolutionary Europe. (3)
spr ng
P t a oc a e om c and nte ectua currents n Europe from the French through the Russ an Revo ut ons
Genera Stud es SB H

HST 355 Total War and the Crisis of Modernity. (3)
fa
Forces f change and stab ty n ear y 20th entury E rope
Genera Stud es SB G H

HST 356 Europe Since 1945. (3)
se ected semeste s
Eu ope t w r d sett ng nce Wor d War emphas z g major po t ca and o a ues from 1945 to the present
Genera Stud es SB G H

HST 358 Jewish H story from the Bible to 1492. (3)
fa
ont nu ty and hange n po t ca ega , econ m and soc ocu tura h story f the ews fr m b b a thro gh med eva t mes Lecture d s cus o
Genera Stud es SB H

HST 359 Jewish H story from 1492 to 1948. (3)
pr ng
Jew h h t ry from ear y modern through modern t mes, h gh ght ng emanc pat on en ghtenment and Jew sh responses to modern ty Lecture d s uss on
G nera Stud es SB G H

HST 361 Witchcraft and Heresy 'n Europe. (3)
se ected semeste s
Ba kground, or g ns and deve opment of the nqu t on per ecut on of women and marg na group Cros sted a REL 374 Cred t s a owed f r on y HST 361 or REL 374 Prerequ te upper d v on stand ng or nstr ctor approva
Genera Stud es L H

HST 362 Sex and Society in C assical and Medieval Europe. (3)
fa
Fam y fe sex ro es and marr age and the r e at onsh p to po t ca econom c and re g ou c ange n c ass ca and med eva Europe Lecture d scu s on Prerequ s te upper d v s on stand ng or nstructor approva
Genera Stud es SB H

HST 363 Sex and Society in Early Modern Europe. (3)
pr ng
Fam y fe sex ro es and marr age and the r re at onsh p to po t a econom c, and re g ous change n ear y modern Europe Lecture, d s uss on Prerequ te upper d v s on stand ng o nstr tor approva
Gen ra Stud es SB H

HST 364 Sex and Society in Modern Europe. (3)
se ected semesters
Fam y fe sex o e and mar age and the r re at onsh p to po t ca eco om and soc a changes n modern Europe Lecture, d scuss Prerequ s te upper d v on stand ng or nstructor approva
Genera Stud es L SB H

HST 365 Women in Europe. (3)
once a year
ropean women s d ve se re g ous ethn c nat ona and e onom c ro es n s c ety c tu e and po t cs 1750 to the present
Gen a Stud es L HU SB H

HST 366 England to 1689. (3)
once a year
Po t ca econom c and s a deve opment of the Eng sh peop e to t e ate 17th century
Genera Stud es SB. H

L te y and cr t a nqu ry **MA** mathemat s **CS** mputer tat t c uant tat ve app at o **HU** human t e a d f e a t **SB** o a and b h v ora sc n es **SG** nat ra ence genera cor ou e **SQ** natura e e—q ant tat ve **C** cu tura d ve ty n the Un ted States **G** g ba **H** t a See G era Stud e page 83

HST 367 Modern Britain. (3)
once a yea
Po t ca e onom c and s c a deve opment n Br ta f om 17th cen tu y t t e present
Gene a Stud es SB H

HST 368 Culture and Imagination in European History (3)
once a year
Top cs n European cu tura and te ect a h sto y May be repeated f cred t
Gene a Stud es HU. H

HST 370 Eastern Europe in Transition. (3)
once a year
Democrat zat on, p vat zat on and dent ty tran format ons n e the fa of ommun sm n c temporary Eastern Europe and the former Sov et Un n ecture d scus on
Genera Stud es SB G H

HST 372 The Modern Middle East. (3)
se ected eme ters
mpact f the West and m dern zat o upon M dd e Eastern gover me ts e g on and soc ety n the19th and 20th centur es
Gen a Stud es SB G H

HST 375 Colonial Latin America. (3)
fa and sp ng
Anc ent c v zat n exp orat o and conq eror and co on a nst tu t ons
Genera Stud es SB H

HST 376 Modern Lat n Amer ca (3)
fa and spr ng
Nat ona st c deve pment f the ndependent rep b cs s nce 1821
Genera St d es SB H

HST 377 Women in Colonial Latin America. (3)
fa
H story f women n co on a at n Amer a ross exam n ng c as ra e and gender re at ons n depth Lecture d us on
Genera Stud es H

HST 378 Latin American Women. The Nationa Period. (3)
spr ng
Surveys t e h st ry of w men gender re at ons and state po c es n a broad ont nenta sett ng, from ndependence to the present ecture, med a, d scuss n
Genera Stud es SB. G H

HST 380 Cu tural History of Lat'n Amer'ca (3)
e ected semesters
Ma n currents of thought the outstan ng th kers a d the r mpact on 19th and 20th century Lat n Amer ca Cu tura and nst tut ona ba of at n Amer n fe
Ge era Stud es SB H

HST 383 China. (3)
fa
Po t a econom , c a and cu tura story of the Ch nese peop e from ear y t mes to the 17th century
Genera Stud es SB, H

HST 384 China. (3)
spr ng
Po t ca e om c soc a and cu tura st y of the h nese peop e from t e 17t cent ry to the p esent
Gene a Stud es SB G H

HST 385 Chinese Sc'ence and Medicine. (3)
se ected semeste s
Exp re deve pme t f Ch ese trad t s dea g w th the atu a wor d sc e ce and med c ne Lecture d cus o Cros sted as HPS 325 Cred t s a owed for on y HPS 325 or HST 385
Genera Stud es HU G H

HST 386 Interpreting China s Class cs. (3)
se e ted semesters
Study of e e ted Confu an and Ta st c ass a d ways they have been read n both A an and We tern scho a sh p Cross ted as HUM 31 Cred t a owed for on y HST 86 or HUM 312
Genera Stud e L HU H

HST 387 Japan. (3)
once a year
Po t ca ec om c soc a and cu tura h story of the Japanese peop e from ea y t mes to the 17th century
Ge era St d es L SB H

HST 388 Japan. (3)
once a year
Po t ca e o om c soc a and u tura h story of the Japanese peop e from the 17th ce tury to the present
Genera Stud e SB G H

HST 389 Japanese Society and Values: Premodern. (3)
se e ted semesters
Effe ts of econom c and soc a trans t ons on persona and so a va ues s ref ected n the dramat zat ons of contemporary events

HST 391 Modern Southeast Asia. (3)
spr ng
V etnam La s Cambod a Tha and Burma Ma ays a S ngapore Brune Indo es a a d P pp nes s nce 1750 mpe a sm revo ut on and ndepenen e Lecture, d scus on
Genera Stud es SB G H

HST 394 ST· Selected Topics in History. (3)
fa and spr ng
Fu descr pt on of top cs for any semester s ava ab e n the Depart ment of H story ff e May be repeated f r cred t

HST 405 Colonia American History to 1763. (3)
once a year
Po t a e onom c, so a a d cu tura h story of the co on a era o ce trates on Eng h co on es w th some cons derat on of Span h French and ot er co on a reg ons n Nort Amer ca
Genera Stud es SB H

HST 406 The American Revolution, 1763–1789. (3)
once a year
Causes course and c nsequences of the Amer can Revo ut on cu m nat ng n the rat f cat on of the Const t t on
Ge era Stud es SB, H

HST 407 The Early U.S. Republic, 1789–1850. (3)
once a year
Po t ca soc a ec nom c and cu tura deve pment of the ted States fr m the Rev ut on to 1850
Ge era Stud s L SB H

HST 408 Civil War and Reconstruction. (3)
once a year
Exp res the cau es onduct and consequences of the Amer can C v War con entrat ng on the years 1848 to 1877
Genera Stud es L SB, H

HST 409 The Emergence of the Modern United States, 1877 to 1918. (3)
once a year
Tr umph of modern po t ca oc a a d ec nom c tru tures and va ues 1877 1918 ro e of reg on re g n race and ethn c ty
Genera Stud es. SB H

HST 410 The Modern Un ted States, 1918 to 1945. (3)
once a year
1920 s boom and the crash the Depress on and the New Dea re p n e T e Second W r d War at home and ab ad
Genera Stud s· SB H

HST 411 The Postwar United States, 1945 to 1973. (3)
onc a year
Co d War prosper ty reform and mmense soc a and po t ca change n the U S
Genera Stud es SB H

HST 412 The Contemporary United States, 1973 to the Present. (3)
o e a year
End f the Co d War po t a cr ses, and c tura transformat ons n the S
Genera Stud es. SB H

HST 414 The Modern U.S. Economy. (3)
se e ted semesters
Or g ns of 19th entury avery and dustr a zat on 20th century cr and regu at n: po t a economy of an advanced cap ta st dem c ra y Prerequ s te ECN 111 or 112 or HST 109 or 110
Genera Stud es SB H

HST 415 Unequal Sisters: Women and Political and Cultural Change. (3)
once a year
Exam nes race ethn c and c ass d fferences among women focus ng on the po t ca and cu tura exper ences of women n the U S
Genera Stud es L SB C H

HST 416 Indian History of the Southwest. (3)
once a year
Rev ews h stor ca events from preh stor c peop es the Span sh and Mex can per ods and the U S per od from 1846 to present
Genera Stud es SB C H

HST 417 Topics in Mexican American History. (3)
once a year
Focuses on spec f c top cs n Mex can Amer can h story nc ud ng mm grat on c v r ghts the Ch cano Movement un on act v sm and reg ona and generat ona d fferences
Genera Stud es. SB, C H

HST 423 The Tudor Monarchy. (3)
once a year
Po t ca cu tura and soc a foundat ons of 16th cent ry Eng and
Genera Stud es SB. H

HST 424 The Stuart Transformation of England. (3)
once a year
Po t ca soc al econom c and cultura deve opment n 17th centu y Eng and
Genera Stud es. SB, H

HST 426 The British Empire. (3)
once a year
Br t sh mper a sm and o on a sm n Afr ca the Amer cas As a and the South Pac f c. Prerequ s te pper d v s on stand ng or nstructor approva
Genera Stud es SB H

HST 427 The French Revolution and the Napoleonic Era. (3)
once a year
Cond t on n Pre Revo ut onary and Revo ut onary F ance organ za t on of France under Napo eon and mpact of French changes upon Europe
Genera Stud es SB H

HST 428 Modern France. (3)
se ected semesters
Soc a , po t ca econom and cu tura transformat ons of French soc ety 1815–present mpact of ndustr a zat on war and revo ut on on peop e s ves Prerequ s te upper d v s on stand ng or n tructor approva
Genera Stud es SB G H

HST 429 Modern Germany. (3)
once a year
Germany s nce 1871
Genera Stud es SB G H

HST 430 Hitler: Man and Legend. (3)
once a year
B ograph ca approach to the Ge man Th rd Re ch emphas z ng nature of Naz reg me soc'ocu tura 'ssues Wor d War and h stor ography
Genera Stud es SB H

HST 431 Eastern Europe and the Balkans Before 1914. (3)
se ected semesters
Emp re and nat on n Eastern Europe and the Ba kans before Wor d War I emphas z ng Hapsburg and Ottoman ands
Genera Stud es SB H

HST 432 Eastern Europe and the Balkans in the 20th Century. (3)
se ected semesters
Po t cs and cu ture n Eastern Europe and the Ba kans from Wor d War to the present
Genera Stud es SB, G, H

HST 435 The Russian Empire. (3)
fa
Development of Russ an mperia nst tut ons and c v soc ety from the 17th to the ear y 20th centur es Lecture d scuss on
Genera Stud es SB, H

HST 436 The Soviet Experiment. (3)
spr ng
Commun st revo ut onar es ru e of Russ a focus ng on utop an cu ture Sta n st terror hero sm n war and the breakup of the former USSR
Genera Stud es SB G H

HST 437 Spain Through the Golden Age. (3)
se ected semesters
Cu t ra econom c, po t ca and soc a deve opment of Spa n from ant qu ty to the ate 17th century
Genera Stud es HU SB H

HST 438 Modern Spain. (3)
se ected semesters
Cu tura econom c, po t ca and soc a deve opment of modern Spa n
Genera Stud es· HU SB G H

HST 441 Spanish South America. (3)
se ected semesters
Po t ca econom c and soc a deve opment of the Span sh speak ng nat ons of South Amer ca s n e ndependence 19th century deve op ments
Genera Stud es· SB H

HST 442 Spanish South America. (3)
once a year
Po t ca econom c and soc a deve opment of the Span sh peak ng nat ons of South Amer ca 20th entury deve opments
Genera Stud es SB, H

HST 443 The United States and Latin America. (3)
once a yea
Lat Amer can strugg e for d p omat recogn t on attempts at po t ca un on part c pat n nternat na rgan zat ons s nce 1810 and re at ons between the Un ted States and Lat n Amer ca
Genera Stud es SB G H

HST 445 20th-Century Cuba. (3)
once a year
H story of Cuba from co on a era to format on of the ear y repub c po t a econom c s c a deve opment n ate 20th century. Lecture d scuss on
Genera Stud es SB G H

HST 446 Colonial Mexico. (3)
once a year
Po t ca e onom c s a and c tura deve pments from pre Co um b an t mes to 1810
Genera Stud es SB H

HST 447 Modern Mexico. (3)
once a year
Po t ca econom c soc a and cu tura deve opments from 1810 to the present
Genera Stud es SB H

HST 451 Ch nese Cultural History. (3)
se ected semesters
Ch na c ass cs n tran at on stud ed both for the r ntr ns c dea and for the or g ns of Ch nese thought
Genera Stud es SB H

HST 452 Chinese Cultural History. (3)
se ected emesters
Evo ut on of Confuc an thought ts synthes s w th Tao m and Bud dh sm and modern rea t ons aga nst and use of Conf an trad t ons
Genera Stud es SB G H

HST 453 The People's Republic of China. (3)
se ected semesters
Ana yzes ma or po t ca soc a econom c and nte ectua t ends n Ch na s nce the found ng f the Peop e s Repub c n 1949
Genera Stud es SB G H

L teracy an cr t a qu ry **MA** athemat **CS** c mputer stat st q ant tat e app t ons **HU** h an t nd f n arts **SB** o a and behav ora sc en es **SG** nat ra s e—g era core o rse **SQ** nat a s en e—q ant tat ve **C** t ra d ver ty n t e n ted State **G** g oba H h to a Se Genera St d e " page 8

HST 455 The United States and Japan. (3)
fa
Cu tu a po t ca and econom c re at ons n the 19th and 20t entu es Emphas zes post Wor d War per od
Genera St d es SB G H

HST 456 The Vietnam War. (3)
once a yea
ntersect on of Amer can a d As an h stor es n V etnam v ewed fr m as many s de as poss b e
Genera Stud es SB G H

HST 460 History of Fire. (3)
fa
G oba survey of the natura and cu tura h story of f re Lecture, d s cu s on.
Gene a Stud es L H

HST 480 Methods of Teaching History: Classroom Resources. (3)
fa
Meth d n nstruct on organ zat on and pre entat on of the subject matter of h tory and c ose y a ed f e ds Prerequ s te HST 3 0 T adm ss on

HST 481 Methods of Teaching History: Community Resources. (3)
spr ng
dent fy commun ty based resources for teach ng h tory work w th resources and earn how to ntegrate them nto the secondary c ass room Lecture ab Prerequ s tes HST 3 0 ITC adm ss on

HST 484 Internsh p. (1–4)
se ected emesters

HST 492 Honors Directed Study. (1–6)
se ected semesters

HST 493 Honors Thesis. (3)
se ected semesters
Genera Stud es L

HST 494 Special Topics. (1–4)
se ected semesters

HST 498 PS. History Pro-Seminar. (3)
fa and spr ng
Requ red course for majors on top c se ected by nstructor wr t ng ntens ve o rse re ated to the deve pment of research sk s and wr t ng t o s used by h stor ans Prerequ s tes HST 300 H story major
G nera Stud es L

HST 499 Individualized Instruction (1–3)
se ected semesters

HST 500 Methods of Historical Investigations. (1 12)
se ected semesters

HST 502 Public History Methodology. (3)
fa
ntr duces h stor ca re earch meth do og es techn que and trate g es used by pub c h stor ans Read ngs short papers and guest speakers Requ red for students n the pub c h story concentrat on

HST 512 Western Civilization to the Enlightenment (3)
fa
Systemat a y exam nes var o s nterpretat ons of We tern c v zat on from the anc ent M dd e Eastern v zat ons to the European En ght e ment Sem na

HST 513 Western Civilization Since the French Revolution. (3)
spr ng
Systemat ca y exam nes var ous nterpretat ns of Western c v zat on s n e the Fren h Revo ut o Sem nar

HST 514 Historians of the United States. (3)
se ected semesters
Study of the h story of Amer can h stor ca wr t ng from the e r y co o n days to the 20th century

HST 515 Studies in Historiography. (3)
fa and spr ng
Methods and theor es of wr ters of h story May be repeated for cred t

HST 525 H stor ca Resource Management. (3)
fa
Ident f at on documentat o and terpretat on of h stor c per od b d gs s tes, and d str ts Emphas s on nterd c p nary efforts among h stor ans arch tects and anthropo og sts

HST 526 Historians and Preservation. (3)
spr ng
Preparat on of h stor an for pub c a d pr vate h sto pre ervat on pr grams Prereq s te HST 525 or nstruct r approva

HST 527 Historical Administrat'on. (3)
fa
Preparat on of h st r ans n dm n strat n f a ch ves and h stor ca s tes museums oc et es, and off ce n government agenc es

HST 532 Commun ty History. (3)
s ected seme ters
Techn ques and methods of c mu ty h st ry emphas z g oca resources Requ red for ommun ty h tory opt on Sem nar

HST 551 Comparative Histories of War and Revolut on (3)
once a year
Compa at ve f e d course of the t emes of war a d evo ut on

HST 552 Comparative H story of Family and Community. (3)
se ected semeste s
Comparat ve course w th a focus on fam y n ud ng m nor ty and et n groups n so ety

HST 553 Comparative H story of State and Institutions. (3)
se ected semeste s
Comparat ve course t at exp o es the hang ng nature of centra n t tut ons and government

HST 554 Comparative Historical Populat on Studies Ethnicity, Economy, and Migration. (3)
se ected semesters
Comparat ve ourse th t exp ores the mpact of soc a cu tu a o econom c changes n the popu at on

HST 555 Comparative H stor'cal Topics. (3)
se ected semesters
Ana yzes a var ety of spec f c so a po t ca cu tura and te ectua top cs

HST 584 Internship. (1–12)
se ected semesters

HST 590 Reading and Conference. (1 12)
se e ted semesters

HST 591 Seminar. (3)
se ected s mesters
May be repeated for cred t

HST 592 Research. (1–12)
se ected semesters

HST 595 Cont nuing Reg stration. (1)
e ected emesters

HST 598 Special Top cs. (1–4)
se ected semesters
Read ng cour es des gned to n rease fam ar ty w th a part cu ar top c and the mportant wr t ng concern ng t May be repeated for cred t Top cs may n de the f ow ng
- A an H story 3
- Eng h and Br t sh H story 3
- European H story 3
- Lat n Amer ca H story 3
- U S H story 3

HST 599 Thes's. (1 12)
se ected emesters

HST 684 Internsh p. (1 12)
se ected semesters

HST 690 Reading and Conference. (1–12)
se cted semesters

HST 695 Continuing Registrat on. (1)
s ected seme ters

HST 700 Public History Research Methods. (1 12)
se ected semesters

HST 790 Reading and Conference. (1–12)
se ected semesters

HST 791 Seminar. (1–12)
se ected emeste s

HST 792 Research (1 12)
se ected semesters

HST 795 Continuing Registration. (1)
e ected semesters

HST 799 Dissertation. (1–15)
se ected semesters

Omnibus Courses. For an exp a at on f courses offered but not spec f ca y sted n t s cata og see Omn b s Cour es page 56

SCHOLARLY PUBLISHING (PUB)

See the *Gr iduate Cat l g* for the PUB courses

Interdisciplinary Humanities Program

www.asu.edu clas humanities
480 965-6747
LL 641

Mary L. Rothschild, Interim Director

Humanities
Professors Kuge mass, Lehman;
Assoc ate Professors Pr vateer, Wr ght
Assistant Professors. Baker, Lund Romeyn, Tay or Duncan;
Academ c Profess ona Zaffrann

Languages and Literatures
Regents Professor: Foster

The humanities are those learned bodies of know edge that are used to express ideas, to understand the meaning of words, and to explore the values and beliefs that underlie our culture and the cultures of others As defined by the U S. Congress, the humanities include archaeology, comparative reli_ion, ethics, history, jurisprudence, literature, linguistics, philosophy, the history and criticism of the arts, and those aspects of the social sciences that employ a phi osophical or historical rather than quantitative approach to know ledge.

HUMANITIES—B.A.

The ma or in Humanities is interdisciplinary and may be intercollegiate In consultation w ith an adv isor, the student takes a minimum of 44 semester hours of interdisciplinary humanities courses from two components: 1 an interdisci plinary core of 23 hours and 2 an area of concentration of 21 hours

Interdisciplinary Core

Issues Meth ds, an l The y
HUM 2 Encou ntering the Human t es *HL* 3
HUM 494 Pro Semin ar in th Humanities *L HL* 3

C ltur t C nt t
HUM 301 Humanities n th Western World *L HL, H* .. 4
HUM 302 Humanities in the Western World *L HL, H* ... 4
One approved upper division H IM course on the cultures ar d tradit ons of Lat r America, Asia, or Africa 3

Eth ty, Ra e an l Ge nde
One approved course 3

A t S ien e, a l He lth
One approved c ourse 3

Total 23

Area of Study
Req red c urse from list obtained f om adv sor 21

Courses must be selected from an approved ist or be approved in advance by the undergraduate advisor. Areas of study include architecture, culture and society, classical studies; digital cultures and media technologies, film and media studies, and humanistic studies. An undergraduate maj or may also earn a certificate in Classical Studies.

MINOR IN HUMANITIES

The following courses are required for the minor

HUM 110 C ntemporary Issues in Hun an t es *HL* 3
or HUM 2 Enc unterin the Hum ities *HL* 3
HUM 301 Hun anit es i th Western W rld *L HU H* ... 4
HUM 302 Hun anit s in the West rn World *L HL, H* ... 4
Th ree approv d upper d v sion HUM co r es 9

Total 2

GRADUATE PROGRAM

The faculty in the program also offer the M.A. degree in Humanities through the Graduate C mmittee on Humani ties. See the *Gr aduate Cat l g* for requirements.

HUMANITIES (HUM)

HUM 110 Contemporary Issues in Humanities. (3)
fa and spr ng
Responses of terature art h story h story ph osophy re g on and other d cp nes to c mmon prob ems affe t ng modern Amer can fe
Genera Stud es HU

HUM 194 Special Topics in the Humanities. (1–4)
se ected seme ters
Open to a students Top cs may n ude the fo ow ng
- Amer can F ne Arts 3
- Comparat ve F ne and Perform ng Arts 3
- u t res of Ethn c M nor t e 3
- Non Western Cu t res 3
- Western H stor ca or C ntemporary Cu tures 3

HUM 200 Encountering the Humanities. (3)
fa and spr ng
Introduces the anguages methods and b ect ves of the tudy of the nterd sc p nary human t es ntersect ons of deas va ues and c tura nst t t ons Lecture stud o workshop Prerequ s te Human t es major
Genera Stud es HU

HUM 260 Introduction to Islam. (3)
spr ng
Exam nes s am c be efs ceremon es fest va s and nst tut ons Assumes no prior know edge about s am Lecture d cu on Cross sted as REL 260 Cred t s a owed for on y HUM 260 or REL 260
Genera Stud es HU G

HUM 294 Special Topics in the Humanit es. (1–4)
se ected semesters
Open to a tudents Top cs may nc ude the fo ow ng
- Amer can F ne Arts 3
- Comparat ve F ne and Perform ng Arts 3
- Cu tures of Ethn c M nor t es 3
- F m and Med a Stud es 3

L teracy a d t ca nqu ry **MA** mathemat s **CS** comp ter tat t q ant tat ve app at on **HU** human t e a d f ne arts **SB** o a and behav ora c en e **SG** nat r c e ce—genera re o es **SQ** natura e e—quant tat ve C cu tu a d ver ty n the U ted States **G** g oba H h stor ca See Ge e a Stud page 83

- Introduction to Film
  Fee.
- Non-Western Cultures. (3)

HUM 301 Humanities in the Western World. (4)
fall
Interrelation of arts and ideas in Western civilization. Hellenic through medieval. 3 hours lecture, 1 discussion meeting per week.
General Studies: L HU, H

HUM 302 Humanities in the Western World. (4)
spring
Interrelation of arts and ideas in Western civilization. Renaissance to the present. 3 hours lecture, 1 discussion meeting per week.
General Studies: L HU, H

HUM 310 Japanese Cities and Cultures to 1800. (3)
once a year
Relations among ideas and literary, visual, and performing arts of the ancient aristocracy, medieval samurai, and early modern townspeople. Cross-listed as REL 355. Credit is allowed for only HUM 310 or REL 355.
General Studies: L/HU, H

HUM 312 Interpreting China's Classics. (3)
selected semesters
Study of selected Confucian and or Taoist classics and ways they have been read in both Asian and Western scholarship. Cross-listed as HST 386. Credit is allowed for only HST 386 or HUM 312.
General Studies: L HU, H

HUM 331 Sexuality, Race, and Power. (3)
fall
Sexuality as an expression of identity politics, social transgression, and racial inequality, as portrayed in international literature, art, and film. Lecture, discussion.

HUM 340 Contemporary American Film and Popular Culture. (3)
fall
Study of American film, television, and popular music of past three decades as cultural documents. Fee.
General Studies: HU

Regents' Professor David Smith at the electron microscope

Tim Trumble photo

HUM 371 Origins, Evolution, and Creation. (3)
selected semesters
Examines scientific, mythic, and religious ideas relating to origins (particularly human). Place of antievolutionism and "scientific creationism" in American culture. Lecture, discussion. Cross-listed as BIO 344 HPS 311 REL 383. Credit is allowed for only BIO 344 or HPS 311 or HUM 371 or REL 383.

HUM 372 The Darwinian Revolution. (3)
selected semesters
Intellectual and cultural history of Darwinism and modern evolutionary theory and their impact on 19th- and 20th-century thought. Lecture, discussion. Cross-listed as BIO 346 HPS 332. Credit is allowed for only BIO 346 or HPS 332 or HUM 372.

HUM 394 Special Topics in the Humanities. (1–4)
selected semesters
Open to all students. Topics may include the following:
- Art and Politics. (3)
- Culture and Society of Contemporary China. (3)
- Film History
  Fee.
- Immigration and Ethnicity in American Culture. (3)
- The Holocaust and Social Theory. (3)

HUM 401 The Culture and Legacy of the European Enlightenment. (3)
spring
Historical survey of 18th-century European enlightenment and its status within contemporary intellectual culture. Lecture, discussion.
General Studies: HU, H

HUM 420 Interpreting Latin America. (3)
spring
Introduces protocols and methodologies for cultural interpretation of Latin America, with emphasis on four principal cities as cultural space.
General Studies: HU, G, H

HUM 440 Los Angeles and Cultural Theory. (3)
spring
Analyzes representations of Los Angeles in literary, film, and musical texts and broader implications for contemporary American society.
General Studies: L/HU, C

HUM 441 American Jewry Through Film and TV. (3)
fall
Examines the connection between Jews and the entertainment industry with reference to the constructions of race, class, and ethnicity. Lecture, discussion.

HUM 450 Technology and Culture. (3)
spring
Explores sociocultural, ideological, and postmodern implications of technology and the role technology plays in social constructions as well as the spaces it creates. Seminar, discussion.
General Studies: L HU

HUM 451 Virtual Reality: The Culture of Cyberspace. (3)
once a year
Socioeconomic, cultural, aesthetic, postmodern, theoretical, and human implications of virtual reality technologies. Themes: cultural ideological productions of cyberspace. Collaborative and research based.

HUM 460 Postmodern Culture and Interpretation. (3)
selected semesters
Currents and interpretations of postmodern culture: international, comparative perspective on the culture and traditions of contemporary "Europes" and "Americas." Seminar, discussion.
General Studies: L

HUM 461 Postcolonial Studies. (3)
selected semesters
Interdisciplinary approach to the culture of European imperialism, independence movements, and contemporary postcolonial societies, focusing on literature, film, and theory. Lecture, discussion.

HUM 462 Psychoanalysis and Culture. (3)
fall
Introduces intellectual history of psychoanalytic movement of the 20th century and its contribution to humanities disciplines.
General Studies: L HU SB

HUM 465 Narrative 'n the Human Sciences. (3)
fa
Theor es of narrat ve a d arrat v ty n the human t es concentrat ng on the prob em of spec f c d c p nes and nterd sc p nary so ut on
Genera Stud es L HU

HUM 494 Special Topics in the Humanities. (1–4)
se ected seme ters
Open to a student Top cs may nc ude the fo ow ng
- Comedy and Cu ture 3
- G oba Med a Stud es 3
- ta an Amer can Cu ture 3
- ses and Abuses of C as ca Ant qu ty 3

HUM 498 Pro-Seminar in the Humanities. (1 7)
fa and spr ng
Methodo ogies and comparat ve theo es for the study of re at onsh ps between var ous aspects of cu ture the h sto y of deas and the arts For students w th a ma or n Human t es w th upper d v s on stand ng May be repeated f r a tota of 6 semester hours when top cs vary Top cs may nc ude the fo ow ng·
- Theory and Cu ture 3
  Genera Stud e L HU

HUM 501 Introduction to Cu tura Theory. (3)
fa
Se ect ve h story of cu tura theory Ma or f g res and top cs nc de Marx N etzs he, Freud phenomeno ogy western Marx sm structura sm and post structura sm Sem nar

HUM 502 Writing Cultures. (3)
spr ng
Theor es and methods of represe t ng Western and non Western cu tures n terature h story ethnography, and p ctor med a

HUM 503 Research and Writing 'n the Humanities. (3)
fa
Systemat c tra n ng n huma st c re earch and wr t ng w t part cular attent on to the nterd sc p nary st dy of cu ture Sem nar

HUM 511 Structures of Knowledge. (3)
fa
Theor es and examp es of structures f know edge nc ud ng such top cs as metaphor sem ot cs, and know edge of the other'

HUM 513 Interpretation of Cultures. (3)
once a year
Methodo og es and comparat ve theor es for t e study of re at on h ps between var ou aspects of u t re the h story of deas and the arts May be repeated for a tota of 6 semester hours when top cs vary Fee

HUM 549 Contemporary Critical Theory. (3)
once a year
Advanced survey of major choo s of 20th century terary and cr t ca the ry Lecture d scuss n Cross sted as ENG 502. red t s a owed for on y ENG 502 or HUM 549

HUM 591 Seminar. (1 12)
once a year
Top cs may nc ude the fo ow ng
- Cu tura P duct ons 3
- Theory and Cu t re 3
- Tragedy Mea ng a d Fo m 3

HUM 598 Special Topics in the Humanities. (1–4)
se ected semesters
Open to a students Top cs may nc ude the fo ow ng
- Comparat ve F ne and Perform ng Arts 3
- Cu tures of Ethn c M nor t es 3
- F m and Med a Stud es 3
- F m Theory and Cr t sm
  Fee.
- Non Western C tures 3
- Sexua ty n the Med a
  Fee
- Western H st r ca or Contemporary C tures 3

Omnibus Courses. For an exp anat on of c urses offered but not spec f ca y sted n th s cata og, see Omn bus Co rses page 56

Department of Languages and Literatures

www.asu.edu languages index.htm
480 965-6281
LL 440

Deborah Losse, Chair

Regents' Professors: Foster Ke er

Professors: A exander Ba d n Ballon Agu rre Chambers Couch, Croft Ekman s Guntermann Honegger. Horwath Losse, Va d v eso Vo ek Wetse , W ams W xted T Wong

Associate Professors: Acereda, Cande a, Cota Cardenas, Garc a Fernández W. Hendr ckson Hernandez G , B Lafford Oss'pov, Re man, Sanchez Suwarno Tompk ns Ur oste Azcorra, V tu o

Assistant Professors: Burton Canovas, Cashman Cho , Co na, George, G nsburg Gruz nska, Haberman Or ch, Rees T pton

Lecturers: Foard, S Hendr ckson Lage. Mart nez, Petersen, Sherman St fte Wa ton Ram rez, E Wong

Instructors: Dea , Le Oh Pang

Associate Research Professional: P Lafford

Academic Associate: G essner

BACHELOR OF ARTS DEGREE

The faculty in the Department of Languages and Litera tures offer majors in Asian Languages Chinese Japanese , French, German, Italian, Russian, and Spanish. Each major consists of 45 semester hours, of which 30 must be in one language and 15 in a secon d language or in closely related fields to be approved by the advisor in consultation with the student. Of the 30 hours required for the major a minimum of 24 hours must be taken at the 300 or 400 level and must include at least nine hours at the 400 evel Specific required courses for each major area are shown in this section and in a brochure available in the departmen t See ' College Degree Requirements,' page 330.

MAJORS

Asian Languages (Chinese Japanese)—B.A.

Students n ajoring in Asian Languages (Ch nese Japa nese may select a course of study that focuses on either lan guage. The major requires 45 semester hours.

L tera y a d t a q ry **MA** math mat c **CS** computer tat t c qu nt t ve app cat ons **HU** n t e and f n art **SB** so a and behav a s e ce **SG** natura c en e—ge era co e cour e **SQ** natura c enc quant tat ve **C** cu t ra d ve ty the n ted State **G** g oba **H** tor See "Ge e a Stud e page 83

Chinese. At least t nc seme ter hours must be at the 400 evel It addition to tl e ourses shown be ow, the student n ust meet with ar a lvisc r and choose at least 15 semester hours of courses, inc u lim six semester hours of JPN courses such as Japanese language and ca igraphy, apa nese literature in translation (F A 421 o KOR prefix courses such as Korean lan guage and or Korean culture and r ine semester hours from appropriate c ourses in art, human ities, social and behavioral sciences, ar d business

Required

CHI	1 >	Third Ye ir Ch nes I *G* 3
CHI	214	Third Ye ir Chines I *G* 3
CH	221	Chir e L ter atur > *L HL* 3
CHI	22	Chir e L ter atur > *L HL G* 3
		or FLA 42 Fore n Lite ur in Transl tion *HL* C 3
CHI	4 3	Intro d ct on t C assical Chine e *HL* . . . . . >
CHI	4 4	Int od ct n to C assica Ch nese *H* . . . . . >

ota 5

Electives

Ch oose six semest ours fr m th e c ir es b w 6

CHI	> 9	Ch ese C nver at on 2
CHI	3	Cl ese C nversat on 2
CHI	31	Cl ese C ver ation 2
CHI	312	Ch ese C nversa n 2
CH	494	Spec al T pics 1–4
CH	499	Individu lized Instructi n 1 >

ota 6

Recommended

Two 2 eve CHI cour es ex u lin 2 > . . . . . (

Japanese. At least nine semester hours must be taken from FLA 421, ar d JPN 321 and 414. No n ore than eight semes ter hours may be se ected fro n JPN 30 9, 310, 311, and 312.

Required

FLA	42	Jap nese L ter tur in Trans at o *L HL G* 3
JPN	3 3	Th rd Yea J p nes I *G* >
JPN	3 4	Th rd Year J p nes II *G* 3
JPN	32	Japane e L ter tur *I H G* . . . . . >
JPN	414	Introduction to Clas ical Japan se . . . . . >

ota . . . . . >

Electives

Ch o se n ne semester hours fr m the u s b >> . . . . . .

PN	> 9	ntermediate Japanese Conver ation 2
JPN	>10	Intern ed at Jap ne e Conversation 2
JPN	311	Japanese Co versa n and Compos tion *G* 3
PN	312	Japa e Conv rsa n and Co mp s n *G* 3
JPN	>21	Japa e Lit rature *L HL G* >
JPN	394	S ec al To pics 1–4
JPN	43>	A lvance Rea In 3
JPN	45>	P ob ms f T ns at 3
IPN	494	Spec a T pics –4
JPN	49	In v dua zed Instructi 1 >

Total 9

Recommended

wo eve PN o rse . . 6

In addition to the courses, tl e student n ust meet with an advisor and choose at least 15 semester hou s of courses, inc uding six semester hours of CHI prefix courses such as Chinese lan guage and calligraphy, Chinese literature in translation CHI 321 and 322 and FLA 420) or KOR prefix courses such as Korean lan guage ar d or Korean culture. At least three semester hours must be in an approved course that pro v des an overv ew of Japane e history. The rem in ing hours may consist of appropriate courses in art, hun ani t es literature, publ c pro rams, social and behavioral sci ences, business, etc

French—B.A.

Required

FRE	2 3>	Rea lin in French terature *G* 3
FRE	311	F ch Conversation *C* . . . . . >
FRE	1?	F nch Compos t on *C* . . . . . >
FRE	>21	F nch Literature *L HL H* . . . . . >
FRE	>2	Frenc l t ratu e *L HL* . . . . . >

T t . . . . . >

Sel ct 15 semester hours from the follow ng list, includ ng at l ast nine semester hours from the 400 leve

FRE	>15	Frenc l Phonet . . . . . >
FRE	>19	B siness French *G* . . . . . >
FRE	411	A l anced Sp ken F en h *G* 3
FRE	412	A lvanced Wr tten Frenc l *C* 3
FRE	4 >	Fren h Civ lization I *HL* 3
FRE	4 (	Frenc h Civ lizatic II *HL* 3
FRE	421	Structure of French 3
FRE	42?	Appl ed French L n u t s 3
FRE	423	Fr n h Syntax 3
FRE	441	Fr nch Lit atu e of the 7th Centu y *HL* 3
FRE	442	Fren h L t ratu e of the 1 th Century *HL H* 3
FRE	44>	Fren h L terature of the 18th Century *L H* . . . 3
FRE	451	French P etry of th e 19th Ce t ry. 3
FRE	452	French N vel of the 9th Ce tu y *HL* 3
FRE	453	heatr of the 19th Century *L HL* 3
FRE	461	Modern Narrative *HL* 3
FRE	46	Modern P etry *HL* 3
FRE	47	The L teratu e of F ancophone Af ca a l ne C rib bean *L H* . . . . . >
FRE	47	Franco Ca adia C v lization 3
FRF	48	Trans t n Theory and Practice . . . . . >
FRE	482	B siness Translat'on 3
FRE	48>	Literary Trans s ation 3
FRE	494	Spec a T pics 1–4
FRE	499	Indiv dua zed Instruct n . . . . . >

In addition to the courses, the student must n eet with an adv sor and choose at east 15 semester hours of courses fro n appropriate socia and behav ora science, humanities business courses, and other anguage courses.

German B.A.

Required

GER	311	Ger n C nversat on *C* 3
		r GER 3 2 German Co ersat on *G* 3
GER	313	German Comp s t on *G* 3
GER	4	Advance l Cr m n ar e d Co nversation *G* 3
GER	4 2	Advanced Gr m n ar ar d C mpo it on *G* 3
GER	471	Germ a Literat re *HL* 3
GER	472	German Literat e *HL* 3

C oose s x s me ter h u s f o the co rse be ow 6

GER	3(3	Sc ntific German 3
CER	304	Sc ntific German 3
GER	>14	Intr duction to German te ature 3