and codified body of knowledge that will serve as a foundation to engineering and for further specialized studies in a particular engineering discipline. As such, it comprises the major portion of the four-year curriculum. 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 field(s) of specialization.

Engineering Core Requirement
(84 hours minimum)

			Semester Hours
ECE	102	Introduction to Engineering	2
ECE	104	Engineering Graphics and Design	2
CHM	114	General Chemistry	4
or		CHM 115 and CHM 116 General Chemistry and Lab	
or		ECE 118 Chemical Foundations of Engineering	
MAT	20	Calculus I	5
MAT	21	Calculus II	5
ECE	122	Computer Programming	2
ECE	201	Mechanics and Heat	4
ECE	202	Electricity and Magnetism	4
ECE	203	Sound and Optics	3
or		PHY 115, 116, 117 and 118 University Physics for ECE 201, 202 and 203	
ECE	211	Engineering Mechanics I	3
or		ECE 217 Particle Mechanics	
ECE	305	System Dynamics and Networks	4
ECE	312	Engineering Mechanics II	3
or		ECE 318 Rigid Body Mechanics	
ECE	313	Mechanics of Materials	3
ECE	335	Electrical Science	4
ECE	340	Thermodynamics	3
or		CHM 44 General Physical Chemistry	
ECE	350	Structure and Properties of Materials	3
or		ECE 351 Engineering Materials	
or		ECE 352 Semiconductors and Devices	
or		CHM 442 General Physical Chemistry	
ECE	371	Transport Phenomena	4
ECE	380	Ordinary Differential Equations for Engineers	3
and			
ECE	382	Linear Algebra for Engineers	2
or		ECE 383 Probability and Statistics for Engineers	
or		ECE 384 Numerical Analysis for Engineers	
or		ECE 385 Vector Analysis for Engineers	
or		ECE 386 Partial Differential Equations for Engineers	
or		ECE 387 Complex Variables for Engineers	
or			
MAT	222	Calculus III	5
Approved mathematics content elective			3
ECE	400	Engineering Communications	3

In addition to the requirements shown above, the program of study must include, from the field of specialization, a minimum of 13 hours of engineering sciences content and a minimum of 6 hours of engineering design content.

Chemical and Bio Engineering

The chemical engineer is generally concerned with processes involving a chemical change or separation. He applies chemistry as well as physics for the development, design and operation of processes and equipment. Mathematics is applied in computer analysis and design with economics as a practical guide. Since chemistry is involved in most activities, the chemical engineer is found in a diversity of industries which manufacture conventional chemicals, metals, ceramics, space propellants, solid state devices, petroleum products, plastics, foods, drugs and health care equipment.

Training in chemical engineering provides a broad background which prepares one for a variety of occupations including environmental control, extractive metallurgy, energy and material transformation, oceanography, biomedical, and nuclear engineering.

Although the bachelor's degree has sufficed for the majority, research and development activities often make graduate study desirable. Students expecting to undertake a graduate program should consult with their advisor before the senior year to obtain the best selection of courses for an integrated Master of Science in Engineering program.

Living systems represent the most complicated chemical processes requiring analysis. Biomedical courses offer the chemical engineer an opportunity to specialize in this area, and interdisciplinary options are provided for increased interaction between life science and other engineering majors.

Chemical Engineering Core

Since CHM 114 is a terminal course not designed to prepare for advanced courses, its selection by chemical engineering majors is not recommended. The following courses are normally required for chemical engineering students as part of the engineering core re

quirements:

			Semester Hours
MAT	212	Calculus III	5
CHM	441, 442	General Physical Chemistry	6
ASE	487	Applied Mathematical Analysis	3

The following additional courses are normally required for the chemical engineering core:

CHM	331, 332, 335	General Organic Chemistry	8
CHM	443	Physical Chemistry Laboratory	1
CHE	311	Material and Energy Balances	2
CHE	332	Chemical Engineering Operations	4
CHE	333	Transport Phenomena Laboratory	1
CHE	342	Applied Chemical Thermodynamics	3
CHE	364	Chemical Process Instrumentation	3
CHE	442	Chemical Reactor Design	3
CHE	451, 452	Chemical Engineering Laboratory	4
CHE	461	Process Control	3
CHE	462	Process Design	4
CHE	496	Professional Seminar	1
Approved Technical Electives			3

The chemical engineering core is fundamentally chemical process engineering. Appropriate technical electives are chosen with the advice and consent of the advisor to allow some specialization in a field of interest. When greater specialization seems desirable, a maximum of two courses in the chemical engineering core may be replaced by selected courses meeting engineering education standards if approved by the advisor and faculty chair.

Chemical Engineering Areas of Emphasis. Suggested electives which may be selected to emphasize areas of interest include:

Biomedical. CHE 411, 511, 512, 513, 515, 517; IEE 425; BAS 460; EEE 465, 466, 565, 566.

Chemical Plant Administration. CHE 553, 581; CEE 564; ADS 305; MKT 300; MGT 301; CEE 564.

Computerized Design and Modeling. CHE 581; ASE 422, 425, 549.

Energy and Materials Conservation. CHE 523, 527, 553, 554, 571; MEE 487.

Environmental Control. CHE 553, 554, 555, 557; CEE 361, 362, 564, 567.

Nuclear. CHE 521, 581; MEE 411, 412, 413.

Simulation and System Control. CHE 562, 581; IEE 463; MEE 465; EEE 480.

Civil Engineering

Civil engineers are responsible for the planning, design, construction, research and management of many structural, urban and environmental projects which form the basis of our modern civilization. These include buildings, bridges, highways, dams, canals, irrigation projects, water and waste treatment plants and various multipurpose systems. Education in this field is established on scientific fundamentals with extensive training and practice in one or more areas of emphasis.

In addition to completing the engineering core with an average grade of C or better, plus at least a C grade in each of MAT 120, MAT 121, ECE 380, ECE 211, ECE 313, and ECE 371, civil engineering requires the completion of the courses listed below. Except for surveying, civil engineering core courses may not be taken without special permission until the engineering core (excepting electrical and communications courses) has been completed with previously stated minimum grades.

Civil Engineering Core

The additional requirements for science, engineering sciences, and design specified in the engineering core are satisfied within the civil engineering core.

			Semester Hours
CEE	341	Surveying	3
CEE	321	Structural Mechanics	3
CEE	322	Structural Elements	3
CEE	323	Structural Engineering	3
CEE	351	Soil Mechanics	4
CEE	361, 362	Environmental Engineering	5
CEE	372	Transportation Engineering	3
CEE	381	Hydraulic Engineering	4
CEE	496	Topics in Civil Engineering Practice	4

Bachelor's Degree Program. Requirements for the bachelor's degree include the completion of the civil engineering core courses and twelve (12) credit hours of technical electives with an average grade of C or better. Course selections will be made by the student with the advisor's approval and must include at least six (6) credit hours of *Civil Engineering Designated Design Electives* The remaining six (6) credit hours of technical electives may be selected from, but not restricted to, any of the courses listed under *Civil Engineering Elective Areas* For those students wishing to enter an area of specialization, the technical electives should be selected from the elective area of particular interest The graduate courses sted under the elective areas may, with appropriate approvals, be taken for undergraduate credit

Civil Engineering Designated Design Electives

			Semester Hours
CEE	423	Structural Design	3
CEE	452	Foundations	3
CEE	466	Sanitary Systems Design	3
CEE	475	Highway Geometric Design	3
CEE	481	Water Resources Engineering	3

Civil Engineering Elective Areas with Suggested Courses

Structural Engineering Analysis and design of structures for buildings, bridges space frames, structural mechanics. CEE 423, CEE 521, CEE 531, CEE 532.

Soils and Foundation Engineering Properties of soils as an engineering material Foundation design Geotechnical engineering CEE 452, CEE 552, CEE 555, CEE 556 CEE 557.

Environmental Engineering Water treatment Industrial and domestic waste treatment and disposal. Public health engineering. Industrial hygiene. CEE 466, CEE 461, CEE 563, CHM 231, MIC 201 2.

Transportation Engineering Analysis and design of transportation facilities. Transportation planning and economics. Transportation in the urban environment. CEE 475, CEE 471, CEE 572, CEE 574 CEE 576.

Water Resources Engineering Planning and design of facilities for collection, storage, and distribution of water. Water systems management Estimating availability of water resources. CEE 481, CEE 581, CEE 582, CEE 583, CEE 586

Construction Engineering CEE 344, CON 383, CON 395, CON 496, CEE 573

Pre-Architecture

Civil engineering provides a mechanism for qualified students to complete their requirements for admission to the College of Architecture while satisfying preliminary prerequisites for further study in structural engineering. Required are APH 100 and 101, ENG 102, ECE 102, 8 hours of humanities 8 hours of social and behavioral science including ECN 201, MAT 120 and 121, ECE 380 and an approved math elective, ECE 201, ECE 211, ECE 312, and ASE 321 Ten hours of electives are to be chosen from ARP 221 and 222, ECE 104, TST 111, IND 160 and/or IND 161 to satisfy the 61 semester hour requirement for admission to the three-year professional program in architecture. To complete this pre architectural sequence in two years, students should have done well in algebra, trigonometry and physics in high school A pre calculus math course and chemistry may be desirable.

Joint Bachelor of Architecture Master of Science (Engineering Degree Program

Students who complete the pre architecture sequence in civil engineering may satisfy prerequisites to an M.S., with a focus in structural engineering, by completing ECE 313, 351 and CEE 321, 322 and 323 as technical electives during their three year professional program in the College of Architecture Upon receipt of their Bachelor of Architecture, such students can obtain their M.S. with 30 additional hours of approved course work if their academic qualifications satisfy graduate college requirements

Electrical and Computer Engineering

Electrical Engineering. The professional activities of electrical engineers directly affect the lives of most of the world's population every day. Electrical engineers are responsible for the production and transmission of the vast quantities of electrical energy that our industrial society requires for its operation and for the analysis, design and development of systems to control automatically the machines and processes of our factories Electrical engineers are responsible for the design and development of complex signal processing systems, such as telephone, radar, television, and analog and digital computers Indeed, an electrical engineer is likely to be involved whenever power is utilized, intelligence is transmitted, or control of a physical process is required.

Computer Engineering. In recent years a rapidly increasing number of electrical engineers have devoted more and more of their time and talent to computer engineering Computer engineering encompasses a broad spectrum of engineering design activities from the design of tiny digital integrated circuits to the design and implementation of software and operating systems for large scale digital computer systems Computer engineering topics

within the electrical engineering curriculum include digital circuit design, switching theory, digital and computer systems design, operating-system and software design, computer algorithms, and computer languages.

Current advances in miniature digital integrated circuits, which have made devices such as digital watches and pocket sized calculators commonplace, have also reduced computer hardware costs and made the microcomputer a reality. As a result we are experiencing an explosion in the applications of and demand for microprocessors. Electrical and computer engineering work is being done more and more in connection with everyday products and consumer services.

Electrical and Computer Engineering Core

The curriculum in electrical and computer engineering is based upon the fundamental principles of mathematics, science, and engineering developed in the engineering core. In addition to the engineering core, each student completes the electrical and computer engineering core. Approved technical electives then provide him with an opportunity to study in greater depth technical subjects in which he has special interests.

The following courses are required for students in electrical and computer engineering as part of the engineering core.

			Semester Hours
MAT	212	Calculus III	5
MAT	362	Advanced Mathematics for Engineers and Scientists (Approved mathematics elective	3
ECE	352	Semiconductors and Device Materials Science)	3

In addition, the following courses are required to fulfill the electrical and computer engineering core.

			Semester Hours
EEE	301	Electrical Network	3
EEE	303	Signals and Filters	3
EEE	320	Digital Computer Fundamentals	4
EEE	332	Electronic Engineering	4
EEE	340	Electromagnetic Engineering I	3
EEE	440	Electromagnetic Engineering II	4
EEE	455	Communication Systems I	4
EEE	480	Feedback Systems	4
EEE	496	Professional Seminar	0

Technical Electives in Electrical and Computer Engineering
(Minimum total 13 semester hours)

Technical electives may be selected from one or more of the following technical areas of emphasis:

Antennas and Microwaves: EEE 441, 443, 445, 448, 541, 543, 547.

Bio-Medical and Clinical: EEE 465, 466, 565, 566, CHE 411, 512, 517.

Computer Languages: ASE 422, 423, EEE 514, 515, 516.

Computer Programming: ASE 322, 324, 422, 423, 424, 425; EEE 420, 514, 516.

Controls: EEE 420, 427, 428, 475, 487, 488; MEE 451.

Digital Circuit Design: EEE 425, 426, 427, 431, 483, 525.

Digital Computer Systems Design: EEE 420, 483, 514, 520, 522, ASE 423.

Electrical Communications: EEE 451, 456, 551, 553, 554, 555, 557, ECE 353, ASE 484, 485.

Electrical Networks: EEE 402, 405, 406, 428, 433, 445, 470, 501, 503, 504.

Engineering Math: ECE 383, 384; ASE 484, 485, 487, 582, 583, 586, 587, MAT 342, 461, 462, 463, 464, 465.

Lasers and Coherent Optics: EEE 434, 448, 548, 549.

Measurement Systems and Instrumentation: ESE 461, 462, 562.

Power Systems and Machinery: EEE 470, 471, 472, 473, 474, 475; MEE 411, 413; ECN 451. (CUG 364 recommended for Social Science Elective)

Solid State Electronics: EEE 425, 426, 431, 432, 433, 434, 435, 436, 437.

With the approval of the student's faculty advisor, technical electives may also be chosen from other courses in engineering, mathematics, the sciences, and business administration at or above the 300 level.

Engineering Science

The Engineering Science curricula emphasize the fundamentals of the physical sciences and mathematical disciplines which have application in solving important technological problems of society. Included in the curricula are the broad fields of engineering mechanics, materials science, and measurement systems.

This fundamental education gives the engineer the flexibility and understanding required to cope with the rapidly occurring changes in technology and the needs of society. Additionally, these backgrounds will prepare the student for career opportunities in research, development, design, engineering sales and consulting positions in industrial and governmental organizations and in teaching and research positions in universities. These curricula also offer courses for engineers in such fields as civil, electrical and mechanical engineering who find the increasing demands a greater depth of understanding in engineering mechanics, materials science, measurement systems, or other areas of engineering science.

Graduate students in engineering science pursue individual programs of study which are planned with the students' undergraduate background in mind, to provide a proper balance in mathematics, the basic and engineering sciences, and design synthesis and

systems. Areas of emphasis include. acoustics and noise control, aerospace engineering, continuum mechanics, dynamic meteorology, dynamics and vibrations, engineering mathematics, rotor dynamics, stress analysis, vehicle and structural mechanics, failure analysis, mechanical properties of materials, physical metallurgy, radiation effects, and measurement systems.

Undergraduate programs, appropriate for entrance into the engineering science graduate programs, are offered in the School of Engineering Special and Interdisciplinary Programs (see page 180), including engineering mechanics, engineering science, aerospace engineering, engineering mathematics, materials science and measurement systems engineering. Students with undergraduate degrees from other fields in engineering frequently pursue graduate degrees in Engineering Science.

The degrees awarded in Engineering Science include Master of Science in Engineering, the Master of Science, and the Doctor of Philosophy. The Master of Science in Engineering (M.S.E.) degree programs accredited by the Engineers' Council for Professional Development at the advanced level

Integrated B.S.E.-M.S.E. Program

This program is for academically qualified undergraduate engineering students who desire a more efficient integration of their undergraduate and graduate programs. Qualified students are assigned a faculty committee to assist them in selecting appropriate courses for both the bachelor's and master's degrees

Industrial and Management Systems Engineering

Industrial and Management Systems Engineering (IEE) provides a multidisciplinary approach for analyzing, understanding and resolving problems within organizations. Emphasis is on objective and analytical procedures for structuring approaches to problem solutions that facilitate sound decision making. The IEE approach to decision making is to formulate an objective and the constraints imposed on the decision maker and then to evolve decisions that accomplish the objective while meeting the constraints. The problem solving approaches may involve physical theories, engineering principles, management concepts and/or mathematical and computer models.

Modern industrial and management systems engineering approaches for designing effective operational systems are universally applicable to all forms of enterprise. Students must gain competence in a number of areas of knowledge and be capable of understanding complex systems through application of such knowledge.

The purpose of the IEE field of specialization, therefore, is to provide each student with an understanding of (1) how operational systems are designed, (2) how each component of a system contributes to overall system effectiveness, (3) the methodologies of systems analysis, 4) the probabilistic nature of events, (5) the human being as a complex system component, and (6) organization and management to facilitate planning and control.

At the undergraduate level, students pursue Industrial and Management Systems Engineering studies as a special program within the School of Engineering. In addition to the engineering core, an industrial and management systems engineering core is required of each student.

Industrial and Management Systems Engineering Core

The following three courses from the Engineering Core are required for the IEE students:

			Semester Hour
ECE	380	Ordinary Differential Equations for Engineers	3
ECE	382	Linear Algebra for Engineers	2
ECE	383	Probability and Statistics for Engineers	3

The following courses are required to fulfill the requirements in Industrial and Management Systems Engineering

			Semester Hour
IEE	300	Engineering Economy	2
MEE	332	Production Processes	3
IEE	362	Industrial Engineering Analysis	3
IEE	374	Quality Control	3
IEE	431	Engineering Administration	3
IEE	461	Planning, Scheduling and Control of Resources	3
IEE	473	System Applications of Linear Programming	3
IEE	475	Fundamentals of Simulation	3
IEE	476	Operations Research Models	3
ASE	485	Engineering Statistics	3
ASE	492	Project in Design and Development	3
ACC	498	Pro Seminar Cost Accounting for Engineers	3
		Technical Electives	10
		Total	44

In consultation with an advisor, technical electives are selected to emphasize an area of interest. The principal areas include (1) applied statistics and probability, 2) computer information systems, 3) human factors and productivity, 4) industrial systems and controls, (5) management systems, and (6) operations research.

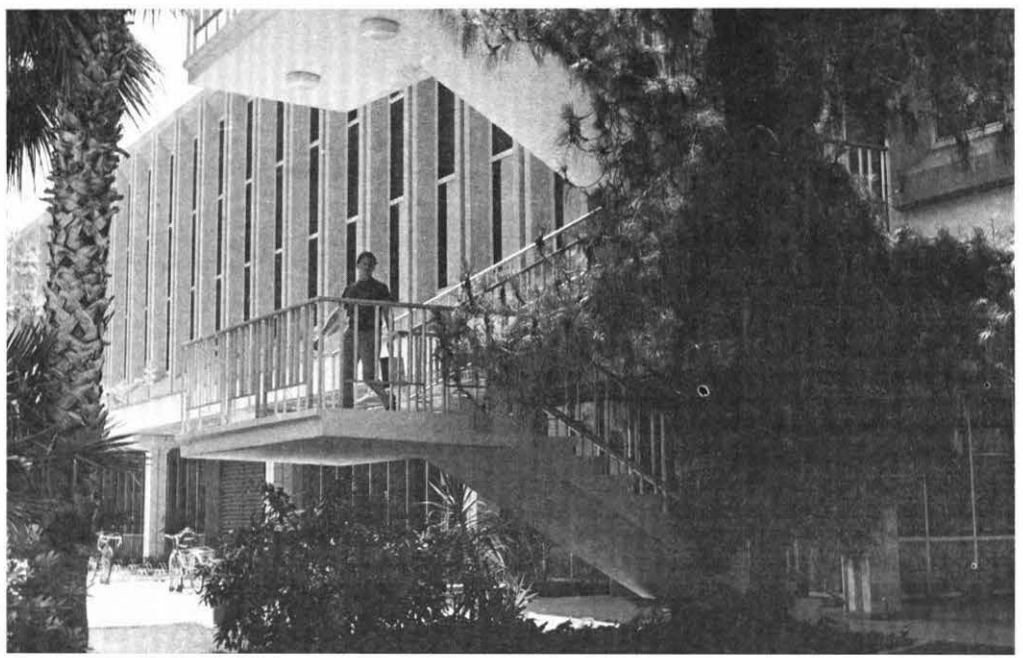
Integrated B.S.E.-M.S.E. Program

For the well-qualified undergraduate student who seeks both the B.S.E. and the M.S.E. degrees in an integrated five-year study plan, an advanced degree program is available leading to the degree of Master of Science in Engineering with Industrial and Management Systems Engineering major. The advanced degree program includes the requirements of the Special Engineering Program in Industrial and Management Systems Engineering, a B.S.E. degree being earned when the undergraduate program requirements have been met. Admission to the B.S.E.-M.S.E. program is normally at the junior or senior level and requires an application to the Dean through the faculty and the chair. Admission at the undergraduate level does not automatically qualify the student for admission to the fifth-year graduate program, but it is expected that qualified students in this program will complete both the B.S.E. and M.S.E. degrees within a five-year term of full-time study.

Fifth Year M.S.E. Program

The 30 semester hours of graduate work builds on the undergraduate core of IEE course work to provide an integrated and efficient path to the M.S.E. degree. Composition of the fifth year includes:

	Semester Hours
Probability-Statistics-Mathematics Selection	3
Operations Research Selection	3
Management or Economic Analysis Selection	3
Engineering Design and Systems Selections	9
Electives	9
IEE 592 Engineering Report	3
	30



Mechanical Engineering

Mechanical Engineering as a profession is broadly concerned with energy, including its transformation from one form to another as well as its transmission and utilization. This includes, for example, the conversion of chemical, nuclear or solar energy into mechanical work, the transmission of energy via heat exchangers, pipe lines and mechanical systems, and the harnessing of energy to perform useful tasks. Mechanical engineers are employed by every kind of industry to seek new knowledge through research, to do creative design and development and to build and control the modern devices and systems needed by society.

The undergraduate mechanical engineering field of specialization includes a foundation of basic mathematics, physics and engineering core courses common to all branches of engineering. Advanced mechanical engineering courses provide for the analytical study of the fundamental laws governing the use of energy, the principles of design, and the principles and use of measurement and control devices. Laboratory experiments illustrate the application of these principles in practical devices. At the undergraduate level, mechanical engineering students may elect to specialize in a variety of areas of emphasis: aerospace, biomechanical, computer methods, controls and measurement systems, design, energy conversion and power systems, environmental, manufacturing, nuclear, thermosciences, and vehicular engines. In addition, a general area of emphasis can be used to generate a pre-approved sequence that is of particular interest to the student.

Mechanical Engineering Core

The following courses are required for mechanical engineering students as part of the engineering core requirements:

		Semester Hours
CHM	114 General Chemistry for Engineers	4

ECE	340	Thermodynamics	3
ECE	380	Ordinary Differential Equations for Engineers	3
ECE	384	Numerical Analysis for Engineers	2
ECE	386	Partial Differential Equations for Engineers	2
ECE	350	Structure and Properties of Materials	3

In addition, the following courses are required to fulfill the requirements of the mechanical engineering core

			Semester Hours
ASE	304	Atomic and Nuclear Principles	2
ESE	415	Vibration Analysis	3
ESE	422	Mechanics of Materials	3
MEE	365	Control System Principles	3
MEE	372	Fluid Mechanics	4
MEE	382	Thermodynamics	3
MEE	441	Principles of Design I	3
MEE	445	Engineering Design	3
MEE	488	Heat Transfer	3
MEE	491	Experimental Mechanical Engineering	3
MEE	492	Mechanical Engineering Projects	3
		Approved area of emphasis electives	12

Mechanical Engineering Areas of Emphasis. In each area, a 2 or 3 semester hour course in mathematics, numerical analysis or computer programming (at 300 level, at least) may also be used.

Aerospace Select 12 hours from the following: ESE 414, MEE 450, 451, 453, 455, 471, 487

Biomechanical Select 12 hours from the following. EEE 301; ESL 461, 462, CHE 411, 517 (recommended); MEE 321, 412

Computer Methods Select 12 hours from the following: ASE 425, 483, 484, 485, 487, 582; ECE 383, 384; IEE 475; CHE 581; MAT 464, 465; MEE 471

Controls and Measurement Systems. Select 12 hours from the following: EEE 301, 320, 340; ESE 462 or 463 (recommended), ECE 383; MEE 451, 465 (recommended), 487

Design Select 12 hours from the following ASE 402; ESE 351, 413, 461, 462; ECE 383, MEE 321, 332, 432, 442, 465, 487

Energy Conversion and Power Systems Select 12 hours from the following. EEE 301, 470, 471, 472, 473; MEE 383, 411, 415, 455, 457, 487.

Environmental Select 12 hours from the following: BIO 320; CEE 361, 362, 381, 461, 563, 564, 565; MEE 386, 412.

Manufacturing. Select 12 hours from the following. ESE 455; IEE 300, 411, 431, 461, 463; MEE 321 332, 432, 442, 465

Nuclear. Select 12 hours from the following: EEE 340, 434, MEE 411 (recommended), 412, 413, 415, 417, 457, 465, 487

Thermosciences Select 12 hours from the following. MEE 383, 386, 411, 450, 453, 455, 457, 471, 487, 489.

Vehicular Engines Select 12 hours from the following: EEE 301, 473; MEE 383, 455 465, 487

General. Student must submit a detailed plan consisting of 12 hours of related courses for approval by the Mechanical Engineering Undergraduate Committee

School of Engineering Special and Interdisciplinary Programs

The School of Engineering special and interdisciplinary programs accommodate students whose educational objectives require more curricular flexibility than traditional engineering fields of specialization generally permit 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 are brought to bear on problems of large scope. The necessary breadth that these students seek often is not obtainable by branching from existing engineering fields. Rather, especially designed programs of course work that merge the required principles and approaches drawn from all fields of engineering and other pertinent disciplines are desired As an answer to the need, two types of course arrangements are available. (1) the Bachelor of Science in Engineering degree special programs, and (2) interdisciplinary programs that lead to the degree Bachelor of Science

The B.S.E. programs are designed primarily for students intending to pursue engineering careers at a professional level in industry or graduate studies The interdisciplinary programs accommodate those students who desire the integrity of an engineering education but plan to enter professions other than engineering or particularly to serve society in socially relevant activities Both are developed beyond the engineering core

The curricula leading to both the Bachelor of Science in Engineering (B.S.E.) and the Bachelor of Science (B.S.) have been accredited by the Engineers' Council for Professional Development under the category *Engineering Science*.

Bachelor of Science in Engineering Special Programs

Aerospace Engineering. Those engineering sciences that relate directly to the design, control, and missions of aerospace and high speed ground transportation systems are emphasized. The aerospace industry is a major employer of engineering talent Additionally, the field of

high speed transportation is a young, developing field with many needs for imaginative engineering innovation. This program recognizes the variety of directions which the aerospace and transit industries must move in order to solve many of the important problems of society, and prepares the student to operate effectively in the future in new and unanticipated problem situations. A professional orientation of aerospace engineering is acquired by the student in studying those topics most pertinent to the industry.

Required courses: ESE 426, 450, MEE 365, 450. [ASE 492; ECE 350; ESE 413, 415, 422, 461; MEE 372 required in engineering core.

Approved engineering electives from an area of emphasis: 13 semester hours.

Bioengineering. Bioengineering bridges the engineering, physical, and life sciences. Engineers, physicists and mathematicians routinely join with the biologist and physician in developing techniques, equipment and materials. The multidisciplinary approach to solving problems in medical treatment and research has evolved from exchanges of information between specialists of the concerned areas. Advanced study beyond the bachelor's degree is acutely needed in bioengineering, requiring a depth of knowledge from at least two diverse disciplines. This program is designed for entry into this type of work.

Required courses: CHE 364, CHM 331, 335, 332, 36 , LET 565, ASE 492, BMS 460, CHL 411, 512, ICE 118 (or CHM 115 and 116), EEE 465 required in engineering core.

Approved engineering electives from an area of emphasis (one course must be of engineering sciences type content): 2 semester hours.

Computer Science. Computer technology has had a significant impact on our way of life in general and on engineering education and engineering practice in particular. This impact may even be greater in the future as the full potential of modern computing systems and techniques is realized. The computer science program gives emphasis to the structure of information, the nature of information processing systems, and the use of computers in the solution of a broad range of engineering and non-engineering problems. Primary emphasis is placed upon the use of the computer, rather than upon the design of the computer logic.

Required courses: ASE 324 (or 325), 423, 483 (or 485), ECE 384; IEE 330, 422, 475 [ASE 492; ECE 382, 383, EEE 320, 420; IEE 463, 473 (or 476) must be selected in engineering core.]

Approved engineering electives from an area of emphasis (one course must be of engineering sciences type content): 9 semester hours.

Engineering Mechanics. This program strengthens the student's understanding of the basic fundamentals of mechanics and mathematics and their application to a number of important problems of society such as transportation, noise abatement, vehicle crashworthiness and structural and mechanical design. An education in mechanics enables the engineer to adapt to a rapidly changing technology and to apply more effectively the classical principles of engineering and physics to new concepts and techniques as they arise. This area of emphasis makes available to the student a wide range of employment possibilities in various fields of engineering and also establishes an excellent foundation for graduate study.

Required courses: ESE 410, 413, 426, 450 [ASE 492; ECE 350, 382, 386; ESE 415, 422, 430, 461, MEE 372 required in engineering core.]

Approved engineering electives from an area of emphasis: 14 semester hours.

Engineering Science. For students who desire a fundamental and multidisciplinary undergraduate engineering education, this area of emphasis includes course work associated with many of the contemporary challenges of society such as vibration and noise control, energy sources and conversion, environmental protection, engineering materials and nuclear reactor systems. The student can elect to continue this broad based engineering education or to specialize in one of several fields of engineering or other disciplines by the nature of his choice of the approved electives. By proper choice of electives the engineering science graduate can be prepared for a variety of positions in industry or for specialized graduate work in engineering or other professional fields.

Required courses: ASE 304, CEE 361, ESE 410, 413, 450, MEE 487. [ASE 492; ECE 350; ESE 415, 422, 430, 461, MEE 411 required in engineering core.]

Approved engineering electives from an area of emphasis: 10 semester hours.

Industrial and Management Systems Engineering. For students wishing to pursue an industrial engineering career concerned with the design, improvement, and installation of integrated systems of men, materials and equipment, this area of emphasis provides a strong engineering and mathematical foundation. The ability to analyze systems for improvement and to predict the consequences of decisions prior to their implementation is built upon this foundation. The term "industrial" is used in its broadest sense, and is applicable to a wide spectrum of activities, typical of which would be transportation optimization, bank activity analysis, hospital procedures improvement, manufacturing systems, and processing activities.

Required courses: ACC 498, IEE 362, 431, 473, MEE 332. [ASE 485, 492; ECE 382, 383, IEE 300, 374, 461, 475, 476 required in engineering core.]

Approved engineering electives from an area of emphasis 10 semester hours.

Materials Science. Historically, life has been influenced greatly by the development and utilization of new materials. Many challenges faced in the past were met successfully only after new materials had been developed to meet the new demands, most recently evidenced by the space program. Today's engineers must find solutions to problems in the area of energy production, transportation, communications, pollution control and efficient utilization of our natural resources. Challenges to the materials scientists in these areas range from studying the behavior of existing materials in new or more hostile environments, to developing new materials to meet new demands. Advanced research methods including X-ray and electron diffraction, scanning electron microscopy and Mossbauer spectroscopy are tools used by materials scientists in problem solving. This program is designed to provide students with the basic knowledge necessary to understand materials problems and to generate and analyze the scientific data which must be developed to formulate effective solutions. Many students in materials science elect to continue their education at the graduate level.

Required courses ASE 304, ECE 352; ESE 451. [ASE 492, ECE 350; ESE 450, 453, 455, 461; MEE 489 required in engineering core.]

Approved engineering electives from an area of emphasis 17 semester hours.

Measurement Systems Engineering. Today's technology in all fields exceeds the capabilities of purely theoretical approaches. Experimental work of increasingly sophisticated nature is necessary to study phenomena in all branches of engineering. The engineering of these measuring systems is a new, exciting and challenging field. Measurements are made in all disciplines, and all disciplines contribute to the design of measuring systems. Thus, measurement engineering is among the broadest and most general of the areas of engineering. For this reason, job opportunities in industry are particularly promising for engineers with this preparation.

Required courses ASE 304; EEE 303; ESE 462; MEE 365, 465 (or EEE 480). [ASE 492; ECE 386, 387; EEE 301, 340, ESE 415, 422, 450, 461 required in engineering core.]

Approved engineering electives from a field of specialization 10 semester hours.

Nuclear Engineering. Nuclear engineering is concerned with the release, control and utilization of nuclear energy, including an understanding of basic principles in the design and application of nuclear reactors for electrical power generation, marine propulsion, sea water desalting, and power systems for outer space. Advanced research methods are also studied using neutron activation analysis and radioisotope techniques in the field of medicine, biology, agriculture, and industry. This program is deeply rooted in the thermal and electrical sciences as well as nuclear science.

Required courses ASE 304 and 9 semester hours of approved courses from a field of specialization. [ECE 350 (or 352, 386, ESE 415, MEE 411, 412, 413, 415, 417 required in engineering core.]

Approved engineering electives from an area of emphasis 15 semester hours.

System Engineering. The increasing involvement of engineers in vital issues of the public sector has emphasized the need for breadth in technical perspective. In addition to the complexity of technology demands the depth of technical insight which is characteristic of traditional engineering disciplines. Coping with environmental issues, resource management, public policy formulation and decision criteria in the public arena requires this perspective and insight. The systems for transportation, urban development, pollution control and law enforcement are examples of bridges between public concerns and engineering activities. A solid foundation in science and technology with an engineering orientation is essential to the development and implementation of workable design concepts compatible with the needs of society. This program in system engineering is designed to provide this foundation in three parts, as follows: the basic elements of system theory and its application are introduced from the point of view of the traditional engineering disciplines: chemical, civil, electrical, engineering science, mechanical and industrial, the technical electives are sufficient to provide a substantial introduction to specialization in one of these fields, and General Studies requirements include courses specifically oriented to the relationships among technology, society, human values and public policy.

Required courses CFE 361; ESE 461 (or EEE 301); IEE 473, MEE 365. ASE 307, 403, 408; CHE 461, ECE 382, 383, EEE 320; ESE 441, HUM 402; IEE 476 required in engineering core and general studies.]

Approved engineering electives from a field of specialization 13 semester hours.

Urban Systems Engineering. Frequently civilizations are measured by their cities. For the past 100 years America has been moving toward urbanization, and forecasts indicate that this trend will likely continue for the next two decades. The problems of urbanization extend over a wide range of physical, social and economic conditions. These problems are also affected by scale, thus an urban area with a concentration of 1,000,00 people is not always functionally the same as another area with a population of 1 , . The problems of urban areas are highly interrelated and interdisciplinary. This program leads into such areas as urban engineering, transportation

planning, environmental engineering, city planning, urban management and decision making, or perhaps serving the electorate directly.

Required courses: GCU 494; CEE 371, 461; IEE 431 [ASE 485, ECE 382, 383, CEE 372, 471; ECN 201, IEE 300, 473, 476; PGS 100, SOC 301 required in engineering core and general studies.]

Approved engineering electives from an area of emphasis (one course must be of engineering sciences type content) 15 semester hours

Bachelor of Science Interdisciplinary Programs

Business and Pre-Law. This program accommodates especially those engineering students whose primary intent is to earn a graduate degree in business administration or law. The success with which engineers have risen to positions of leadership in business and government is well established. It is predicted that with the rapid increase in technological advance on every hand, opportunities for engineers to enter business and legal careers will be enhanced to an even greater degree in the future. Students who complete this program may complete requirements for the degree Master of Business Administration in one calendar year.

Required courses: ACC 498; ADS 305, ASE 324; FIN 300, IEE 461, MGT 301, MKT 300. ASE 492, ECE 382, 383, ECN 201, 202, ASE 485 (or ESE 441) ESE 461 (or IEE 362), IEE 300, 473 required in engineering core and general studies.

Approved engineering electives from a field of specialization two courses must be of engineering sciences type content) 9 semester hours.

Education. This program accommodates those who wish to couple an engineering education with a career in teaching. It is particularly directed to those who desire teaching competence in engineering, mathematics, or the physical sciences. Its content has been organized in cooperation with the College of Education and the Arizona State Department of Public Instruction. Graduates of this program who wish to receive a secondary teaching certificate with a teaching major in engineering science must complete two additional courses RDG 467 and RDG 480. It is also possible to obtain teaching minors in mathematics and physics.

Required courses: EDP 310, SED 310, 311, 411, 433. [ASE 492; ESE 441, 46 (or IEE 362), IEE 300; POS 300, 311 required in engineering core and general studies.]

Approved engineering electives from a field of specialization (3 courses must be of engineering sciences type content 14 semester hours.

Engineering Mathematics. The engineer of the future will continue to utilize mathematics in much of his work. In research, design, production or even in the solution of social problems, the rapidly decreasing time lag between discoveries and applications imposes ever increasing demands upon the mathematical preparation of the engineer. What was thought to be abstract or pure mathematics only 15 years ago is routinely used by engineers today. An engineer interested in the applications of mathematics to engineering must have preparation in the various areas of modern mathematics; therefore, pure mathematics, applied mathematics, and courses from a field of specialization are combined in this program.

Required courses: ASE 483, 484 (or MAT 464); MAT 442 (or ASE 582), 460, 461 (or ASE 587), 462 (or ASE 586), 470. [ASE 492, ECE 382, ESE 422 required in engineering core.]

Approved engineering electives from a field of specialization (3 courses must be of engineering sciences type content and one course of design type content) 17 semester hours

Geological Engineering. This program incorporates the joint application of engineering and geological principles to the planning, analysis and design of engineering projects directly related to the earth, its materials, structures and forces. The goal of the program is to investigate the physical properties of the shallow portions of the earth's crust which influence the design and construction of engineering structures such as foundations, excavations, dams, highways and sites for waste disposal. Additionally, the geological factors associated with land use planning and with the occurrence of petroleum and mineral deposits are encompassed within the program.

Required courses: GLG 101, 321, 424, 418. [ASE 492, ECE 351; CEE 351, 452; GLG 310 required in engineering core.]

Approved engineering electives from an area of emphasis (three courses must be of engineering sciences type content.) (An approved summer engineering geology field course is also highly recommended.) 16 semester hours.

Pre-Medical. In the past decade the interrelation between engineering and medicine has become vigorous and exciting. Our 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, operations research, electronics and cybernetics. This program would be of special interest to students desiring entry into a medical college and whose medical interests lie in research, aerospace and undersea medicine, or biophysics. Since both engineering and medicine have as their goal

the well being of man, this program could be compatible with any field of medical endeavor

Required courses BIO 101, 102; CHM 331, 335, 332, 336. [ASE 492, CHE 411; ECE 118 (or CHM 115 and 116 ; EEE 465, ESE 461 (or CHE 364 required in engineering core]

Approved pre-med ca electives 3 semester hours.

Approved engineering electives from a field of specialization (three courses must be of engineering sciences type content) 13 semester hours.

Social Systems Administration. Engineering concepts increasingly impact criminal justice administration, particularly in the solution of complex systems problems. New career roles are gradually emerging for engineering students who go on to earn a master's degree in Criminal Justice Problems of geographic resource distribution, functional resource allocation, automated data systems and decision systems, and a variety of forecasting and planning needs call upon competencies found in this particular curriculum.

Required courses CRJ 100, 200, 311, 360 (or SOC 341), 402 (or 462 or 463), IEE 431, PGS 350 [ASE 492; ECE 382, 383; ESE 441, 461, (or IEE 362), IEE 476; PGS 100, SOC 301 required in engineering core and general studies.]

Approved engineering electives from a field of specialization (two courses must be of engineering sciences type content) 1 semester hours

Analysis and Systems

ASE 200 Engineering Drawing. Further study of orthographic projection, auxiliary views, sectional views, dimensioning and standard engineering drawing conventions. Drafting skills and precision dimensioning techniques for production drawings of typical engineering parts Prerequisite: ECE 104 or ND 111 Six hours lecture-laboratory. Credit 2 hours

226 Digital Computer Programming. Role of the digital computer in business and society computer systems and information representation problem solving and algorithm design, FORTRAN programming fundamentals Credit, 2 hours

300 Communication Processes. Synthesis of basic communication processes with emphasis upon listening speaking, reading, and writing Prerequisites. ENG 101 or approval of instructor. Credit 3 hours

303 Energy, Technical and Societal Aspects. Introduction to role of energy in modern technical society Study of: transformation of energy from natural forms into forms useful to man; physical laws and material behaviors governing transformation methodology used to solve engineering problems. (Not for engineering degree credit.) Prerequisite· algebra Credit 2 hours

304 Atomic and Nuclear Principles. Atomic and nuclear principles with applications to engineering Prerequisite ECE 202; corequisite ECE 203 Credit 2 hours

307 System Engineering Methodology. Introduction to general systems theory with application to both natural and man made systems Corequisite ECE 383 Credit 3 hours

321 Fundamentals of Computer Programming. A human oriented systems approach to problem definition, formulation and solution using FORTRAN. Suitable as either an introductory or terminal course (ASE 321 and ECE 122 cannot both be used for credit) Computer solution required for projects Prerequisite high school algebra Two lectures Credit, 3 hours

324 Introduction to COBOL. The business-oriented language COBOL Emphasis on applications to management information systems Credit 3 hours

325 Introduction to PL/1. Basic concepts of programming language PL 1 Prerequisite ECE 122 ASE 226 or 321 or equivalent. Lecture and laboratory Credit 3 hours

402 Technology, Society and Human Values. Values which motivate mankind to create technology Areas of conflict and resolution between basic human values and technological society Reading and discussion with visiting lecturers (Also listed under HUM 402) Prerequisite junior standing Credit, 3 hours

403 Technology and Public Policy. Technology assessment involving natural resources environment, and social consequences of technology related to public policy formulation, planning process and management by objectives. Case studies and group projects. Prerequisite: junior standing. Credit, 3 hours

407 Environmental Systems Planning. Review of interdisciplinary systems analysis and techniques for planning and managing environmental programs student group investigations of projects formulated in collaboration with university faculty members and or community groups. Credit 3 hours

408 Integrated System Engineering. Modeling and structuring complex systems involving interactions among technological industrial, governmental and environmental systems Case studies and group projects Prerequisite. ASE 307 Credit 3 hours

410 Medical Practice Seminar. Lecture and recitation on methods used in diagnosis and treatment of diseases and disorders emphasizing reference on technical information in each medical specialty. Prerequisite approval of instructor. Credit 2 hours

422 Programming Languages. Programming language specification and its application to FORTRAN V and ALGOL-like languages. Prerequisites· ECE 122, ASE 226 or 321 ECE 380 or MAT 212 Lecture and laboratory Credit 3 hours

423 Symbolic Programming. Symbolic assembly language programming techniques and applications. Prerequisite ECE 122, ASE 226 or 321 Lecture and laboratory. Credit, 3 hours

425 Advanced Programming. A broad range of computer applications Advanced FORTRAN character handling machine dependency, sorting and merging and plotting Use of magnetic tape magnetic disks time sharing terminals and library programs Prerequisites a first course in FORTRAN programming Lecture and laboratory. Credit, 3 hours

480 Medical Data Analysis. Applications of statistical and probabilistic models to study and analysis of biological and clinical problems including experience with biomedical program packages Prerequisite· MAT 121 or MAT 142. Credit, 3 hours.

483 Probability for Engineers. First course in applied stochastic processes. Special emphasis on applying theory developed for Markov and renewal processes to queueing reliability time series and social and behavioral problems Prerequisite ECE 383 Credit 3 hours

484 Numerical Analysis in Engineering. Application of numerical procedures to the solution of complex engineering problems Analysis and organization of practical programs for numerical solution of initial boundary and eigenvalue problems Prerequisite: ECE 380 or MAT 212 Credit, 3 hours

485 Engineering Statistics. Statistical methods applied

to engineering problems. Regression and correlation analyses, quality control and tolerance charts, distribution of extremes, and introduction to experimental design and analysis of variance. Prerequisite: ECE 383. Credit, 3 hours.

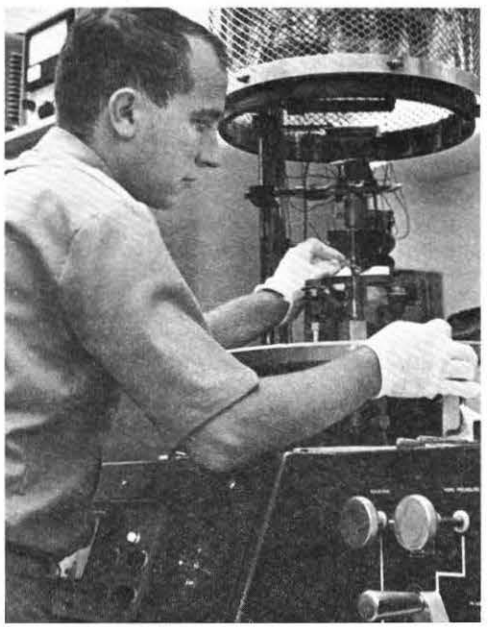
487 Applied Mathematical Analysis. Treatment and interpretation of engineering data, mathematical models of engineering problems, linear algebra and introduction to optimization techniques, and computation techniques for solving nonlinear equations. Prerequisite: ECE 380 or MAT 212. Credit, 3 hours.

492 Project in Design and Development. Individual project in creative design and synthesis. Credit, 2-3 hours.

510 Rotating Internship. Exposure by scheduled rotating assignments to major hospital and health delivery departments including medical, administrative, and support functions. Credit, 1 hour.

511 Clinical Practicum. Extended supervised engineering service in health delivery system with assignment of individual project culminating in technical report defense. Credit, 3 hours.

582 Linear Algebra in Engineering. Matrix theory and numerical analysis of matrix operations. Applications from mechanical, structural, electrical and control fields of engineering. Prerequisite: ECE 386 or MAT 460. Credit, 3 hours.



583 Statistical Applications in Engineering. Descriptive statistics, linear and nonlinear regression analysis, experimental design, and experimental optimum seeking techniques. Credit, 3 hours.

586 Partial Differential Equations in Engineering. Ordinary differential equations, series solutions, boundary value problems. Fourier series, separation of variables, inhomogeneous problems. Prerequisites: ECE 380 or MAT 212; ECE 386 or MAT 460. Credit, 3 hours.

587 Complex Analysis in Engineering. Complex variables in engineering: analytic functions, integrals, power series, conformal mapping, application of conformal mapping and transforms to problems in fluid flow, heat transfer and electric potential. Prerequisite: ECE 386 or MAT 460. Credit, 3 hours.

Chemical and Bio Engineering

PROFESSORS:
REISER (ECG 120C), BERMAN, CRAIG, DORSON, KUESTER, SATER

ASSOCIATE PROFESSOR:
BELLAMY

ASSISTANT PROFESSOR:
EHMSEN

CHE 311 Material and Energy Balances. Principles of physics and chemistry applied to the formulation of material and energy balances. Prerequisite: ECE 118; corequisite: MAT 121. Two hours lecture, one hour recitation. Credit, 2 hours.

332 Chemical Engineering Operations. Process operations including distillation, extraction, absorption, drying, crystallization, filtration, materials handling and preparation. Prerequisite: ECE 371. Credit, 4 hours.

333 Transport Phenomena Laboratory. Physicochemical measurements and determination of transport properties. Prerequisite: ECE 371. Three hours laboratory. Credit, 1 hour.

342 Applied Chemical Thermodynamics. Energy relations and equilibrium conversions based on chemical potentials and phase equilibria. Prerequisites: CHE 311, CHM 441. Credit, 3 hours.

384 Chemical Process Instrumentation. Theory and applications of analytical and control instrumentation used in the chemical process industries. Prerequisites: CHM 115, ECE 203, 335. Lecture, demonstrations and laboratory. Credit, 3 hours.

411 Biomedical Engineering. Review of diagnostic and prosthetic methods using engineering methodology. Introduction to transport, metabolic and autoregulatory processes in the human body. Prerequisite: approval of instructor. Credit, 3 hours.

442 Chemical Reactor Design. Application of kinetics to chemical reactor design. Prerequisite: CHE 342, ECE 371. Credit, 3 hours.

451, 452 Chemical Engineering Laboratory. Operation, control and design of experimental and industrial process equipment; independent research projects. Corequisite: CHE 332. Six hours laboratory. Credit, 2 hours each semester.

461 Process Control. Process dynamics, instrumentation and feedback applied to automatic process control. Prerequisites: ECE 335, 371. Two lectures, 3 hours laboratory. Credit, 3 hours.

462 Process Design. Application of economic principles to optimize equipment selection and design; development and design of process systems. Prerequisite: CHE 332, 442. Credit, 4 hours.

496 Professional Seminar. Professional and ethical aspects with a discussion of employment opportunities and responsibilities. Lectures and field trips. Credit, 1 hour for seniors with examination.

511 Digital Data Processing. Adjunct laboratory to CHE 512 for Clinical Engineering students with insufficient background in FORTRAN, BASIC, A/D conversion, and medical data processing. Corequisite: CHE 512. Credit, 1 hour.

512 Physiological Instrumentation. In vitro and in vivo theory, concepts, techniques, and practicum in biomedical instrumentation including A/D conversion and digital data processing. Lecture and laboratory. Prerequisite: BAS 460 or equivalent. Credit, 3 hours.

513 Rheology of Fluids. Physical and mathematical foundation of the constitutive fluid equations and their application, including biological fluids, uses and limitations of experimental viscometry, development of multidimensional flow equation for a general fluid. Prerequisite: ECE 371. Credit, 3 hours.

515 Physiological Transport Processes. Analysis of heat, mass, momentum and electrical energy transfer in mammals, derivation of both microscopic and macroscopic models based on current research. Credit, 3 hours.

517 Prosthetic and Diagnostic Engineering. Criteria for mechanical replacement or assistance of organ functions; diagnostic methods, equipment and usage;

ex sting methodo ogy and future requ rements nc ud-ing detailed des gns Cred t, 3 hours.

521 Chemical Processing of Nuclear Materials. The nuc ear fuel cycle inc ud ng product on of nuc ear fue s and process ng of spent fue s for recyc e and recovery of f ssi e mater als and waste disposa Prerequis te: approva of nstructor. Cred t, 3 hours

523 Materials Processing. Sol d state theory, contro of morphology, pur ty growth and defects formation structure and properties of th n f lms; m crocrysta s whiskers, organic crystals Cred t 3 hours

527 Polymer Science and Engineering. Synthes s character zat on and processing of commercial h gh polymers Cred t, 3 hours

533 Transport Processes. Un f ed treatment of momen tum, heat and mass transfer from mo ecu ar theory and continuum points of v ew Cont nuum equat ons of mi croscopic and macroscopic systems multicomponent and multiphase systems Cred t, 3 hours

535 Interfacial Transport. Phys ca character st cs of nterfaces with app cation to ndustrial contact ng equ pment; interfac al mot on and stabi ity, d sperse systems; absorpt on, adsorpt on desorpt on, adhes on emu s ons, drop format on and coa escence; e ectro static phenomena. Credit 3 hours

536 Convective Mass Transfer. Turbu ent f ow for mu t component systems inc ud ng chem ca reactions w th app ication ons n separat ons and a r po lut on Prerequ - s te. CHE 533 or MEE 571 Cred t 3 hours.

543 Thermodynamics of Chemical Systems. C assical and stat stica thermodynam cs of non deal phys co chem ca systems and processes pred ct on of opt mum operating conditions. Cred t, 3 hours

544 Chemical Reactor Engineering. React on rates thermodynam cs, and transport pr nciples app ed to the des gn and operation of chem ca reactors Prerequ s te: CHE 543 Credit 3 hours

553 Energy-Pollution Strategies. Interact on of energy conservations, res dua s management and econom c pol cy n the chemica process ndustry Cred t, 3 hours

554 Resource Recovery. Mater a s fue and chemical feedstock recovery from urban forest and agr cultura wastes. Top cs covered inc ude techn ca des gn, case stud es econom cs, and market ng Prerequis te: ap prova of nstructor Cred t 3 hours.

555 Membrane Processes for Environmental Control. Theory and pract ce of membrane separat on tech-n ques are developed emphasiz ng env ronmental contro prob ems Both gas and l qu d stream nsta la tion case h stor es are rev ewed Prerequ s te ECE 371 Cred t, 3 hours

557 Industrial Water and Waste Treatment. Pur fication of water for ndustr al use pur ty corrosion and sca e formation; treatment of wastewater for recyc ng and thermal upgrading for comp iance w th zero po utant d scharge regulat ons. Cred t 3 hours

562 Chemical Systems Engineering. Process dynam-cs, systems ana ys s, computer appl cat ons, process contro Cred t, 3 hours

563 Chemical Engineering Design. Computationa methods, the design of chemica p ants and processes Credit, 3 hours

571 Electrochemical Engineering. Pr nc p es of e ectro chemical react ons app ed to chemica product on, e ectroplating, electrod a ysis and fue ce ls Cred t, 3 hours.

581 Optimization Techniques. Deve opment and app i-cat on of class cal, search and dynam c programming methods for opt m z ng unconstra ned equal ty con-strained and nequa ity constra ned prob ems. Prerequisite: MAT 212 Cred t, 3 hours.

Special Courses: CHE 494 498 499 584, 590, 591 592, 593 594, 598 599, 792 799

Civil Engineering

PROFESSORS:
HILL (ECG 120D) BETZ, BLACKBURN, KLOCK
LUNDGREN, O BANNON, P AN RUFF

ASSOCIATE PROFESSORS:
BORGO, MATTHIAS

ASSISTANT PROFESSORS:
DOWNS DUFFY RAZZAQ

CEE 310 Materials for Construction. Structura and behav ora character st cs, eng neering propert es mea surements and app icat on of construction mater a s Not open to eng neer ng students Prerequis te CON 323 or equiva ent One ecture 3 hours aboratory Cre d t, 2 hours.

321 Structural Mechanics. Stat ca y determ nate and ndeterm nate structures inc ud ng trusses, beams and frames Cred t 3 hours

322 Structural Elements. Fundamenta s of behavior and design of various stee concrete and t mber e e-ments and components Corequ s te CEE 321 Cred t, 3 hours.

323 Structural Engineering. Structural design n accor-dance w th the provisions of bu d ng codes and specifications. Prerequ site CEE 321 322 Two lec tures, 3 hours aboratory. Cred t 3 hours

340 Surveying and Mapping. Large sca e mapping of sma l areas by plane tab e trans t stad a and gr d squares. Computation of traverses and areas, topo-graphic map read ng. Not open to engineering or construct on students Prerequ s te. h gh school or co ege trigonometry One lecture, 3 hours aboratory Cred t, 3 hours.

341 Surveying. Theory and fie d work n construct on and and surveys Prerequisite MAT 118 Two ectures 3 hours laboratory Credit, 3 hours

342 Surveying Calculation Techniques. Off ce ca cu a tions inc ud ng traverses adjustment of traverse curve calcu ations horizontal, vert ca , sp ra s coord nates and azimuth determination by so ar observations Cre dit 3 hours

344 Route Surveying. Simp e, compound and trans t on curves, reconnaissance, prel m nary and location sur veys Ca cula on of earthwork So a observat ons for az muth Prerequ s te. CEE 341. Two ectures 3 hours aboratory. Cred t 3 hours

345 Surveying of Public Lands. H story and methods of surveying publ c lands of the United States. Problems n resurveys of pub c lands Cred t, 3 hours

351 Soil Mechanics. ndex propert es and eng neer ng character stics of so s. Compact on shear compress b l ty and permeabi ty Three ectures, 3 hours aboratory Credit 4 hours.

361 Environmental Engineering. Natura environment water resources hydro og c cyc e chem stry of natura waters, qual ty requirements and water treatment water d stribution systems Cred t 3 hours

362 Environmental Engineering. Natura environment the carbon cycle and b ochem stry of wastes pr nc p es of waste treatment dra nage systems. Coreq s te. CEE 381 Cred t, 2 hours

371 Urban Problems. Prob ems of the modern urban environment. Concepts of comprehens ve plann ng H s tory of urban deve opment, transportat on pub c serv ce zoning, and d vis on, urban renewa ne ghbor hood planning See AUP 371, page 216 Cred t 3 hours

372 Transportation Engineering. E ementary forms of transportat on: h ghway ra l, wate a r S mi ar t es and d fferences n construction operat on planning and adm nistrat on. Cred t, 3 hours

380 Hydraulics and Hydrology. Water supp y and d str but on, prec p tation and runoff, we ls Flow n pressure condu ts and open channels Hydrau c mach nery Not open to eng neering students Two lectures 2 hours laboratory. Cred t, 3 hours.

381 Hydraulic Engineering. App ication of f uid me-chan cs to water eng neering Pressure condu t and free surface f ow, unsteady f ow and turbo-mach nery. Intro duction to hydro ogy. Three ectures, 2 hours aboratory Credit 4 hours

423 Structural Design. Ana ys s and des gn of structura systems. Prerequ s te CEE 323. Two lectures, 3 hours laboratory. Cred t, 3 hours

450 Soil Mechanics in Construction. So mechan cs as app ied to the construction f e d foundat ons highways retaining wa ls and slope stab l ty. Re ationsh p between so l character stics and geolog c formations Prerequi-s te· sen or stand ng or approva of nstructor Not open to eng neer ng students Two ectures, 3 hours aborato-tory Cred t, 3 hours.

452 Foundations. App cat ons of so l mechanics to s ope stabi ity, h ghways, earth dams foundations, and stress distribut on n so l media Prerequ s te CEE 351 Two ectures 3 hours aboratory. Cred t, 3 hours

461 Environment and Society. Physica chem ca and b o ogical components of the natural env ronment m-pact of man, or gins and types of po lution. Environmenta factors affect ng soc ety Open to ju niors, seniors and graduate students. Cred t 3 hours.

466 Sanitary Systems Design. Capac ty, p anning and design of water supply, domest c and storm dra nage, and sol d waste systems Cred t, 3 hours

471 Planning and Design of Urban Systems. For stu dents in city planning, urban systems, c v eng neer ng and related areas working as interdiscipl nary p ann ng and design teams. Effect of economic base employ ment and popu ation on urban land use requ rements Locat on and requ red capac ty of urban systems to serve urban land uses Prerequ s te. sen or stand ng. Two lectures, 3 hours aboratory. Cred t, 3 hours.

475 Highway Geometric Design. Des gn of the vis b e e ements of the roadway Fundamenta des gn contro s with app ication to rura roads at grade ntersections, freeways and nterchanges Prerequ s te CEE 372 Two lectures 2 hours laboratory Credit 3 hours

481 Water Resources Engineering. Formu at on of hy draulic eng neering systems concepts perta ning to irrigation, hydroe ectric power flood contro mun c pal and industria water supply, nav gat on recreat on, f sh and wi d ife conservat on Prerequ s te CEE 381 Cred t 3 hours

496 Topics in Civil Engineering Practice. Techn ca , econom c, po t ca ega and socia aspects of civ en g neering practice as related to the formu at on planning, design and management of eng neer ng proj-ects. Credit, 1 4 hours

521 Stress Analysis. Advanced top cs n the ana ytica determ nation of stress and stra n Prerequ site ECE 313 Credit, 3 hours.

524 Steel Structures. Strength properties of steel and their effects on structural behav or. Elastic des gn of steel structures P ast c analysis and design of beams frames and bents Plastic def ections Plastic des gn requ rements. Mu t -story bu d ngs. Cred t, 3 hours

525 Bridge Design. Computer-aided design of br dges and bridge components Super structure des gn of con t nuous girder continuous truss, arch, and suspension br dges. Complete design of a continuous plate girder br dge Prerequ s te CEE 531 Two hours ecture, 2 hours aboratory Credit 3 hours

527 Concrete Structures. E ast c ultimate strength and y e d ine theory. Deflect on, torsion, shrinkage and plast c f ow Prestressed concrete; spec al systems Prerequ s te CEE 423. Credit 3 hours

528 Stability of Structures. Elast c and nelastic buck l ng of rolled and cold-formed columns and beams Stab ity of p ates r gid frames and trusses Credit, 3 hours.

529 Complex Structures. C ass ca and numer ca n vest gations of l near and non l near structures composed of f at and curved surfaces, and l near or curv l near e ements. Cred t, 1 3 hours

531 Theory of Structures. Genera theorems relat ng to elastic systems; def ect on of trusses and beams stati cal y ndeterm nate trusses, beams r ngs, arches, and frames by cons stent deformat on, east work and elas tic center horizontal y curved members n bend ng and torsion Prerequisite· CEE 321 Cred t 3 hours

532 Matrix Methods in Structural Analysis. Matr x methods appl ed to structura eng'neer ng and struc tural mechan cs. Stiffness and flex b lity methods· fin te e ements differences Corequisites· CEE 531 or equiva lent and computer programm ng background Cred t, 3 hours.

536 Dynamics of Structures. Structures and structura members subjected to dynam c load ngs· response spectra theory emphasiz ng earthquake app ications nvestigations of the response of multi-degree of free-dom structures matrix methods of ana ysis Prerequisite: CEE 531. Cred t 3 hours.

537 Topics in Structural Engineering. Advanced de s gn topics including wind eng neering, earthquake engineering, and behav or of structura systems Prerequisite: CEE 423. Credit, 1 3 hours.

552 Geological Engineering. Geo og ca invest gat ons for engineering purposes case histories, major aspects of geologic structure weather ng r ver mechan cs gla cial deposits eol an deposits, airphoto interpretation for engineering site locations Credit 3 hours

553 Theoretical Soil Mechanics. Engineering properties of soils, appl cation of theory of elastic ty to soi media failure theories theories of consol dat on and shear strength of granular materia s. Prerequ site. CEE 351. Two lectures, 3 hours laboratory. Credit, 3 hours.

554 Theoretical Soil Mechanics. Shear strength of cohesive mater a s, c ay m nera ogy and so l structure theories of bearing capacity, slope stab l ty soi dynam cs. Prerequis te. CEE 351 Two ectures 3 hours laboratory Credit, 3 hours.

555 Applied Soil Mechanics. App icat on of theoret cal soil mechan cs to eng neer ng problems Subsoi invest-gations, sampl ng techniques field measurements underp nning dewater ng systems chemical and me chanical stabi izat on techn ques Prerequisite· CEE 553 Two ectures, 3 hours aboratory Cred t 3 hours

556 Seepage and Earth Dams. Transient and steady state flow of water through so l media confined and unconf ned flow, pore water pressures, and appl cation of theor es to the des gn of earth dams Prerequ s te. CEE 351 Two ectures 3 hours laboratory Credit, 3 hours

557 Advanced Foundation Engineering. Des gn of shal-ow and deep foundat ons, reta ning wal s, braced excavations anchored bu kheads and cofferdams. Pre requisite: CEE 553 Credit 3 hours.

561 Water and Waste Water Treatment. Theory and design of physica and chemica processes for the treat ment of water and waste waters. Prerequisite· CEE 361 or equivalent Credit 3 hours

562 Waste Water Treatment. Theory and des gn of bio-logica waste treatment systems Pol ut on and environmental ass m lat on of wastes Prerequis te· CEE 362 or equ va ent Credit 3 hours

563 Environmental Chemistry Laboratory. Ana ys s of water domestic and ndustr a wastes aboratory pro cedures for contro of water and waste treatment processes. Prerequis te. CEE 361 or 362 Two ectures 3 hours aboratory Credit 3 hours

564, 565 Industrial Hygiene. Survey methods lega and phys o ogical aspects of occupational health hazards Methods of measurement and analys s and phys o og-ca actions of such contam nants as toxic gases, m nera dusts metals and the r compounds, and in-dustr al solvents. Two lectures, 3 hours aboratory Credit 3 hours each semester

566 Sanitary Engineering Processes Laboratory. Study of unit processes nvolved in water and waste treat ment. One ecture 6 hours laboratory. Cred t, 3 hours.

567 Atmospheric Pollution. Atmospher c composition and dynamics, orig ns and chem stry of contamination, b o ogica significance analyt cal measurement eng neering control methods and a r pol ut on leg s ation Cred t 1 3 hours

568 Epidemiology and Public Health Engineering. Bi ology and transm ss on of d seases mathematica theory of ep dem cs, san tat on and publ c health ad m n strat on Credit, 1 3 hours

572 Design of Highway and Airport Pavements. Des gn practices, mater als and test ng of flex b e and r g d pavements Prerequ s tes CEE 351 372 Cred t 3 hours

573 Engineering Interpretation of Land Forms. North America by geograph c reg ons and the eng neer ng problems and characterist cs of each area Cred t 3 hours

574 Traffic Engineering. Operator and veh c e charac terist cs, street capac ty signa s s gns and mark ngs, etc A phases of traffic eng neer ng as applied to urban areas Cred t, 3 hours

576 Airport Engineering. P ann ng and des gn of a rport faci it es, financing, a r traff c contro aircraft character stics demand, site se ect on runway conf guration and term na areas Prerequ site· CEE 372 Credit 3 hours

577 Urban Transportation Planning. App cat on of and use parameters traff c generation theory, traffic d stri but on and ass'gnment models trans t ana ysis and economic factors to the so ut on of the urban transpor tat on prob em Credit 3 hours

578 Highway Engineering, Planning and Economics. H ghway transportation nclud ng design, operation plann ng, env ronmental mpact economic feas bi ty and f nanc ng. Highways as a reg ona system Cred t 3 hours

579, 581 Hydrology. Theory and the appl cat on of hy drolog c pr nc ples to the solut on of typ ca water resources systems p ann ng and eng neering design prob ems. Prerequis te· CEE 381 Cred t 2 hours

582 Open Channel Flow. ntroduct on to hydrodynam ics of open channel f ow Emphas s on appl cations Prerequ s te. CEE 381 Cred t, 2 hours

583 Water Resources Systems Planning. ntroduction to the theory of quantitat ve p ann ng methodo ogies for arge sca e systems. Case stud es Cred t, 3 hours

586 Water Resources Systems. App cat on of quantita- t ve planning methodo og es to the eng neer ng aspects of water resource systems Case stud es Corequ s te CEE 583. Cred t 2 hours

587 Water Resources Systems. Appl cat on of quant ta t ve p ann'ng methodo og es to the social lega pol t ca and econom c aspects of water resource systems. Case studies Corequisite: CEE 583 Credit 2 hours

589 Water Resources Systems Management. System- at c approach to the management of water resources systems Synthesis of the techn cal and non techn ca system components Case stud es of arge sca e deve opments. Prerequ s tes. CEE 584 and 585 Cred t 3 hours

Special Courses: CEE 494, 498, 499 580 584, 590 591, 592 594, 598 599, 792, 799 (See page 31

Students enro led in CEE 580, 584, 590, 592, 599, 792 and 799 are required to attend gradu ate student sem nars at time shown in c ass schedule Each semester every graduate stu dent enrol ed for more than 6 cred t hours is to enroll for at east 1 cred t hour of CEE 592, 599 792 or 799 Each c vil eng neer ng graduate stu dent hold ng an appo ntment as a Teach ng or Research Assistant or Associate s to enroll for 1 credit hour of CEE 580 such cred t does not app y toward graduat on

Electrical and Computer Engineering

PROFESSORS:
T CE (ECA 209), DEMASSA DONNELLY, GELOPULOS, H GG NS, JELSMA, KAUFMAN, KELLY, PALAIS, PATTERSON, P E RUSSELL, SIRK S, T.B. THOMPSON, WELCH, WOODF LL

ASSOCIATE PROFESSORS:
BLACKLEDGE, CLARK, ROBBINS, SN DER, STE NMANN, Z MMER

ASSISTANT PROFESSORS:
PHEANIS, WHITE

LECTURER:
SAK OT S

EEE 273 Electrical Construction Fundamentals. E ectrical c rcu ts and machinery. E ements of power transmissions and d stribution. Re ated measurement and nstrumentat on essent als Not for degree cred t for EEE majors) Prerequ s tes: PHY 112, MAT 120 Three lectures 3 hours aboratory. Cred t 4 hours

301 Electrical Networks. Ana ys s of l near networks and e ectron c circuit mode s. Corequ s te. ECE 335 Credit 3 hours.

303 Signals and Filters. Filter ng and spectra analysis in continuous and d screte systems. Prerequisite EEE 301 Credit, 3 hours

320 Digital Computer Fundamentals. Introduction to dig ta computers and microprocessors. Prerequis te jun or stand ng and ECE 122 Three ectures 3 hours aboratory Credit, 4 hours

332 Electronic Engineering. Ana ys s and appl cation of dig ta and analog circuits Prerequ sites EEE 301 320 ECE 335. Three lectures, 3 hours aboratory Cred t 4 hours.

340 Electromagnetic Engineering I. Static and t me varying vector f e ds. Die ectr c and magnetic mater a s Maxwe l's equations Un form plane waves Energy Radiat on Prerequisites ECE 202, MAT 362 Cred t 3 hours.

402 Network Analysis. Advanced top cs n near net work analys s. Mu tiports, scatter ng parameters and topo ogica methods Prerequ site. EEE 303 or equ va- ent. Credit 3 hours

405 Filter Design. Pr nc p es of f ter synthes s Time and frequency doma n approx mat on Prerequ s te· EEE 303 or equ valent. Credit, 3 hours

406 Computer-Aided Network Design. Computer methods n AC DC and transient ana ys s of near and nonl near networks. Act ve dev ce model ng. Theory and use of selected general purpose programs such as SP CE ECAP C RCUS and SCEPTRE. Prerequ s te EEE 303 or equivalent. Credit 3 hours

420 Digital System Design Fundamentals. Computer ar thmetic, log cal des gn, and circuit techno ogy. Hard- ware, programming and software of a part cular system. Software inc udes use of on- ine assemb y and util ty systems Prerequisite. EEE 320 2 5 hours lecture 1.5 hours laboratory Credit, 3 hours.

425 Digital Systems Circuits. Mode s and ana ys s of BJT's and FET s n nonlinear electrica c rcuits for log c, timing, switching, memory and osc l at ons in dig tal and ana og systems Prerequis tes EEE 301, 320 Corequ s- te: EEE 426 or equ valent Cred t, 3 hours

426 Digital Circuits Laboratory. ncorporat on of dig ta components nto c rcu ts for digita systems app ica tions Corequis te: EEE 425 Three hours. Cred t, 1 hour

427 Digital Switching Theory. M n m zation of Boo ean funct ons for comb national s ng e and multiple output switch ng circuits. Symmetr ca funct ons, thresho d functions memory e ements and completely spec fied

sequential machines. Prerequ s te. EEE 320. Cred t 3 hours

428 Analog and Hybrid Computers. Design and appl cation of hybrid analog-d gita computer systems and components. Prerequ sites EEE 320, 332 2 5 hours ecture, 1.5 hours aboratory. Cred t, 3 hours

431 Solid State Devices. Trans t time and charge control concepts for bipolar and fie d-effect devices fabr cated by diffus on and on mplantation processes Network mode s and mode parameters for computer simu at on, system appl cat ons Prerequisites EEE 332, ECE 352. Cred t, 3 hours.

432 Solid State Circuits. Bipolar and fie d effect transistor models for the arge sca e CAD programs S NC and SPICE; macromode ing. Speed power products for log c fam lies. Basic mono ith c integrated circu t tech n ques; s mulat on of digita and ana og system performance. Prerequisite· EEE 332. Corequisite· EEE 437 or equ va ent. Cred t 3 hours.

433 Analog Circuit Design. Des gn of electron c circu ts inc uding ampl fiers, m xers waveform generators and actlve fi ters Prerequ s te EEE 332 or equivalent. Three ectures 3 hours laboratory Credit 4 hours

434 Quantum Mechanics for Engineers. Probab lity, Schroed nger equat on, e genfunctions, harmon c osc l- ator, period c potent a superposit on angular momentum scattering, tunnel ng, perturbation theory Prerequisite: EEE 340 Credit 3 hours.

435 Microelectronics. Pract ce of sol d state dev ce fab rication techniques nc ud ng th n film and integrated circuit fabricat on principles Prerequ site. ECE 352 or equivalent. Two lectures, 3 hours laboratory Credit 3 hours

436 Fundamentals of Solid State Devices. ntroductory treatment of PN diodes, Schottky diodes and transis tors prov d ng a bas c understand ng of device behavior. Prerequ s te ECE 352 Cred t, 3 hours.

437 Solid State Circuits Laboratory. Use of so d state circuits to perform var ous system funct ons measure ment techn ques and problems. Corequisite: EEE 432 Credit, 1 hour.

440 Electromagnetic Engineering II. Gu ded waves, systems, nes and components Prerequis tes. ECE 122, EEE 340. Three ectures, 3 hours laboratory. Credit 4 hours

441 Advanced Engineering Electromagnetics. Stat c and time-vary ng fields. Po ar zation. Magnet zation High frequency impedance. Propagation and ref ection of plane waves Gu ded waves. S ow waves An sotrop c media Resonators. Coup ng Radiat on. Prerequ s te EEE 340 Credit, 3 hours

443 Antennas. Engineer ng princ p es arrays measure ments numer cal computations. Prerequ s tes EEE 340, 440. Credit, 3 hours.

445 Microwaves. Components, systems and measure ments. Prerequ sites: EEE 340, 440. Three lectures 3 hours laboratory Credit, 4 hours

448 Coherent Optics. Ana ysis and des gn of systems using asers. Prerequ s te· EEE 340 Cred t, 3 hours

451 Error-Correcting Codes. Applicat on of modern algebra to the analys s and synthes s of random error detecting and error-correct ng b ock codes Prerequ - site: EEE 320. Credit, 3 hours.

455 Communication Systems I. S gna analys s Linear, exponential and pulse modu at on. Comparat ve ana y- sis of circuits and systems Prerequisites EEE 303, 332 Three lectures 3 hours laboratory Credit, 4 hours.

456 Communication Systems II. Cont nuation of EEE 455. Prerequ site· EEE 455 Credit, 3 hours

465 Clinical Engineering I. Responsib lities of the c in cal engineer. Design of pat ent safety programs App icab e codes and regulations admin stered by FDA, HEW, OSHA and other agencies. Prerequisite: ECE 335, CHE 364 or EEE 332, ECE 122. Credit 3 hours

466 Selected Topics in Biomedical Engineering. Lectures on biomed ca topics of current nterest to the engineering and medical communit es. May be repeated for credit. Prerequ site: sen or stand ng. Cred t, 3 hours.

470 Power Networks. Steady state solution of networks w th alternating current sources. Matrix formu at on of large power network problems Prerequisite· EEE 301. Credit 3 hours

471 Electrical Transmission Systems. Formu ation of transm ssion ine equations ntroduct on to system plann ng. Prerequisite: EEE 301. Credit 3 hours

472 Power System Faults. Symmetrica components unba anced fau ts n e ectr ca power systems. Classical power systems stab l ty cr ter a Prerequ s te· EEE 471 Cred t 3 hours.

473 Electrical Machinery. Fundamenta s of transform ers and rotating mach nery commutator induct on and synchronous mach nes. Prerequ s te ECE 335. Cred t, 3 hours.

474 Energy Conversion Laboratory. Laboratory experi ments w th transformers commutator mach nes induct on motors and synchronous machines Corequis- ite: EEE 473 or equ va ent Three hours Credit 1 hour

475 Power Systems Control. Design, mode ing and s mu at on of systems which contro the voltage and/or power flow on interconnected electric uti ity systems Corequisite: EEE 480. Credit 3 hours.

480 Feedback Systems. Ana ys s and design of l near feedback systems Frequency response and root locus techniques, series compensation and state variable feedback. Prerequisites EEE 303 332 Three ectures 3 hours aboratory. Cred t, 4 hours.

482 Digital Simulation. Simulat on of cont nuous systems Numerical ana ysis operational methods, simulat on languages Corequis te. EEE 480. Credit, 3 hours.

483 Digital Controls Hardware. Hardware and software design of d gital contro lers. Inc udes e ementary control ers, microprocessors, ana og to digita and d g ta to analog conversion assembler k ts and programming Corequisite: EEE 480 Three hours lecture 3 hours ab oratory. Cred t, 4 hours.

496 Professional Seminar. Topics of nterest to gradu ating electrical eng neers. Prerequ site: sen or standing One ecture. Cred t, None

501 Passive Filter Synthesis. Advanced top cs n the synthesis of pass ve f lters and frequency and time domain approximation inc ud ng both analyt ca and numerical methods. Prerequ s te. EEE 405. Cred t, 3 hours.

503 Active Networks. Theory of networks containing general active elements Numerical methods n des gn Prerequisite: EEE 402 or equivalent. Cred t, 3 hours.

504 Active Filter Synthesis. Synthesis of active and pass ve RC networks. Theory of switching networks Appl cations of low-frequency fi ter des gn. Prerequisite EEE 402 or equiva ent. Credit, 3 hours

505 Digital Processing of Signals. Frequency-domain description of dig ta f tering. Discrete spectrum analysis by z-transform and d screte Four er transform with quantization effects. Prerequ s te. EEE 303 or equ va ent Credit, 3 hours

514 Fundamental Computer Algorithms. Assembly language treatment of subroutines recurs on, corou t nes, and nterpretive rout nes such as trace rout nes and s mulators. A so mu t p e buffering of input and output and bas c nked- ist concepts Analys s and tim- ng of a gor thms. Prerequ site ASE 423 or EEE 420 or equiva ent experience. Lecture and laboratory. Credit 3 hours.

515 Computer Information Structures. Assemb y anguage hand ing of inear lists and trees Stacks queues, dequeues, sequent al a locat on, inked a loca tion, c rcular ists doub y- inked ists arrays, dynamic storage al ocat on binary trees Ana ys s and t m ng of a gorithms for processing data structures. Prerequ s te· EEE 514. Lecture and laboratory. Cred t, 3 hours

516 System Programming Methods. Macro program-

ming, h erarch cal data structures, memory vs. computing resource trade-off analysis and programming n lmp ementat'on languages such as APL Prerequisite. ASE 422. Lecture and laboratory. Credit 3 hours.

517 Design of Automatic Programming Systems. Methods and techniques of des gn ng compilers for an guages such as FORTRAN and ALGOL Prerequ s te EEE 516, and ASE 423 or equiva ent Lecture and labo ratory. Credit 3 hours

518 Compiler Compilers. Theoret ca basis of compi er generators w th spec fic examp es Topics nc ude gen eral zed trans at on self-comp l ng and bootstrap comp ing of one d mens onal computer languages. Prerequ s te EEE 516. Lecture and laboratory Credit 3 hours

519 Artificial Intelligence. Progress, prob ems and prospects of automating cogn t ve and heurist c reason ng processes. Programm ng n L SP Prerequis te EEE 516 Lecture and aboratory. Credit 3 hours

520 Digital System Design. Programm ng, log cal de sign, and hardware of a particu ar min -computer system Machine anguage and assembly-language programming of that system and use of its on-l ne assemb y and ut lity packages. CPU techno ogy and implementat on Prerequ s te EEE 420. 2 5 hours ecture 1 5 hours aboratory. Credit 3 hours.

521 Digital Systems Hardware. The memory input/output and nterrupt components of the d gital system studied n EEE 520 are scrutin zed and the r re lationship to the system software is nvestigated A ternate system des gn schemes are exam ned. Prerequ s te EEE 520. Credit, 3 hours

522 System Design Using Microprocessors. Micropro cessor technology and its app cation to the des gn of practical digita systems Hardware, programm ng and interface of microprocessor or ented systems Prerequ - s te EEE 520. Credit, 3 hours

523 Microprogramming. Theory, pract ce, and appl ca tion of m croprogramm ng and avai ab e m croprogrammed computer systems Prerequ s te EEE 520 Credit, 3 hours.

524 Digital Systems Software. Des gn of dig ta system software includ ng re ocatable loaders, assemblers on- ine uti ity systems, and mult programming operating systems A continuat on of EEE 520 Prerequ s te. EEE 520 Credit, 3 hours.

525 Digital Circuit Design. Voltage and current t me base generators, mu t vibrators, negative res stance c r- cu ts, active and magnet c memory elements Prerequisite: EEE 425 Credit, 3 hours

527 Advanced Switching Theory. App cation of matri- ces, partia ly ordered sets att ces equivalence and compat bil ty relat ons to ogical des gn of comp etely and incompletely spec fied sequential mach nes Prerequisite: EEE 427. Cred t, 3 hours

528 Automata. Theory of f n te state machines and the r connect on with (mathematica) l ngu stic models. Prerequisite: EEE 527 Cred t, 3 hours

529 Digital Systems Seminar. Se ected topics in theory des gn, or application. May be repeated for credit Credit, 3 hours

531 Semiconductor Device Theory I. Junct on d odes junct on and f e d-effect trans stors nhomogeneous impurity prof les, h gh injection effects basic fabr cat on techniques, surface effects analys s of MOS f e d effect transistors. Prerequisite: EEE 436 or equivalent. Credit 3 hours

532 Semiconductor Device Theory II. Semiconductor dev ce phenomena inc uding ight and heat effects, tun ne ing, metal insulator sem conductor devices Prerequ site: EEE 531. Credit, 3 hours

533 Integrated Circuit Design. Integrated c rcuit fabri cat on, device modeling, active and pass ve parasit cs. Comparison of integrated and discrete c rcu ts Charac ter zation and des gn of integrated log c and smal signal c rcu ts Prerequis te EEE 431 or equ va ent Cred t, 3 hours

541 Advanced Electromagnetic Fields. Ana yt ca tech n ques app ied to e ectromagnetic f e d prob ems Prerequisite: EEE 340, 440 or equ va ent Cred t 3 hours each semester.

543 Antennas. Analysis and synthesis of se ected ra diating structures and systems Prerequ s te EEE 443 or equiva ent. Credit 3 hours.

547 Microwave Solid State Electronics. Use of ferr te sem conductor and p ezoelectric materials in microwave systems. Prerequ s tes. ECE 352 and EEE 445, or equ v- alent. Credit 3 hours.

548 Optical Electronics. Laser commun cation dev ces and systems. Prerequisite. EEE 448 Cred t 3 hours

549 Laser Engineering. Theory and des gn of asers Prerequisite. EEE 448 Cred t, 3 hours

550 Transform Theory and Applications. App ications of comp ex var ab es to Fourier, Laplace, and z-transforms. Oriented to app ications in contro , net work, commun cat on, and near system theory Prerequisite. EEE 303. Credit 3 hours

551 Error-Correcting Codes. Burst error correct ng codes convo ut on codes, comma free codes ar thme tic codes and error-control probab l ty Prerequis te EEE 451. Credit 3 hours.

552 Coherent Communications. Systems ana ys s and des gn of telecommunication systems using phase ocked oops Prerequ s te: EEE 555 Credit 3 hours

553 Pattern Recognition Principles. Basic princ ples and techniques for the analys s and des gn of pattern process ng and recogn tion systems Prerequisite. EEE 554 Cred t, 3 hours.

554 Random Signal Theory. App cat on of statistica techn ques to the representat on and ana ysis of e ectr cal signals and to communicat on systems analys s Prerequisite: EEE 303 Cred t 3 hours

555 Electrical Communications. Process ng of signa s n the presence of noise Random signa s corre at on frequency spectra, estimat on f lter ng noise pred c tion, transients. Prerequ site EEE 554 Cred t 3 hours

556 Detection and Estimation Theory. Comb nat on of the classical techn ques of stat st ca nference and the random process character zation of communication radar and other modern data processing systems Prerequis tes· EEE 455 550, 555. Cred t 3 hours

557 Information Theory. Def n tions of informat on sources and channels; fundamenta theorems of infor mat on theory and the r s gnificance s mp e error detect ng and error correcting codes. Prerequisite EEE 554 Credit, 3 hours

558 Modulation Theory. L near and non near modu a t on optimum processors nclud ng the deve opment of performance bounds. Prerequ s tes. EEE 455 555. Cred t, 3 hours

565 Clinical Engineering II. Cont nuat on of EEE 465 Safety, research and regu atory procedures with pa- t ent involvement. Prerequis te EEE 465 Credit 3 hours.

566 Advanced Medical Instrumentation. Design and ana ysis of soph st cated components and systems for aboratory analys s, research med cal care and mon tor ng. Prerequisites BSEE or equ valent Credit 3 hours.

580 Digital Control Systems. Ana ys s and des gn of d gita and sampled data contro systems nc uding samp ng theory z transforms, the state transit on method, stab l ty design and synthes s Prerequ s tes EEE 550, 582. Credit, 3 hours

581 Random Processes in Control Systems. Stat stical f ltering, estimat on and contro w th emphasis on the Ka man filter and its applicat ons and computat onal prob ems Prerequis tes EEE 550, 554 582 Credit 3 hours

582 Linear System Theory. State var ab es contro la b ity and observability state feedback and observers,

multivariable systems. Prerequis'te· EEE 480 Cred t, 3 hours

586 Nonlinear Control Systems. Stab l ty theory nclud ing phaseplane, descr b ng funct on, Liapunov s method and frequency doma n criter a for continuous and dis-crete, nonl near and time-varying systems Prerequisite. EEE 582. Credit 3 hours

587 Optimal Control Systems. Appl cation of ca cu us of var at ons, Pontryag n s princ p e, and dynam c pro-gramming to contro prob ems. Computationa techniques for so v ng optima control problems Pre requ s te. EEE 582 Credit 3 hours.

Special Courses: EEE 498, 499, 590 591, 592 594 599, 792, 799 (See page 31.)

Engineering Core

ECE 102 Introduction to Engineering. Role of the eng neer, elementary engineer ng prob ems current trends n engineering; methods of eng neer ng design; and de-s gn project. Lecture recitation and aboratory. Cred t 2 hours

104 Engineering Graphics and Design. Graphics as a fundamenta means of commun cat on n eng neering analys s and des gn Sketch ng, spat a v sua zat on descr ptive geometry, and modern engineer ng drawing practices for design app icat on Six hours ecture laboratory. Cred t, 2 hours

118 Chemical Foundations of Engineering. Atom c and molecu ar structure states of matter and the r energ es, chemical equil br a and react on rates organ c com pounds and industr al processes Prerequisite· super or performance in one year of h gh school phys cs and chemistry. Lecture demonstrations and rec tat on Cre-d t 4 hours

122 Computer Programming. Def n t on formu at on and flow chart ng, ead ng to the so ution of comp ex problems by digita computer using FORTRAN Com-puter solution s required for projects Corequisite. MAT 120, or prerequ s te MAT 142 or 260 Cred t 2 hours

201 Mechanics. Bas c concepts of mechan cs w th ap-p cat ons to eng neer ng. Lecture, demonstrat ons and laboratory. Prerequis te. MAT 120 Cred t 3 hours

202 Electricity and Magnetism. Bas c concepts of e ec-tr c ty and magnetism with app ications to eng neering Lecture, demonstrations and aboratory Prerequisite ECE 201, corequ s te. MAT 121. Cred t 4 hours.

203 Sound and Optics. Bas c concepts of wave phe nomena w th app cations to engineering Prerequ s te· ECE 202. Credit 2 hours.

211 Engineering Mechanics I. Force systems resu tants equilibr um, d str buted forces, friction. First and second moments of areas Prerequisite· ECE 201· core quis te ECE 380 or MAT 212. Cred t 2 hours

217 Particle Mechanics. The mechan cs of a partic e and systems of particles. Static and dynam c analys s Momentum and energy methods Prerequisite ECE 201 corequ s te. ECE 380 or MAT 212. Cred t, 2 hours

305 System Dynamics and Networks. Un fied treat ment of electrica , mechanica flu d, and therma dynam c systems, their deal zed mode s, response and analytical descript on. Prerequ s tes: ECE 122, 202, ECE 380 or MAT 212; corequis tes. ECE 312 or 318. Lecture and demonstrat ons Credit 4 hours

312 Engineering Mechanics II. Kinemat cs and kinet cs of partic es trans at ng and rotating coord nate sys tems. Rigid body kinematics Dynamics of systems of part cles and r g d bodies Energy and momentum methods Prerequisites ECE 211; ECE 380 or MAT 212 Credit 3 hours

313 Mechanics of Materials. Stress and stra n Hooke s law strength and deflection of axial force members, shafts in tors on and beams n flexure; comb ned stress stab lity of columns. Prerequ sites. ECE 211 or 217 ECE 380 or MAT 212. Credit 3 hours

318 Rigid Body Mechanics. The mechanics of a r gid body and systems of rig d bod es Static and dynam c analysis. Momentum and energy methods Prerequi s tes. ECE 217; ECE 380 or MAT 212 Credit 3 hours

335 Electrical Science. Introduct on to sign f cant areas of app ication of electrical science, ncluding energy conversion e ectro-mechan cs, electron c devices and c rcuits. Prerequ s te ECE 305. Lecture demonstrations and laboratory. Credit, 4 hours

340 Thermodynamics. Work heat and energy transfor mations Relation of properties. Laws, concepts and modes of analysis common to a l app ications of ther modynamics in engineering. Lecture rec tat on Corequ site· ECE 312 or 318 Credit 3 hours

350 Structure and Properties of Materials. Bas c con cepts of mater al structure and its relation to properties App ication to eng neer ng prob ems Corequ site· ECE 340. Credit, 3 hours

351 Engineering Materials. Structure and behav or of civi eng neering mater a s. Laboratory nvest gat ons and test criter a Prerequisite· ECE 313 Two lectures, 3 hours laboratory. Credit, 3 hours.

352 Semiconductors and Devices. Sem conductors, drift diffus on, generation recombination, junctions diodes, sw tch ng transistors, Ebers-Mol equat ons. Prerequisites: ECE 335 ECE 380 or MAT 212 Cred t, 3 hours

371 Transport Phenomena. Heat mass, and momen-tum transfer. Prerequisite. ECE 340; or CHE 311 with corequ s te CHM 441. Cred t 4 hours

380 Ordinary Differential Equations for Engineers. First order equations second and h gher order l near equat ons, series solutions systems of equat ons, boundary va ue prob ems Prerequ s te· MAT 121 Cre d t, 3 hours.

382 Linear Algebra for Engineers. Matrices and sys tems of linear equat ons, determinants, vector spaces, and eigenva ue prob ems. Prerequ s te MAT 121 Cre-d t, 2 hours.

383 Probability and Statistics for Engineers. Topics inc ude discrete and continuous d str but ons, random var ables, sampl ng and descr ptive stat st cs as well as tests of hypotheses and est mates Prerequisite. MAT 121 Credit, 2 hours.

384 Numerical Analysis for Engineers. A gebraic and transcendental equations, roots of polynom a s l near equat ons, numerica different at on and ntegration, numerical so ution of different a equations Emphasis is on use of the d gita computer Corequ site ECE 380 Credit 2 hours.

385 Vector Analysis for Engineers. A gebra of vectors, functions of vectors, Jacobians and imp c t funct on theorem ine and surface ntegra s, Green's, Stokes and d vergence theorems. Prerequ s te MAT 121 Cre d t, 2 hours

386 Partial Differential Equations for Engineers. Boundary value problems separat on of var ab es, Four er ser es as appl ed to nit a -boundary value prob ems. Prerequ s te ECE 380 or MAT 212 Cred t, 2 hours.

387 Complex Variables for Engineers. Comp ex num bers, analyt c functions, elementary funct ons ntegra s power series, res dues and po es Prerequis te MAT 121 Credit, 2 hours.

400 Engineering Communications. Composition for technica papers, reports and scient fic art cles su table for pub ication Oral and written presentation. Prerequ -site· upper d v sion stand ng Credit, 3 hours

Engineering Science

PROFESSORS:
WALLACE (ECG 120B), AVERY, CHEN, NELSON, STANLEY, STE N, L. P. THOMPSON, TURNBOW

ASSOCIATE PROFESSORS:
BICKFORD, HENDR CKSON, S. J RUSSELL

ASSISTANT PROFESSORS:
RANK N

Engineering Communications

PROFESSOR:
W LCOX

ASSOCIATE PROFESSORS:
LAWLER, STADM LLER

ESE 355 Metallurgy. Ferrous and nonferrous metals Relations between microstructure and properties Cast ng, forming and heat treat ng. For nonengineer ng majors. Laboratory Prerequisite. CHM 114 Cred t, 3 hours

410 Acoustics and Noise Control. Pr nciples of acoust cal analysis and design, emphas zing current env ronmental problems Prerequ s te ECE 203 Lec ture and demonstrations. Credit 2 hours

413 Intermediate Dynamics. Rotat ng reference frames Lagrange's and Eu er's equat ons gyroscop c motion trans ent response of dynam ca systems; numer ca analys s, veh cular impact Prerequ s tes ECE 312 318 Cred t, 3 hours.

415 Vibration Analysis. Free v bration and forced re sponse of sing e and multiple degree of freedom systems, norma modes, random v brat ons Lecture and laboratory. Prerequ s te ECE 313 Credit, 3 hours.

422 Mechanics of Materials. Fa ure theories torsion of nonc rcular members, finite e ement methods p ates curved beams, unsymmetrica bending shear flow shear center, energy methods. Prerequ s te: ECE 313 Lecture and laboratory. Credit 3 hours

426 Aerospace Structures. Load ana ys s th n-wal ed members inc ud ng skin-str nger structure; r ngs, frames determinate and indeterminate structures sandw ch construction; numer ca methods. Prerequi- s te ESE 422. Credit 3 hours.

430 Introduction to Continuum Mechanics. Appl cation of the principles of continuum mechan cs to such fie ds as flow in porous media, meteorology biomechanics, electromagnetic cont nua, magneto-flu d mechanics. Prerequisites: ECE 313, 371 Cred t, 3 hours.

441 Introduction to Cybernetics. H stor cal survey and mathematica fundamentals of cybernetic eng neering. App ications in technology, industry, b o ogy, and so c ety. Credit 3 hours.

450 Mechanical Properties of Solids. Effects of env - ronmental and microstructural variab es on mechanica properties; plast c deformation fatigue creep, br tt e fracture, nterna fric'on Prerequ site ECE 350 Cred t 3 hours.

451 X-Ray and Electron Diffraction. Fundamenta s of X-ray d ffract on, transmiss on e ectron microscopy and scann ng electron microscopy Techn ques for studying surfaces, nternal microstructures and fluorescence Lecture and demonstrations Cred t 3 hours

453 Corrosion and Corrosion Control. ntroduction to corrosion mechanisms and methods of prevent ng cor rosion Top cs: electrochem stry po ar zat on, corros on rates, ox dation, coatings cathodic protection Prereq uisite ECE 350. Cred t 3 hours

455 Physical Metallurgy. Crysta structure and defects Phase diagrams meta lography, so idif cation and cast ing deformation and anneal ng Prerequ s te ECE 350. Three lectures, 3 hours aboratory Cred t, 4 hours

460 Measuring Systems. Systems concepts stat c and dynamic system behavior. Carry ng process ng, shap- ing and converting energy and nformat on Lectures discuss on, laboratory. (Not for engineering degree cre- d t.) Prerequ s tes PHY 112; TST 200 or ELT 300, TST 311, 312, 362· ELT 201, ND 406 Cred t 3 hours

461 Measurement Systems Engineering. System de- s gn concepts app ied to static and dynam c measurements. Carrying, process ng shap ng and con vert ng energy and information Prerequ s tes. ECE 313 305. Lectures, demonstrations, aboratory and rec ta- tion. Cred t, 3 hours

462 Measurement Systems. Cont nuation of ESE 461 Transducer behavior as it affects system character s t cs, system dynam cs Signal enhancement and noise supress on. Prerequisite: ESE 461 or 565 Lectures, laboratory d scussion. Cred t, 3 hours.

511 Acoustics. Pr nc p es underlying the generat on, transm ssion and recept on of acoust c waves Appl ca t ons to no se control, electroacoust c transducers and architectural acoustics Cred t, 3 hours.

512 Acoustics Laboratory. Experiments and measure- ments associated w th architectural acoust cs and no se control. Lecture and aboratory Credit 2 hours

513 Advanced Dynamics I. Dynam cs and systems of particles. Generalized coordinates D'Alembert s and Hamilton's princip es, Lagrange s equations, k nematics and kinet cs of rig d bodies. Cred t, 3 hours.

514 Advanced Dynamics II. Gyrodynam cs. Orb ts and trajector es Aerospace veh c e mot on Free and forced response of nonlinear mechan cal systems Prerequ - site. ESE 413. Credit, 3 hours.

515 Vibrations: Discrete Systems. Free vibrat on and forced response of discrete e ast c systems. F n te e e ments Ana ytica and computer methods of so ut on Random vibrations Prerequ s te ESE 415. Credit 3 hours.

516 Vibrations: Continuous Systems. Free v brat on and forced response of continuous e astic systems. Var iationa methods. Exact and approx mate methods of solut on. Wave propagat on Prerequ site. ESE 415 Credit, 3 hours

518 Dynamics of Rotor-Bearing Systems. Cr t cal speed and response analysis of r gid and flexib e rotor systems. Bear ng inf uence and representat on Stab l ty ana ysis Methods of balanc ng Credit 3 hours.

522 Variational Principles of Mechanics. V rtua work stat onary and complementary potentia energ es Ham lton's pr nc p e Applicat on of these and d rect methods to v brat ons elasticity and stab ity. Credit 3 hours.

523 Theory of Plates and Shells. Bend ng of p ates P ates on elastic foundation. Large deflection of p ates. Membrane theory of she ls She s of revolution Ap- prox mate methods. Cred t, 3 hours

524 Theory of Elasticity. Ana ys s of stress and stra n in three d mens ons General theorems P ane e astostat c problems Bending and torsion thermoelastic ty, ax symmetrica prob ems App ication ons Prerequ s te ECE 386 Cred t, 3 hours

527 Theory of Plasticity. Mechanics of perfectly p ast c so ids and strain-harden ng sol ds Yield conditions and flow aws. M nimum princip es Cred t 3 hours

528 Fracture Mechanics. Basic concepts of sol d me chanics app ied to the problem of fracture. M crostructura effects in fracture n t at ons and propa gat on. Exper menta methods Cred t 3 hours

529 Theory of Elastic Stability. General concepts sta- bi ity of discrete and continuous systems Tors ona and latera buck ing of thin plates and she ls. Dynamic nsta- b l ty Prerequis te· ECE 386 or MAT 460 Cred t 3 hours.

530 Continuum Mechanics. Methods of continuum mechanics with app ication ons to current research Cred t, 3 hours.

541 Cybernetics. Ana ys s of adaptive, learning, and self-organ zing systems App icat ons to problems of current nterest. Credit, 3 hours

550 Theory of Crystalline Solids. An sotrop c proper ties of crysta s; tensor treatment of elast c magnet c electr c, and therma propert es, crysta ography of Mar tens tic transformat ons. Cred t, 3 hours

551 Effects of Radiation on Materials. Defect produc t on and annealing Irrad at on nduced changes enhanced diffus on by photons, neutrons, electrons and heavy ons and swel ng Credit 3 hours.

552 Dislocation Theory. Fundamental propert es of d s- locat ons n crysta s. D s ocat on mu t p cat on mot on and interactions App ication of d slocation theory to behav or of so ds Prerequ s te ESE 550 Credit, 3 hours.

553 Physical Metallurgy. Advanced research tech n ques in phys ca meta urgy ternary and quarternary phase d agrams, thermal ana ys s magnet c ana ysis meta ography, fracture ana ysis Two ectures, 3 hours aboratory. Cred t, 3 hours

554 Metallurgical Thermodynamics and Kinetics. Thermodynam cs of a loy systems diffusion n so ds kinetics of precipitat on and phase transformat ons n solids Prerequisites ECE 340 350 Credit 3 hours

562 Transducer Physical Principles. Transducers as information and energy process ng dev ces Character- istics, se ect on criter a and app cat ons Prerequis te. ESE 461 or 566. Lectures aboratory, d scuss on Credit, 3 hours

563 Measurement Engineering Theory. nformat on process ng methods Effects of energy flow. Effects of nformation f ow Separation of s gnal from no se No se suppression. Prerequ s te ESE 461 or 565. Lectures aboratory discuss on. Cred t, 3 hours.

564 Experimental Stress Analysis. Measurement stresses n models and prototypes Br tt e photoe ast c coat ngs membrane and electr ca ana og es iterat on method, stra n gages. Lectures, laboratory discussion Cred t, 3 hours

565 Measurement Systems Engineering Theory. nfor mation and energy flow through a system structured of components Data va idation, signa enhancement no se suppression, for ana og measurements Lectures, demonstrations, aboratory d scuss on Cred t, 3 hours

574 Dynamic Meteorology. App cat ons of flu d me chanics to atmospheric mot ons, d ffus on processes and po lut on modeling Cred t, 3 hours

Special Courses: 494, 498 499 500, 590 591 592 594, 598, 599 792 799 (See page 31)

Industrial and Management Systems Engineering

PROFESSORS:
BEDWORTH (ECG 136C) DECKER, HOYT, SMITH, YOUNG

ASSOCIATE PROFESSORS:
DEAN, LEWIS, LOVELL MOOR ROLL ER

ASSISTANT PROFESSORS:
ANDERSON, BA LEY

IEE 300 Economic Analysis for Engineers. Econom c eva uat on for eng neering dec s ons emphas zing the t me va ue of money. Cred t, 2 hours

301 Words and Human Behavior. Techniques for rec ogn zing and avo d ng those hab tual responses to fam l ar words that generate much everyday hostl ty anxiety, confus on and frustration Credit 3 hours.

330 Introduction to Data Base Design. Data structures and techn ques w th spec a attention to DBTG stan- dards Design mplementat on, control and case studies of data management systems Prerequ s te programm ng know edge. Cred t 2 hours.

335 Legal Aspects of Engineering and Construction. nfluence of contract property and tort aw on eng neering and construction activ t es. nf uence of governmenta regu at ons (OSHA). Cred t, 2 hours

362 Industrial Engineering Analysis. Ana ys s and de sign of man mach ne systems us ng methods of ndustr a eng neering. Appl cat ons to manufactur ng service cler ca and technical f e ds Two ectures 2 hours laboratory Cred t 3 hours.

374 Quality Control. Ro e of measurement and attribute contro charts n the manufactur ng process Lot by ot acceptance sampl ng by attr butes L fe test ng and re i- abi ity. Credit 2 hours

411 Engineering Economy. Cash f ow model, pr c ng econom c production charts economic balance ana y- s s profitab ity models Prerequ site EE 300. Credit 3 hours.

422 Information Acquisition. App ication of ndustrial engineer ng techn ques to the design of systems to co - lect information. Emphas s on human nformat on processing, methods of nformat on gather ng and man- ager a decision making. ntroduct on to organizat onal information systems Cred t 3 hours

425 Environmental Bioengineering. Explanations of bodily responses to ndustr a , aerospace and other man made hab tats Also introductory bio ogy of deci- sions how a human bodv detects externa informat on and processes t nto act ons Cred t, 3 hours.

431 Engineering Administration. Engineer ng organiza t on and admin stration, introduct on to dec s on making and quantitative approaches to management, qua ita tive approaches to management, and engineer ng admin strat on Cred t, 3 hours

461 Planning, Scheduling and Control of Resources. Use of ndustr a eng neer ng techn ques for plann ng, ana yz ng, contro and evaluat on of operat'ng systems. Emphas s on the use of t me ser es forecast ng network p ann ng, schedul ng and contro within the systems approach App icat ons to manufacturing, serv ce c eri cal and technical fields. Prerequisite. ECE 383. Credit, 3 hours.

463 Control Computer Foundations. Ana og and con tro d gita computers for automation appl cat ons Assembly language programm ng, rea time computer operat on, ana og and d g tal computer nterfaced oper at on Laboratory assignments Prerequisite ECE 122 or equ va ent Credit, 3 hours

473 System Applications of Linear Programming. Lin- ear programming in a systems context Emphas s on des gn aspects of l near programming models for a var ety of prob ems nvolving transportat on, al ocat on and tota industr al systems Prerequ s te· ECE 382. Credit 3 hours.

475 Fundamentals of Simulation. Concepts of d screte event system modeling and the use of d gital computer in mplement ng mode s Various d screte s mu at on anguages are presented w th emphas s on GPSS Pre requ s tes: ECE 122 or ASE 226 ECE 383 Credit 3 hours

476 Operations Research Models. Operat ons research methodo ogy, deve opment of models and techn ques for so ving problems such as queueing, nventory, and replacement Prerequ s te ECE 383 Cred t, 3 hours

500 Systems Research Methods. Scient f c and sys- tems methods as appl ed to master s and doctora degree research. Credit 3 hours

510 Measurement of Productivity. The engineer ng econom c aud t and ts use to determ ne rea va ued output, w th appl cations to break-even ana ys s, var a ble budget control of manufacturing costs cost ana ysis and product pricing. Prerequisite ECE 383 Cred t, 3 hours.

511 Analysis of Decision Processes. Methods of mak ng economic dec s ons; stat st ca decis on theory· effects of r sk, uncertainty, and strategy on manageria

economic decisions Prerequis te. ECE 383 Cred t 3 hours.

520 Topics in Human Engineering. Ana ys s, des gn and contro of human performance n man-mach ne en v ronments cons derat ons of phys o og ca and psycholog ca factors as related to system performance Laboratory ass gnments. Cred t 3 hours

521 Applied Synecology. Systemat zed so ut on of su pervisory and persona prob ems ar s ng from nterpersona fr ct on Cred t 3 hours

531 Topics in Engineering Administration. Cons dera tion g ven to ph osoph ca psycho gica po t ca and soc al mp ıcat ons of adm nistrat ve decis ons Credit 3 hours.

532 Theory in Engineering Administration. Theor es of human and organ zat onal behav or as app ed to eng neer ng adm nistration Deve opment of mode s appropr ate to eng neer ng organ zat ona des gn and contro Prerequisite EE 531 Credit 3 hours

533 Network Analysis. Determ n st c and stochast c network analys s techniques ncluding CPM PERT, GERT GERTS and max mum flow prob ems Prerequ s te ECE 383. Cred t 3 hours

560 Advanced Computing Concepts for Industrial Systems. So ut on of ındustr a systems prob ems us ng d g tal computers Data structures data base manage ment, and graph c d sp ay systems Prerequ site FORTRAN know edge Cred t 3 hours

562 Discrete System Control. App cat on of automat c control methodo ogy to d screte processes Sampled data systems Des gn and synthes s by d g ta computer statist ca ana ys s and opt m zation Prerequ s te ECE 380 or equ va ent. Cred t 3 hours

563 Scheduling of Resources Ana ys s of s hedu ng procedures to atta n opt'mum ut ızat on of resources Measures for evaluat on n m job shop schedu ng net work schedu ng Prerequ site IEE 461 or equ va ent Cred t 3 hours.

564 System Optimization Techniques. Methods for determ n ng the max mum and m n mum for functions of many var ables Search procedures branch and bound techn ques ca culus of var ations geometr c and dy namic programm ng Prerequ s tes ECE 380 383 or equ va ent Cred t 3 hours

567 Combined Simulation by Digital Computer. Deve opment of concepts of comb ned d screte and continuous s mu at on Use of comb ned simulat on an guage n the study of arge scale system prob ems Prerequ s te EE 475 Credit 3 hours

569 Nonparametric Statistical Inference. App cat on of stat st cal nference procedures based on ranks, to en g neer ng problems Eff cient alternatives to c ass ca stat st ca inference constra ned by normal ty assump tions Prerequ s te ASE 485. Credit 3 hours

570 Acceptance Sampling. Stat st ca des gn of sam p ing p ans and procedures for attr butes and var ab es data operat ng character stic curves federa spe f ca t ons and standards of qua ty Prerequ s te EE 374 Cred t 3 hours

571 Probability for Engineers. Spec a top cs n proba b ity emphas z ng app cations to eng eering prob ems Prerequ s te ECE 383 or equ va ent Cred t 3 hours

572 Engineering Statistics. Ana ys s of var ance a d exper menta design Topics nc ude ncomp ete b ocks confound ng, fract onal rep cat on, response surface methodo ogy and evolut onary operat on Prerequ s te ASE 485 Credit 3 hours

573 Reliability Models. Probab st c fa ure mode s measurement apportionment est mat on and predic tion of rel ab ity; fe test procedures redundancy opt mizat on ma nta nabi ty and ava lab l ty Prerequ s te ASE 485 Credit 3 hours

574 Mathematical Programming—Linear. T p cs n n ear programming nc uding s mp ex techn ques rev sed s mplex technique dua ity and the pr ma dua tech n que, and decompos t on theory. Prerequ s te ECE 382 Cred t, 3 hours

575 Mathematical Programming—Nonlinear. Methods for determin ng the max mum and m n mum for func t ons of many var ab es subject to co stra nts Class ca ca culus Lagrange mult p ers near approx mat ons Kuhn-Tucker condit ons, quadrat c and nteger pro gramming Prerequis te ECE 382. Cred t 3 hou s

576 Queueing Theory. Ana ysis of queues us ng ana yt cal and Monte Car o meth ds Prerequ s tes ECE 380 383. Credit 3 hours

577 Information Systems Methodology. Systems ap proach to the ana ysis des gn and mp ementat on of management nformat on systems Cred t 3 hours

578 Inventory Theory. Mathemat ca and stat st cal ana ys s of nventory and warehous ng systems Prereq u s te EE 476 Cred t 3 hours

579 Time Series Analysis and Forecasting. Forecast ng t me ser es by the Box Jenk ns and exponent a smooth ng techn ques; ex st ng d g tal computer pro grams for the two techn ques are ut zed t augment the theory Prerequis te ASE 485 Cred t, 3 hours

580 Current Trends in Industrial Engineering. Eva ua t on of current trends n the theory and pract ce of ndustr a eng neering. Cred t 3 hours

Special Courses: EE 498 590 591 592, 598 599 784 790 792 799 See page 31)

Mechanical Engineering

PROFESSORS:
METZGER (ECG 133), ALLEN, BACKUS, BEAKLEY, BREGAR, DITSWORTH EVANS, FLORSCHUETZ, JANKOWSK LOGAN PRICE RICE STAFFORD

ASSOCIATE PROFESSORS:
AUTORE, COOPERRIDER DAV DSON FRY JACOBSON, WOOD WOOLDR DGE

ASSISTANT PROFESSORS:
LIMBERT, McKLVEEN, McNE LL

MEE 201 Technology and Social Change. Theor es of soc a change technology as re ated to soc a change contemporary and possib e future mpacts of te hno ogy on soc ety. Cred t 2 hours

300 Man and Machine. Mechan ca nvent on and tech n ca progress, and the evolut on of soc a forms and nst tut ons Cred t, 2 hours

301, 302 Science and Technology in History. H story f science and techno ogy Rec proca re at ons w th the soc o-econom c processes and st tut ons. MEE 301 s not a prerequ site for MEE 302 Cred t 3 hours each semester

321 Kinematics and Force Analysis in Machinery. Po s t ons ve oc t es and acce erat ons of mach ne parts cams gears flex ble connectors r ng contact syn thes s of mechan sms, force ana ys s n nkages ba anc ng. Prerequ site ECE 312 Cred t, 3 hours

332 Production Processes. Product on techn q es and equ pment Cast ng and mold ng pressure form ng mater a removal jo n ng and assemb y processes au tomat on and mater a hand ng Cred t 3 hours

365 Control System Principles. Ana ys s and synthe s of feedback contro systems L near system ana ysis n cluding root ocus frequency response and statespace representat on of dynam ca systems Contro ler rea za t on. Laboratory exper mentat w th var ous types of contro systems Prerequ sites ECE 305, 312 Cred t 3 hours

372 Fluid Mechanics. Appl cat n of bas c pr nc p es f f u d mechanics to problems n v scous and compress ble f ow. Laboratory exper mentat on and demonstrat ons Prerequis te ECE 371 Cred t 4 hours

380 Applied Thermodynamics. Thermodynamics of eng nes compressors turbines and elated compo

nents. Not open to engineering students Prerequ sites MAT 120 PHY 112. Cred t, 3 hours

381 Applied Thermodynamics and Heat Transfer. Gas m xtures vapor cyc es gas and vapor mixtures Funda menta s of conduct on rad at on and convect on heat transfer Not open to eng neer ng students Prerequ - s te· MEE 380 Credit 3 hours

382 Thermodynamics. Appl ed thermodynam cs gas mixtures, power cycles and react ve systems Labora tory experimentat on and demonstrations Prerequ s te ECE 340 Credit 3 hours

383 Internal Combustion Engines. Performance char acterist cs, combustion, carburet on coo ng, and contro of internal combustion eng nes Prerequ site· MEE 381 or 382 or approva of nstructor Cred t 3 hours

386 Air Conditioning and Refrigeration. Refr geration cycles, refrigerant propert es heatıng, coo ing oads psychrometry, purif cat on· temperature and hum dity contro . Prerequisite MEE 381 or 382 or approva of nstructor. Cred t, 3 hours

401 Theory, Prediction and Social Effects of Invention. Invention as an nstrument of change n c v ızat on, evo utionary nature of inventions cycle of growth and dec ine causation and soc a effects Cred t 3 hours

411 Nuclear Engineering. Pr nc p es of neutron cha n react ng systems and nuc ear power systems Prerequı s tes ECE 201 and MAT 120. Cred t, 3 hours

412 Health Physics Principles and Radiation Measurements. Source, character stics dosimetry and measurement techn ques for natura and man-made rad at on Ph losophy of rad at on protect on Two ec- tures, 3 hours aboratory Cred t 3 hours

413 Reactor Safety Analysis. Power reactor safety and cens ng prob ems Reactor trans ent and acc dent ana ys s Prerequ s te MEE 411 Cred t 3 hours

415 Nuclear System Design. Eng neer ng des gn of nu c ear steam supply systems w th emphas s on core heat remova prob ems Prerequ sites ECE 371 and MEE 411 Cred t, 3 hours

417 Nuclear Engineering Laboratory. Theory and ap p ıed concepts ın reactor design construct on nstrumentat on and sh e d ng Two lectures 3 hours aboratory Corequ s te MEE 411 Cred t 3 hours

432 Manufacturing Processes. Phys cal and economic principles under y ng manufactur ng processes Prereq u s te MEE 332 Cred t 2 hours

441 Principles of Design I. Des gn procedures, fa ure modes stress and def ection ana ys s stress concentra t on, fat gue, selected components. Prerequ s tes ESE 422 and ECE 350 Cred t 3 hours

442 Principles of Design II. Cont nuat on of MEE 441 with applicat on of the principles and empiric sms of eng neer ng to the creat ve design of mach ne compo- nents and subsystems Prerequ s te· MEE 441 Cred t 3 hours

445 Engineering Design. Projects n des gning eng neer ng systems requ ring prob em formu ation, creativity, appl cat on of knowledge from engineering d sc p ines and consideration of cost rel ab ity and so cial and env ronmenta ımpacts. Prerequ s te sen or stand ng. One lecture 6 hours aboratory Cred t 3 hours

450 Aerodynamics. A rfo l theory pr nciples of drag réduction, mode ng and test ng App cat ons nvolv ng f ows past structures and n the atmosphere. Corequis- te. MEE 372. Credit, 3 hours.

451 Vehicle Dynamics and Control. Veh cle equations of motion, autop lots m ss le and sate te contro sus pension systems structura flex b ity, nstrumentation Prerequ site MEE 365. Credit, 3 hours

453 Propulsion. Performance ana ysis of propu s on systems ncluding turbojet fanjet and turboprop en g nes, so id and l qu d fue ed rockets, and ion- propu s on dev ces Prerequ site· MEE 382 Credit 3 hours

455 Turbomachinery. Pr nciples of turbomach nes ut - zed n power plants nc ud ng steam and gas turb nes hydraul c turb nes, centr fuga pumps, compressors fans and blowers. Corequisites MEE 372 and 382 Cre d t, 3 hours.

457 Energy Technologies. Supply and demand projec t ons for future energy use Assessment of new technolog es Energy sources and the r potent al. fossı fuels nuclear power so ar and geotherma energies, fue from wastes, the hydrogen economy The U.S re source status and potentıa for conservat on Prerequ s te ECE 371. Cred t 2 hours

465 Control System Design. Mode ing and s mu at on of dynam c systems. Introduction to state var ab e tech niques. Compensat on techniques performance nd ces and error cr ter a Des gn and mp ementat on of a con trol system in a aboratory env ronment Prerequ s te MEE 365 Cred t, 2 hours

471 Numerical Fluid Mechanics. Numerica so ut ons for se ected problems ın f u d mechan cs Prerequ s te MEE 372. Credit 3 hours

487 Direct Energy Conversion. Unconvent onal meth- ods of energy conversion; fue cel s thermoe ectr cs therm on cs, photovo taics, and magnetohydro dynam cs Prerequ sites· ECE 340, 350 Cred t, 3 hours

488 Heat Transfer. Steady and unsteady heat conduc t on ncluding numerical solut ons, thermal boundary ayer concepts and app cat ons to free and forced convection. Thermal rad ation concepts Laboratory exper mentation and demonstrat ons Corequ s te MEE 372 Credit 3 hours.

489 Statistical Thermodynamics. Statist cal approach to thermodynam c concepts aws and methods of anal ysis. Generalized p v-T data Specıa systems Prerequ site· ECE 340. Cred t, 3 hours.

491 Experimental Mechanical Engineering. Experi- mental and analyt ca stud es of phenomena and performance of f u d f ow, heat transfer, thermodynam cs, refr gerat on and mechanical power systems Prerequ s tes. MEE 382, ECE 335; corequ s te. MEE 488. One lecture, 6 hours aboratory. Credit 3 hours.

492 Mechanical Engineering Projects. Sma group projects n fundamenta or app ied aspects of mechanı ca eng neer ng emphasis on experimental solutions to complex problems Prerequis tes MEE 441 491 S x hours aboratory Credit 2 hours

498 Pro-Seminar. Spec a topics for advanced students Appl cation of the engineer ng disc p ines to des gn and ana ys s of modern techn cal devices and systems Pre- requisite: approva of nstructor Cred t 1-3 hours

512 Reactor Theory. Neutron moderat on; Ferm Age theory, diffusion theory and app cat ons reflected reac tors, multigroup d ffus on equatıons Prerequisite· MEE 411 Cred t, 3 hours

514 Reactor Design. Heterogeneous reactor systems perturbat on theory fue burn-up ntroduct on to neu tron transport theory Prerequ s te. MEE 512 Credit 3 hours.

544 Mechanical Design and Failure Analysis. Modes of mechan ca fa lure app icat on of pr ncip es of e ast city and plast c ty n multiax a state of stress to des gn syn- thes s; fai ure theor es fatigue creep impact Prerequis te: MEE 445 Credit, 3 hours

548 Mechanism Synthesis and Analysis. A gebra c and graph ca methods for exact and approximate synthesis of cam, gear, and inkage mechan sms des gn optım za t on methods of planar mot on ana ys s character st cs of plane mot on spat a k nematics Cred t, 3 hours

549 Advanced Engineering Design. App ıcat on of probab l ty theory decision theory optım zation tech niques and d g ta computers to eng neer ng des gn Prerequisites MEE 445 FORTRAN know edge Cred t 3 hours.

555 Turbomachinery. Performance character st cs en- ergy transfer n rotors, cascade mechanics th n a rfoı theory, ax symmetr c potent al f ow loss mechanisms cav tat on surge Cred t 3 hours

561 Modern Control Theory. Analytica and computa tiona techniques for solving opt ma control prob ems; calcu us of variat ons, dynam c programming d rect methods. Determin stic observers Nonlinear contro des gn Prerequ sites EEE 582 MEE 365 or equ va ent Credit 3 hours

562 Modern Control Applications. App ıcat ons of modern contro theory to industria prob ems Stochas t c contro Kalman fi ter ng ıdentificat on techn ques D gita contro Prerequ s te MEE 561. Credit 3 hours.

571 Fluid Mechanics. Bas c k nemat c dynamic and thermodynamic equat ons of the flu d cont nuum and the r appl cation to some bas c mode s Cred t, 3 hours

572 Fluid Mechanics. Cont nuation of un f ed treatment of MEE 571 emphas z ng compress ble and turbu ent f ows Prerequ s te: MEE 571 Credit 3 hours

573 Turbulence. Pred ct on methods and exper menta results for turbulent shear flows ntroduction to re search methods and survey of current research activ ty Prerequ site: MEE 571. Cred t, 3 hours

574 Mechanics of Viscous Fluids. Lam nar and turbu-lent v scous f ows Perturbation theory s m larity solut ons and numer ca so ut ons for the various flow regimes. Prerequ s te MEE 571 Cred t, 3 hours

575 Mechanics of Viscous Fluids. Lam nar and turbu ent boundary layer f ows; other v scous flows hav ng boundary layer characterist cs Prerequ s te MEE 574 Credit 3 hours.

581 Thermodynamics. Basic concepts and aws of c assical equi ibr um thermodynamics ntroduct on to statist ca thermodynamics Appl cat ons to engineer ng systems Cred t 3 hours

582 Thermodynamics. Cont nuat on of MEE 581 n-cluding irreversible thermodynam cs Prerequ s te MEE 581 Credit 3 hours

583 Direct Energy Conversion. Bas c concepts of direct energy convers on and associated electr ca magnet c, and therma phenomena Prerequ s te MEE 581 Cred t 3 hours

585 Heat Transfer. Basic equations and concepts of heat transfer appl cat ons to conductive convective and radiat ve heat transfer Prerequ s te. MEE 488 or equ va ent. Cred t, 3 hours

586 Heat Transfer. Continuat on of MEE 585 emphas z-ng convect on heat transfer Prerequ s te MEE 585. Cred t 3 hours

587 Heat Transfer. Continuat on of MEE 585 emphas z ing rad ation heat transfer Prerequ s te MEE 585 Credit 3 hours

591 Seminar. Cred t 1 3 hours Top cs such as the fo owing are offered frequent y for advanced study beyond the regular courses and for study of engineering app ications of current interest (a) Aerodynamics (b) Hydrodynam c Stab lity (c) Photovolta cs (d) Physica Gas Dynamics, (e) Propulsion (f) Two Phase F ow and Heat Transfer

594 Graduate Research Conference. Top cs n contem-porary research. Requ red every semester of a l Mechanica Eng'neer ng graduate students reg stered for 9 or more semester hours Not for degree cred t. Credit 1 hour.

Special Courses: MEE 499, 590 592 598 599 792, 799 (See page 31)

Division of Technology

Walter E. Burdette Ed D., *Director*

Purpose

The Division of Techno ogy serves three major functions One is the preparation of engineer ing and industrial techno ogists as members of the total technological team co npr sed of sci-entists, engineers, technologists and technicians. A second funct on is the prepara tion of other specialists who are nct properly categorized as technologists, although tl e r preparation is intensively industrially or ented. This function embraces the preparation of such specialists as ndustrial designers, graphic and printing management personnel, industria supervisors, technical managers, and technical communicators A third function s the prepa ration of teachers of industria and technica education in the element ary and secondary schools, technical nstitutes, community col leges, universities and in industry

Each four year Bachelor of Sc ence degree technology curriculum prepares supporting and specialist personne n the ma or areas of research and development, design and m inu facturing. Wh le comprehensive and foundational understand ng of scientific prin ciples is required, the essential nature of the task to be performed is in transl tion of the scientific ideas or discoveries into useful prod-ucts and services. Consequently, these curricula combine general foundations of sci entific theory and facts with laboratory experiences which are designed to instruct in methods rather than to develop extensive skills Finally, t s the added purpose of these curricula to make the student keenly aware of the urgent problems c f soc ety and to develop deeper appreciation of the cultura ach eve ments of man

The industria and techn c ı education cur ricula prepare graduates for positions is industrial arts nd technica teachers, depart ment heads, supervisors or d rectors, consultants and industrial tra ning directors It is the purpose of the D'v sion f Technology tc meet these needs through offerings leading to the completion of the Bache or of Arts in Education, the Bachelor of Sc ence the Mas ter of Arts in Education, the Master of Science (Techno ogy), tl e Education Specıal ist, the Doctor of Phi osophy, and the Doctor of Education degrees with specia ization in industrial education (See *Grad iate Catal g*

Organization

All Division offerings have been organized into programs of study with fie ds f specia ı zation as follows.

Aeronautics

- Aeronaut cal Engineering Technology
- Aeronautical Industrial Technology
  - Air Transportation Techn l gy F ight)
  - Air Transportation Management Tech nology

Electronics

- Electronic Engineering Techno ogy
  - Communication Systems
  - Control and Measurement

Digital Systems
Electrical Power Systems
Industrial Controls
Electronic Industrial Technology
Electronic Technology

Graphic Communications

Industrial Design
Industrial Design
Mechanical Design
Mechanical Engineering Technology
Technical Management

Industrial Technical Education
Industrial Arts Education
Technical Teacher Education
Industrial Supervision

Manufacturing Engineering Technology
Manufacturing Processes
Welding Technology

Because each program of study has its own unique educational mission, each is organized around its own structured core of required courses. These respective program cores provide the unifying elements of mathematics, science, graphics, communications, and technical sciences which are appropriate to that particular program of study.

The Division faculty members are organized into six faculties under the leadership of a faculty chair. Division programs of study and their fields of specializations are presented and defined as appropriate to these faculty groups under the headings of: Aeronautics; Electronics; Graphic Communications; Industrial Design; Industrial Technical Education; Manufacturing.

Degrees

Bachelor of Science. Division programs of study require the satisfactory completion of not less than 126 semester hours, or more where indicated by the specific program or by student entrance deficiencies. Included are the General Studies courses, university English, courses of the selected program of studies core, required courses in the field of specialization, supporting field courses and electives.

Specific details regarding purposes of these programs and their requirements are presented in the appropriate program of studies section.

Bachelor of Arts in Education (Fields of Specialization). Students majoring in Industrial Arts Education may specialize in one of the following areas: transportation and power, drafting, electronics, graphic arts, metals, woods, and general industrial arts.

Graduate Degrees. The Division of Technology offers programs leading to the Master of Science degree (M.S. Technology). In addition, the department participates in: (1) the Master of Arts in Education degree program as a subject matter field in Secondary Education, (2) the Education Specialist degree program as a major teaching field, and (3) the Doctor of Philosophy and Doctor of Education degree programs with a major in Industrial Education. Consult the *Graduate Catalog* for requirements.

Engineering Technology

Baccalaureate engineering technology programs are intimately related to engineering education as engineering technologists are prepared to serve with and in close support of engineers as a part of the total technological enterprise that extends from planning to production and the continuing service.

The essential program content is therefore mathematics, basic science, technical science, and field of specialization related to a particular area of engineering practice. Provisions for these elements are presented below in the form of the engineering technology core together with the requirements specified in the field of specialization. The latter consists of aeronautical engineering technology, electronic engineering technology, manufacturing engineering technology and mechanical engineering technology. In each case a minimum of 130 semester hours of satisfactory credits are required.

Engineering Technology Core

			Semester Hours
PHY	111	General Physics	3
PHY	112	General Physics	3
TST	101	Manufacturing Processes and Materials	3
TST	111	Technical Graphics	2
TST	121	Problem Solving	3
TST	200	Applied Electrical Science	3
TST	362 or 372	Applied Calculus or Applied Linear Analysis	3

TST	420	Technical Writing	3
ECN	201	Principles Economics	3
MAT	115	College Algebra and Trigonometry	4
MAT	260	Calculus for Applied Science I	3
MAT	261	Calculus for Applied Science II	3
ASE	226	Digital Computer Programming	2
		Total	38

Students planning to complete one to two years at a community college or college accredited private technical institute prior to entering this program should consult an Arizona State University Engineering Technology advisor for assistance in planning a transferable program

Beyond the engineering technology core and the further requirements of General Studies, the requirements for the fields of specialization are presented under the appropriate subject headings of Aeronautics, Electronics Manufacturing and Industrial Design (for Mechanical Engineering Technology).

Industrial Technology

The employment objective of the industrial technologist is properly defined as that of production management Program and employment emphasis is on applied aspects of industrial processes and on personnel leadership To assist in understanding the interfaces, it is appropriate to describe the industrial technologist as occupying the mid-ground between engineering, engineering technology and business administration Programmatically, then, industrial technology requires selected courses in mathematics, basic science, technical science, technical specialties and in business and personnel management

Variations of the industrial technology programs which permit a high degree of technical emphasis within a field of specialization have been demonstrated by employers to be highly desirable These areas of emphasis are presented in the fields of specialization requirements where appropriate All programs in industrial technology are organized around the industrial technology core with the remaining requirements specified in the fields of specialization.

Industrial Technology Core

			Semester Hours
TST	101	Manufacturing Processes and Materials	3
TST	111	Technical Graphics	3
TST	12	Problem Solving	3
TST	200	Applied Electrical Science	3
TST	420	Technical Writing	3
MAT	115	College Algebra and Trigonometry	4
MAT	260	Calculus for Applied Science I	3
ECN	201	Principles of Economics	3
MGT	301	Principles of Management	3
ASE	226	Digital Computer Programming	3
		Total	29

Beyond the industrial technology core and the further requirements of General Studies, the field of specialization requirements are presented under the respective subject heading of Aeronautics, Electronics, and Graphic Communications

Students planning to complete one to two years at a community college or college accredited private technical institute prior to entering this program should consult an ASU Industrial Technology advisor for assistance in planning a transferable program

Aeronautics

Aeronautical Engineering Technology

An ECPD accredited engineering technology program

The aeronautical engineering technology program is designed to prepare the technologist for technical support of engineering activities throughout the aerospace field Areas of responsibilities include the application of applied engineering practice related to aircraft and aerospace vehicle design, internal combustion engines, combustion processes, turbomachinery, systems analysis and environmental control A minimum of 130 semester hours of satisfactory credits are required to complete this program

The following courses, along with 4 hours of technical elective courses approved by the student's advisor, are required in addition to the engineering technology core courses and General Studies requirements

Required courses ELT 200, TST 310, 311, 360; MEE 380, 381; CHM 114; PHY 113, 114; MET 116, MGT 301, MET 180, 181, 287, 288, 300, 301, 306, 307, 308, 309, 310, 388, 390, 487, 490.

Aeronautical Industrial Technology

Instruction combines thorough technical training with a general university education The curricula are designed to prepare both aeronautical technologists and industrial technologists with theoretical and practical applications in the areas of structures, internal combustion, turbomachinery, design, management, general and commercial aviation systems analysis, and environmental control.

Two areas of emphasis are available in this degree program Air Transportation Technology (Flight); Air Transportation Management Technology (Non Flight) These emphases each require a minimum of 127 semester hours of satisfactory credits for completion

Each of these areas of emphasis requires a common aeronautical technology core and technical elective courses approved by student's advisor, in addition to the required industrial technology core and the General Studies requirements.

Aeronautical Technology Core

			Semester Hours
CHM	1[illegible]4	General Chemistry for Engineers	4
PHY	111	and [illegible]3 General Physics	4
PHY	112	and 1[illegible]4 General Physics	4
AET	180	Aerospace Structures and Materials	3
AET	181	Aerospace Systems	3
AET	287	Aerospace Powerplants	3
AET	288	Gas Turbines and Turbomachinery	
AET	300	Aircraft Design	3
AET	303	Aviation Law and Regulations	2
AET	305	Vector and Structure Analysis	[illegible]
AET	306	Aircraft Electrical and Electronic Systems	3
AET	384	Airport Planning	3
AET	390	Aerospace Systems Analysis I	3
AET	391	Airport Operation	2
AET	410	Aviation Safety	[illegible]
AET	41[illegible]	Aircraft Accident Investigation	3
AET	488	The Air Transportation System	
AET	489	Airline Administration	
		Total	[illegible]

Air Transportation. (Flight courses are Federal Aviation Administration certified courses.)

The air transportation technology (flight) area of emphasis encompasses academic and technical studies with flight training to qualify a student for positions requiring professional piloting ability in general aviation. All phases of training are available to enable the student to complete the private pilot, glider pilot, commercial pilot, and flight instructor certificates, as well as the instrument and multiengine rating requirements of the Federal Aviation Administration.

While enrolled at Arizona State University, students will not receive college credit for flight instruction received at flight schools other than the flight schools with which the University has contracted for such instruction. Consideration for credit will be given for flight experience and certificates received prior to enrollment at the University.

Students enrolled in this emphasis must complete a minimum of [illegible]3 hours of upper division (300 and 400 series) elective courses.

Flight instruction costs are not included in University tuition.

Required courses: AET 182, 183, 202, 28[illegible], 311, 380, 382, 383, 385, 386 and 387, 389 or 415 and 416.

Air Transportation Management. The management area of emphasis is designed to prepare graduates for managerial and supervisory positions with both the air transport industry and general aviation. It encompasses areas leading to jobs with manufacturers, fixed based operations, airports and government service. Included is a depth of technical training as well as a broad exposure to business management curricula.

Required courses: AET 487, 49[illegible], ACC [illegible], 102; ECN 202; FIN 300; MKT 30[illegible]; MGT 311; ADS 305.

Electronics

Baccalaureate degree programs in electronics are organized into two major program categories. The first, Electronic Engineering Technology (an ECPD accredited program), is an integrated four year program aimed at technical careers in industry in support of engineering functions and related activities. The second, Electronic Technology, provides for a variety of electronics related careers which are in support of general industrial functions and related activities. Program patterns under Electronic Technology are generally of the two-plus two variety, or are pattern related in nature and are intended to support in process or established career patterns.

All Electronics program patterns require the basic Electronics Core of 13 hours shown below.

Electronics Core

			Semester Hours
ELT	20[illegible]	Applied Electronic Science Laboratory	
ELT	21[illegible]	Active Devices	3
ELT	211	Electronics Laboratory I	
ELT	300	Electric Circuits	3
ELT	315	Electronics Design Principles	[illegible]
ELT	330	Electronic Instrumentation	2
ELT	33[illegible]	Instrumentation Laboratory	
		Total	13

Beyond the Electronics Core the requirements for various program patterns in electronics follow. A minimum of 24 upper division hours of electronics must be taken at Arizona State University.

Electronic Engineering Technology

An ECPD accredited engineering technology program

Electronic Engineering Technology is a field of specialization available to students interested in applied electronics with emphasis on state-of-the-art design and application. This four year program is designed primarily to prepare students for employment in technical positions in industry in engineering related activities.

The graduate typically finds employment in most major industries at various levels of responsibility including research and development support, design support, product support, fabrication, production, testing and evaluation and field engineering. Some typical positions open to Electronic Engineering Technology graduates include research and

development technologist, design specialist, field engineering specialist, test equipment specialist, process control technologist, and high frequency systems technologist.

The Electronic Engineering Technology program is arranged as a cohesive four year program of career preparation. The department offers a rotational sequence of evening courses to serve the part time evening student.

The program elements of the Electronic Engineering Technology program are:

	Semester Hours
Engineering Technology Core	35
Electronics Core	13
Electronic Engineering Technology Core	27
Approved Area of Emphasis	27
Approved Technical Elective	6
Remaining General Studies (total of 42)	19
Total program (minimum)	13

Electronic Engineering Technology Core

			Semester Hours
ELT	301	Electric Networks I	3
ELT	310	Electronic Circuits I	3
ELT	322	Electronic Circuits II	3
ELT	323	Electronics Design Laboratory	1
ELT	400	Electric Networks II	3
ELT	455	Electronics Design Principles II	2
ELT	450	Digital System Principles	3
ELT	472	Communication Systems	3
PHY	460 or	Elements of Atomic Physics	3
		CHM 113-4	
TST	372	Applied Linear Analysis (TST 362 also required)	3
		Total	29

Area of Emphasis: In addition to the various cores required and remaining General Studies requirements, the student must select an area of emphasis according to career interests within the field of electronics. The emphasis consists of 27 hours in an approved pattern which must include the equivalent of six (6) approved upper division design laboratory units (in addition to the core of which up to three (3) units may be taken through approved on the job special topic projects). Required courses for currently approved areas of emphasis are shown below:

Communication Systems Emphasis: ELT 404, 470, 473, 476; 474 or 401; 480 or 420.

Control and Measurements Emphasis: ELT 406, 408, 420, 440; ELT 460 or TST 312, ELT 430 or ESE 460.

Digital Systems Emphasis: ELT 420, 452, 456; ELT 454 or 408, ELT 422 or 406.

Electrical Power Systems Emphasis: ELT 340; 440, 404, ELT 401 or 406; ELT 460 or TST 312; ELT 430 or ESE 460.

Electronic Systems Emphasis: ELT 406 or 408, 401 or 404, 420 or 460, 430 or 476; 440 or 340; 454 or 456.

Industrial Control Emphasis: ELT 406 or MET 303, ELT 440 or 340, ELT 460 or TST 312, ELT 430 or ESE 460; MET 400; MET 305 or 402.

Electronic Technology

The employment objective of the industrial technologist is more closely allied with production support and management in contrast with the engineering activities associated with the engineering technologist. Program and employment emphasis is on applied aspects of industrial processes and upon personnel leadership. The industrial technologist works with engineering and technological personnel and contributes to their ideas as well as supervises and manages personnel in the coordination of their efforts in the utilization of materials and machines for producing and distributing industrial products.

Graduates of an electronics oriented technology program find employment in the electrical and electronics industry as industrial technologists in such activities as product support and coordination, manufacturing and process development, production support and management.

Two year associate degree graduates and others who have identified specific career needs in connection with their job requirements and goals, may pursue programs in Electronic Technology which allow for supporting patterns in electronic industrial technology, technical education, business administration, medical electronics, aerospace or military science, technical management, technical distribution, technical construction, technical theater, avionics, electronics fabrication, audio systems, technical communication and others.

Programs in Electronic Technology are organized around the industrial technology core with the remaining requirements specified in the program elements shown below:

	Semester Hours
Industrial Technology Core	29
Electronics Core	13
Technical Area (approved pattern)	24
Supporting Area (approved pattern)	24
Remaining General Studies and Approved Electives (must include PHY 111 or PHY 460 or CHM 113)	36
Total (minimum)	26

Technical Area Courses: An approved pattern of 24 hours is required and must include the following courses or approved equivalents: ELT 340 or 301; 440 or 310, 472 or 460, 476 or 322, ELT 450 or ELE 320, ELT 415 or ITE 445.

Supporting Area: An approved pattern of 24 hours is required. Required courses for cur

rently approved supporting areas are shown below Other proposed patterns must be approved by the Electronics Curriculum Committee Some of the required courses may also be utilized for general studies requirements, thus providing for additional approved electives.

Electronic Industrial Technology ITE 443; MAT 326 or QBA 221 or TST 372, ACC 300 or FIN 203; IEE 301 or MGT 451, COM 100 or 300; IND 210, HUM 402 or ITE 346; MET 200 or 303, 301 or 401, MET 305 or 402, or IND 225, ITE 450 or 452 or 453

Technical Education satisfies education entrance requirements for MST Technical Teacher Education) ITE 402, 442, 446; 450 or 480; MGT 451; ITE 445 or equivalent, ITE 485 or equivalent

Business Administration (satisfies business entrance requirements for MBA) ECN 500 or 201, 202, FIN 300 or 500, QBA 221; ADS 305, MGT 301; MKT 300; ACC 500 or 101, 102

Aerospace Military Science AES MIS 101, 102, 201, 202, 301, 302, 401 402

Medical Electronics Co-op programs available) Approved Technical Area ELT 301, 310, 340 or 440; 430, 453, 454 or 456, 476. Approved Supporting Area MIC 201 PGS 100; ZOL 201, 202; CHM 113 in lieu of PHY 460). Approved Electives up to nine (9) hours) ZOL 241; ASB 102, BIO 100, 340, BOT 100; SOC 101, 301, COM 300, HUM 402. Co-op credit 6 to 14 hours

Technical Management (see Design section for details). IND 160, 225 403, TST 312 COM 100 or 300, 400 or 411, ECN 202, QBA 221, MKT 300, ADS 305, ACC 101 102, FIN 300, ADS 223, MGT 463

Technical Distribution ECN 202 ADV 301; MKT 300, 310, 302, 304, 412, 434

Graphic Communications

The graphic communications field of specialization provides a diversified approach for individuals interested in communication techniques The impact of written and printed business and industrial communications, such as newspapers, magazines, manuals, books, package printing and other visual materials is of great social significance

The industrial technology core as well as the General Studies courses are also required of all graphic communications majors This graphic communications field of specialization is designed to provide broad professional education essential for a wide range of careers in the graphic arts industry. Among these are positions in administration and general management, production and quality control sales and sales management, communications, design, estimating, marketing, advertising, photography and research. The needs of each student are reviewed and program flexibility beyond required courses is reflected in the selection of supporting area of emphasis courses as well as technical electives

Required courses GRC 135, 136, 236, 237, 238, 333, 334 336, 337, 339, 433, 435 436, 437, 438, MGT 311; ITE 443; CHM 101, PHY 101; IND 308 A minimum of an additional 12 hours are required in a supporting area of emphasis.

Industrial Design

Three fields of specialization are defined under the industrial design program of study mechanical design with an optional area of emphasis in agricultural design, industrial design (per se) with areas of emphasis in product design or graphic design, and technical management with areas of emphasis in design management, or electronics For electronics emphasis, see electronics section of the catalog. The common unifying elements of the technical basis of these specialties is identified as the design core

Students planning to complete one to two years at a community college or college accredited private technical institute prior to entering this program should consult an Arizona State University Industrial Design advisor for assistance in planning a transferable program

Design Core

			Semester Hours
TST	101	Manufacturing Processes and Materials	3
TST	111	Technical Graphics	2
TST	121	Problem Solving	3
TST	200	Applied Electrical Science	3
TST	420	Technical Writing	3
IND	112	Surface Definition	2
IND	160	Sketching and Drawing	2
IND	210	Production Drafting	2
IND	225	Materials	3
IND	403	Product Liability	3
ASE	226	Digital Computer Programming	2
MAT	115	College Algebra and Trigonometry	4
MAT	260	Calculus for Applied Science I	3
PHY	111	General Physics	3
PHY	113	Physics Laboratory	
ECN	201	Principles of Economics	3
		Total	44

Mechanical Design. The mechanical designer is primarily concerned with the functional aspects of consumer and industrial products and equipment A prime objective in design is to combine considerations of function, cost, efficiency, kinematic and structural details In the execution of this objective, the mechanical designer will prepare layouts working

drawings, and specifications for materials and operation. The emphasis is toward how a machine affects, or is affected by, other machines and processes — the machine-machine relationship.

Required courses: IND 101, 211, 305, 306, 307, 406, 407, 450, 45 , TST 310, 311, 34 , 360, MET 200, ELT 34); MAT 26 , MEE 380; ESE 355, PHY 112, CHM 114, COM 100, Design Core.

The remainder of S semester hour (minimum) of required courses shall be selected by the student in consultation with the advisor. Students planning careers in the design of agricultural production and processing equipment shall include AGI 300, 325, 440 and ERA 325 in place of IND 3 5, TST 340, MEE 380, and 5 additional semester hours of approved electives. AGI 230 may also be required depending upon the student's background and experience.)

Industrial Design. The dynamic process of industrial design is concerned with the integration of esthetics, materials, manufacturing, human factors, merchandising and creativity, for the primary purpose of developing solutions to three-dimensional problems. Originally associated almost exclusively with product styling, industrial design has matured to include total planning and development. Products such as the telephone, typewriter, and parking meter, including their associated packaging and graphics, and large systems, including modular components for industrialized housing or mass transit systems, are now considered legitimate concerns of the industrial designer. The industrial design program of study requires the design core as its technical base while maintaining a strong content in esthetics, art, and studio skills.

Industrial design embraces most human aspects of machine-made consumer and industrial products, and the graphics which attend their esthetics, packaging and merchandising. The product designer is generally involved in the entire development process from initial ideation, sketching and modeling, through production including product planning, marketing and packaging, to the ultimate use of that product. Esthetics and human factors are of primary concern to the product designer as well as how the product developed relates to and affects human activities — the man-machine-environment relationship. The graphic designer addresses the visual and esthetic requirements of the two-dimensional aspects of products, packages, displays, signage and posters.

Required courses: IND 10, 0 , 16 , 204, 211, 230, 231, 264, 265, 3 1, 302, 3 3, 3 5, 350, 351, 40 , TST 312. 12 semester hours of art courses, including ART 2 4, 241, 29 , PHY 112; Design Core.

The remainder of 17 semester hours (minimum) of required courses shall be selected by the student, in consultation with the advisor, in either product design or graphic design. Students planning careers in product design shall include IND 43 , 43 , 450, 451. Those students planning careers in graphic design shall select from IND 4 1, and advisor approved courses in advertising, art and graphic communications.

Technical Management. The primary purpose of technical management is to prepare students for positions of responsibility in the areas which interface between the business and the technical communities. The program is designed to provide a basic background in mathematics, science, engineering technology and design, (2) a mastery of basic business tools and skills and an understanding of business procedures, and 3 a specialized knowledge of either design or management. These skills will be applicable to such career objectives as product planning, product cost analysis and reduction, industrial sales, product service administration, budget administration, industrial purchasing, etc. To attain these objectives, the program has been structured with 25% of the student's work in the College of Business Administration, 30% in the College of Engineering and Applied Sciences and 15% selected from either area as specialization. The remaining 30% is devoted to mathematics, science and General Studies. The student is also thereby prepared to enter the graduate program in business administration, if desired, having completed the basic program for such study. The technical management program of study requires the Design Core as its technical base.

Required courses: IND 306, 307, TST 312, ACC 101, 102, QBA 221; ADS 233, 335, MKT 300, ECN 202, MGT 3 , 463, FIN 300, COM 100, 211 or 3 or 4 5, CHM 1 4 or 113; Design Core.

The remainder of 24 semester hours (minimum) of required courses shall be selected by the student in consultation with the advisor. Those students planning careers in the product area shall include IND 303, 4 2, 45 , 451. Students planning careers in the management area shall include ACC 33 , MGT 311, 355, 368, 451. Advisors will remain responsive to the individual needs of the student and other areas of emphasis may be considered with the approval of the department. Students planning careers in the electronics area should consult the electronics section of the catalog and an electronics advisor.

Mechanical Engineering Technology

An ECPD accredited engineering technology program

The mechanical engineering technology is concerned with applications within the broad and diversified field of mechanical engineering. Among the responsibilities which may be

assigned to such technologists are design, development, and evaluation of machines, power generation, transmission, instrumentation and testing. A technologist may be required to lay out, develop details or supervise the development of a machine or process. In addition, a technologist may test, evaluate performance and make such alterations as to make that machine or process operable and competitive.

Completion of the required Engineering Technology Core and the following courses are intended to provide a broad, fundamental base in technical science and skill development in mechanical engineering technology at the baccalaureate level.

Required courses: IND 112, 160, 210, 211, 225, 306, 307, 403, 406, 407; TST 310, 311, 340, 360, 362; ESE 460; MEE 380, 381; ESE 355; ELT 340; MET 200; PHY 113; CHM 114; COM 100.

The remainder of 9 semester hours (minimum) of required courses will constitute an area of emphasis and shall be selected by the student in consultation with the advisor. Those students planning careers in the management area shall include ACC 300, MGT 301, and MKT 300 in place of IND 211, 406, 407; and 10 additional semester hours of approved electives. Those students planning careers in the industrial engineering technology area shall include: MET 305; IEE 362; IND 370 in place of IND 211, 406, 407; and 10 additional semester hours of approved electives.

Industrial Technical Education

Combining courses in technology, General Studies and professional education, students may prepare for educational careers in industrial arts, technical teacher education and industrial supervision. Fields of specialization in a variety of technical areas are provided.

The following common core is required for all majors in industrial arts and technical teacher education.

Industrial Arts and Technical Teacher Education Core

			Semester Hours
ELT	280	Electricity/Electronics	3
TST	111	Technical Graphics	2
ITE	402	Analysis and Course Development	3
ITE	442	Facility Planning and Management	3
ITE	480	Teaching Industrial Technical Subjects	3
MAT	115	College Algebra and Trigonometry	4
		Physical Sciences	6
		Total	24

Industrial Arts Education. The specific objective of this program is to prepare students for the requirements of industrial arts teaching. The carefully planned pattern of course work permits students to receive a balance and sequence of study. The curriculum leads to a Bachelor of Arts in Education and certification for teaching. For the specific requirements of general and professional education, consult the College of Education section of this catalog.

There are two plans available for industrial arts education majors: (1) a comprehensive major of 60 hours, and (2) a 42-hour major with a minor.

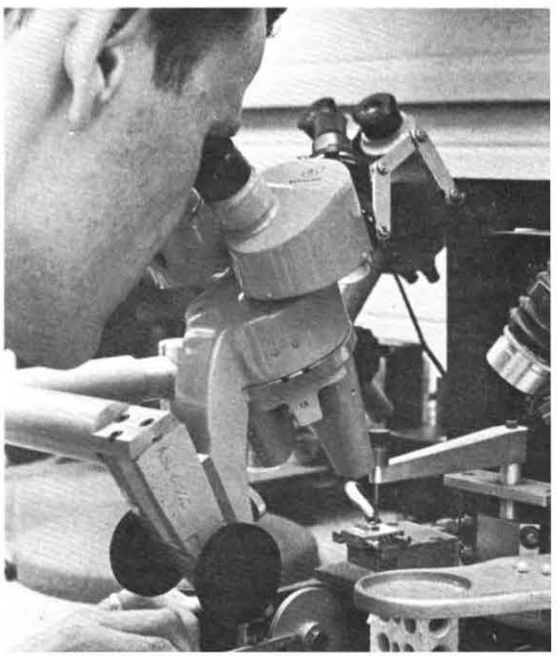
Required courses: Industrial Arts and Technical Teacher Education core; ITE 200, 201, 202, 346; GRC 135; 3 hours of professional electives, and 28 hours of approved technical courses.

Technical Teacher Education. The purpose of this program is to develop competency in one of the technologies and in professional technical education. This four-year Bachelor of Science degree prepares instructors and training personnel for selected trade and technical programs offered at the various levels.

Required courses: Complete Industrial Arts and Technical Teacher Education core; ITE 401, 443, 444, 446, 485, 491; TST 420; ECN 201; COM 100. A minimum of 40 credits, approved by the advisor, is required in a field of specialization or supporting field, of which ITE 445 and ITE 455 may be a part.

Prior to the completion of the degree, the student must show evidence of adequate and appropriate occupational experience.

Industrial Supervision. The purpose of this program is to prepare first-line supervisors for industry. Leading to a Bachelor of Science degree, the program provides for a general education background with a field of specialization in recognized technology and supervisory studies.



Most students will complete the m i or part of the first two years at i community col ege This should include General Stud es and ower division specialization courses

Required courses ELT 28(, TST 111, 420, ITE 402, 443, 444, 450, 452, 453 MGT 301, 31 , 451, ECN 201, COM 100; 6 hours of Physical Sciences A m i mum of 18 credits, approved by the advisor, is requ red n supervision and 4) credits in a echnology f eld) specialization, such as b is ness, safety fire sc ence, health, and the v r o s cpti ns in n dustrial technology (i c , aeronautics, drafting design, electronics, graphic arts n anufacturing of wh ch ITE 445 and ITE 455 may be a part).

Prior to the completion of the degree, the student must show ev dence of adequate and appropriate occupational exper ence

Manufacturing

Manufacturing Engineering Technology

An ECPD a credited ng neer ng techn l gy program

Increased technologic l c mplex ty and phis tication has created great industrial dem and for the services of those individuals who pos sess working knowledge of the technical phases of production and fabric tion. Manu facturing engineering technologists perform a vital function in the ollow through and com pletion of engineering decisions and the solving of manufacturing prob ems

Two areas of emph isis are available in this degree program: 1 Manufacturing Processes and (2) Welding Technology Both emphases require minimum of 130 semester hours of satisfactory credits for com p et on

Each of these areas of emphasis requires i common manufacturing engineering technol ogy core in addition to the required engineering technology core and the General Studies requirements

Manufacturing Engineering Technology Core

			Semester Hours
Engineering Techn logy C re		. . .	38
CHM	114	Genera Chem str for Eng neers	4
TST	310	Applied Mech n cs Stat cs	3
TST	311	Applied Mech n cs Mater s	3
ELT	201	App ied Electr cal Sc ence	
AET	3 9	NDT and Q a ty As ura ice	3
MET	200	Manufactu ng Pr c sses	3
MET	310	Weld ng Surve s	4
MET	30	Manufactur ng A	
MET	400	N C Manu Pr gr mm ng	
MET	431	Qu l t C t	3
MET	4 4	Appl ed Met l gy	3
		T ta	7

Manufacturing Processes. This area of empha sis is des gned to prepare technologists w th both conceptual and practical app cations processes, materials, and products re ated to metalworking industries Emphasis s focused on the roles of personnel n t e auton ated manufacturing systems Accordingly, th s area of emphasis is intended to prepare students t meet the responsibi ties in plann ng the pr cesses of production, developing the t o s and machines, and integrat ng the facilities o pr duction or manufacturing

Required courses MET 30 , 302, 3 3, 304 305, 402, 403, 405, 406 plus approved elec tives

Welding Technology. Th s area of emphasis is des gned primarily to prepare nd vidua s for technical positions in ndustr es utilizing we d ing and related processes The focus is on the application of weld ng technology as appl ed to current and near future industri l needs The program is structured to provide the indiv dual with a balance of theory, app ication ai d hands on experiences. The general areas cov ered by the courses are welding processes, materials, which includes non destructive test ing, and weldment design

Required courses: MET 311 3 2, 3 5, 410, 411, 412, 415 plus approved e ectives.

Students planning to comp ete one to two years at a community co ege or co lege accredited private technical institute prior to entering this progr m sl ou d c nsu t in Ar zona St te Universit M n ifactur ng dv sor for iss stance in plann ng i transfer ib e pro gram

Technology

PROFESSORS:
BURDETTE (TC 201), BARTEL BROWN K G N, LITTRELL PRUST THOMASON

ASSOCIATE PROFESSORS:
ADAMS, BENZ NGER, BLANCHARD COX GRAHAM KANNEMAN, M NTER, PARD N STAFFORD STRAWN, WOOD

ASSISTANT PROFESSORS:
ANDERSON, BA LEY B EKERT, CAVALLIERE DUNLAP, EDWARDS H GBEE H RATA, KE TH McCURDY, NIELSEN QUESADA, ROOK ROPER, SADLER SCHOEN, SM TH, SPRADL NG, WATK NS, W LLIAMS

LECTURERS:
REED, SHELLER

AERONAUTICAL TECHNOLOGY

(Flight instruction costs are not nc uded n University tu t on)

AET 180 Aerospace Structures and Materials. Basic aerodynam cs aerospace veh cle structura des gn and mater a s Manufactur ng processes, assemb y and re pa r techniques, and hardware se ect on Two ectures 4 hours aboratory. Credit, 3 hours

181 Aerospace Systems. Aircraft and aerospace vehi cle systems (hydrau ics, pneumatics aux iary, contro , instrument etc), we ght and ba ance nspect'on re

qu rements and methods Prerequ s te· AET 180 Two ectures 4 hours aboratory. Cred t, 3 hours

182 Private Pilot Ground School. Ground school n preparat on for the FAA Pr vate P lot written exam na tion Three ectures, 3 hours recitat on Cred t 4 hours

183 Private Pilot Certificate. F ght train ng for the FAA Private P lot Cert f cate Sat sfactory comp etion of FAA tests s requ red Prerequ s te or corequ s te AET 182 Cred t, 1 hour

184 Glider Pilot Rating. nstruct on n sc ence and tech niques of soar ng for FAA G der P l t rat ng FAA l cense required for course comp et on Two ectures and fl ght Cred t 2 hours

200 Interim Flight Course. Al ows students to accr e f ght time n preparat on for the nstrument P ot Rat ng and the Commerc a P ot Cert f cate courses Prerequ s te Flying t me 30 hours m n mum 150 hours max mum Perm ss on of Aeronaut ca Techno ogy fac ulty requ red. No cred t.

202 Aviation Meteorology. Eva uat on, ana y s nter pretation of atmospher c phenomena Low and h gh a t tude weather from the p ot s v ewpo nt Nepho ogy Prerequisite. PHY 111 Cred t 3 hours

280 Commercial Pilot Ground School. Preparat on for the FAA Commerc a P ot wr tten exam nat on Ten hours s mu ator required. Prerequis tes AET 183 or equ va ent corequ site AET 202 Three ectures Cred t 3 hours

287 Aircraft and Aerospace Powerplants. Theory of nterna combust on eng nes, components performance ana ysis eng ne accessor es systems and env ronmen ta contro Corequ s te MAT 260 Two ectures 4 hours aboratory Cred t 3 hou s.

288 Gas Turbine and Turbomachinery. Deve opment and theory of gas turb ne eng nes Thrust and perfor mance ana ys s Eng ne components systems aerodynam c prob em app cat ons and env ronmenta contro Corequ s te MAT 260 Two ectures 4 h urs aboratory. Cred t, 3 hours

300 Aircraft Design I. Bas c app ed aerodynamics and a rp ane performance ana ysis Prerequ s tes AET 181, 288· MAT 260; PHY 111 Cred t 3 hours

301 Applied Aerodynamics. Propert es of air a rfo theory, w nd tunne test ng techniques a rflow measure ments, w nd tunne mode deve opment Prerequ s te AET 300 Two lectures, 2 hours aboratory Credit 3 hours.

303 Aviation Law and Regulations. Basic source of regu atory powers Statutes, regu at ons, adv sory c rcu lars. State and nternat ona ru es Cred t 2 hours

305 Vector and Structure Analysis. Vector ana ysis and topics n structura ana ys s. Prerequ s tes MAT 115 or equ va ent and PHY 111 Cred t, 2 hours

306 Aerospace Electrical and Electronic Systems. Theory and des gn of aircraft and aerospace veh cle e ectr ca and electron c systems ncluding nav gat on and communicat on equ pment Prerequisites ELT 200, MAT 260 PHY 112 Cred t 3 hours

307 Aerospace Systems Design. Ana ys s and des gn of a rcraft and spacecraft systems performance evalua t on for rockets and m ss es Prerequ s tes PHY 112· ASE 226 or know edge of FORTRAN programm ng Credit 3 hours.

308 Combustion Analysis. Fue s and comb st on a basic ana ys s of fue s chem stry and chem ca k net cs of the combust on process Prerequ s tes AET 288 MAT 260 MEE 380 PHY 112, CHM 114 or equ va ent Two ectures 2 hours aboratory Cred t 3 hours

309 Nondestructive Testing and Quality Assurance. Purpose of industr a nspect on qua ty standard and stat st ca methods. Theory and app ication of nondes truct ve and destruct ve testing pr cedures. Two lectures 4 hours aboratory Cred t 3 hours

310 Instrumentation. Concepts and pr nc ples of pres sure temperature f ow and chem ca spec es measurement techn ques. Prerequ s tes ELT 200 AET 306, MAT 260 PHY 112 Cred t, 2 hours

311 Air Traffic Control. D scuss on of equ pment and faci t es re ating to a rcraft operat ons n the nat ona a rspace system Govern ng ru es and regu at ons Cre d t, 2 hours.

380 Instrument Pilot Ground School. nstruct on n preparat on for the nstrument P ot wr tten exam na tion Ten hours of s mu ator requ red AET majors, pre- or co requis te AET 202 280 or equ va ent Non AET majors, prerequ s te Pr vate P ot Cert f cate or equ va ent· corequisite· AET 202 or equ valent Cred t 3 hours

381 Instrument Pilot Rating. F ght train ng for the FAA nstrument P ot Rat ng Sat sfactory comp et on of FAA nstrument Rat ng requ red Prerequisite AET 380 or equ va ent fly ng t me 150 hours tota Not for AET majors Credit 1 hour.

382 Air Navigation. Advanced nav gat on methods and under y ng princ p es Dead reckon ng ce est a , pres sure d fferent a techn ques and ntegrated nav gat ona systems. Cred t 2 hours.

383 Commercial Pilot Certificate and Instrument Rating. F ight tra n ng for the FAA Unrestricted Commercia P lot Certif cate Sat sfactory complet on of FAA Certif cate/Rating required. Prerequ s tes AET 280 380; f y ng t me, 150 hours total Cred t 2 hours

384 Airport Planning. Community and a rport re at on ships, s te se ect on financ ng nav gat on a ds geometr c design of airport term nal bu dings l ght ng and p ann ng considerat ons Cred t, 3 hours

385 Flight Instructor Ground School. Instruct on n preparat on for FAA F ght nstructor wr tten examina t on FAA F ight nstructor written exam and BG Cert ficate requ red Prerequis te AET 383 or equ va lent. Credit, 3 hours

386 Flight Instructor Rating. F ght tra n ng for FAA F ght nstructor Cert f cate. Cert f cate requ red for course comp etion Corequ s te AET 385 Cred t 1 hour.

387 Multi-Engine and Flight Engineers Ground School. nstruct on n preparat on for the FAA Mu t Engine Rat ng and the FAA F ght Eng neers Bas c writ ten exam nat on Prerequ s te AET 383 or eq va ent Cred t, 2 hours

388 Propulsion. Pr nc p es thrust · performance cycles combust on systems mechan ca mater a and other des gn cons derat ons ram jets rockets and advanced propu s on systems Prerequ s te AET 308 Two ec tures 2 hours aboratory Cred t 3 h urs

389 Multi-Engine Rating. F ght t a n ng for the FAA Mu t Eng ne Rat ng FAA rat ng requ red for course complet on Corequ s te AET 387 Cred t 1 hour

390 Aerospace Systems Analysis I. A systems concept of quant tative methods n p an ng ana ys s contro inc uding breakeven analys s PERT CPM and probab ity theory Prerequ s tes. ASE 226· MAT 260 Cred t, 3 hours.

391 Airport Operation. Operat ona funct ns commer c a air nes, genera aviat on operat ons term nal bu ding ut zations support fac t es commun ty rela tionsh ps and a rport f nanc ng Prerequ s te· AET 384 Cred t 2 hours.

410 Aviation Safety. Av at on acc dent prevent on de ve opment and ana ys s of av at on safety programs Cred t 2 hours.

411 Aircraft Accident Investigation. Deve opment and eva uation of evidence ana ysis, and recommendat ons for preventive pract ces Prerequ s te AET 410 Cred t 3 hours

415 Flight Instructor Instrument Ground School. n struction n preparat on for FAA Instrument F ght nstructor Certif cate FAA CF written exam nat on and the IGI Cert ficate required. Prerequis te AET 385 Cre- d t 2 hours

416 Flight Instructor Instrument Rating. F ght tra n ng for the FAA CF CF Cert ficate requ red for course comp etion. Prerequ s tes AET 386 415 Cred t 1 hour

487 Aircraft Design II. Bas c aerodynam'cs and a rplane

performance analys s methods app ed to practica de s gn project Prerequ sites AET 300 390 Cred t, 3 hours

488 The Air Transportation System. A r c mmer e re ated to the transportat on system regu atory c mate of a r ine and fixed base operations, career plann ng Pre requ s tes ECN 201, MGT 301 Cred t, 3 hou s

489 Airline Administration. Admin strat ve organ za- t ons economics of a r ne adm n strat on operat ona structure, cost ana ys s re at onsh p w th federa gov ernment agencies Prerequ s te AET 488 Cred t 2 hours

490 Aerospace Systems Analysis II. Systems plann ng, ana ys s and contro forecast ng transportat on a d assignment a gorithms networks L near programm ng product on schedu ng Prerequ s te AET 390 Cred t, 3 hours

Special Courses: AET 494 498, 499 500 58 584 590 591 592 593 594 598 (See page 31

ELECTRONICS

ELT 201 Applied Electrical Science Laboratory. Bas c c rcu ts aboratory techn ques and nstruments Coreq uis te TST 200 Three hours aboratory Cred t 1 hour

210 Active Devices. Act ve dev ce character st cs mod e s and bas c e ectron c c rcu t des gn pr nc p es. Prerequis tes TST 200 ELT 201 Corequ s te ELT 300 Cred t 3 hours.

211 Electronic Circuits Laboratory I. Act ve dev ce character st cs and basic electron c c rcu try D agnost pr nciples and nstr mentat on Corequ s te ELT 210 Three hours aboratory Cred t 1 hour

280 Electricity/Electronics. Pr nc p es of e ectr c ty and e ectronics w th app ations toward nstr uct on at the secondary evel. Open on y to ndustr a arts ma or F ve hours ecture rec tat on aboratory red t 3 h u s

300 Electric Circuits. Graph ca and ana yt ca ana ys s of e ectric c rcu ts and components App cat on of c r cu t theorems. Trans ent and s nuso da exc tat on Prerequ sites TST 200 MAT 115 F ur hours ecture rec tat on demonstrat on C ed t 3 hours

301 Electric Networks I. Graph ca and ana yt ca ana y s s of e ectronic networks using ca cu us essent als Transients. Steady state s nuso da freq en y response Transfer funct ons Prerequ s te ELT 300 Corequ s te MAT 260 Four hours ecture rec tat or Cred t 3 ho rs

310 Electronic Circuits I. Ana ys s and des gn of b po ar and FET e ect on c c rcu ts us ng the mode app oach Amp f er and transfer funct on pr p es Prerequ tes ELT 210 300 Corequ s te ELT 3 1 Fou hour ecture rec tat on Cred t 3 hou s

315 Electronics Design Principles I. Layout, documen tat on standards and bas c fabr cat on techn ques fo des gn of electronic equipment Prerequ s tes· TST 111 and 121 or equ va ent ELT 210 or equ va ent Four hours ecture recitat on aboratory Cred t, 2 hours

322 Electronics Circuits II. Analys s and des gn pr nc p es of electronic c rcuit appl cat ons sma arge s gna ow high frequency, l near non near Prerequ s tes ELT 301, 310. Cred t 3 hours

323 Electronics Circuits Laboratory II. Des gn and ap p ication of e ectron c c rcu ts Prerequis tes ELT 211 or equ va ent ELT 310 Corequ s te. ELT 322 Three hours laboratory rec tat on. Cred t 1 hour

330 Electronic Instrumentation. Theory and operat on of measurement c rcu ts and e ectr n c nstrumentat on D agnostic and ca bration pr nc p es and techn ques Prerequ s tes ELT 210 and 211 or equ va ent Cred t 2 hours

331 Instrumentation Laboratory. Corequ s te ELT 330 Three hours aboratory Cred t 1 hour

340 Electric Circuits and Machines Pr n p es and analys s of e ectr ca power c rcu ts and compo ent Transformers Rotating mach nes and re ated contro equ pment. Prerequ s tes TST 2 0 PHY 112 or ELT 300 or equ va ent Four hours ecture rec tation demon strat on Cred t 3 hours

400 Electric Networks II. Graph ca and ana yt ca ana ys s of e ectr ca networks T me, frequency and Lap ace transform domain techn ques Waveform ana ysis Pre requis tes ELT 3 1 MAT 260 C requ s te MAT 261 Credit 3 hours

401 Electric Networks III. Network ana ys s the ry and app ication s Four er and Lap ace transf rm techn ques Prerequ s tes E T 400 MAT 261 Cred t 3 hours

404 Transmission Lines and Waveguides. Theory and app ication of transm ss on nes, wavegu des and m crowave components Ana ys s a d match ng us ng the Sm th Chart Prerequ s te ELT 301 Four hours ecture rec tat on demonstrat on Cred t 3 hours

406 System Dynamics and Control. T me frequency and transform doma n ana ys s of phys ca systems Transfer funct on ana ys s of feedback c ntro systems performance and stab ty Prereq s te ELT 400 o ST 362 Credit 3 hours

407 Control Systems. Contro system ana ys s S m a t on and des gn pr nc ples Cont o components Compensat on techn ques App cat ons Prerequ s te ELT 406. Cred t, 3 hou s

408 Analog Simulation. Ana og og c s mu at n of dy namic phys ca feedback systems. Programm ng a d scal ng techn ques for nea and non near s mu at o Prerequ site. ELT 400 or TST 362 Four hours ecture rec tat on/laboratory Cred t, 3 h urs

410 Linear Electronic Circuits Design. Frequency re sponse and feedback des gn of mu t stage e ectron c c rcuits and systems L near ntegrated c rcu try Pre requ s tes. ELT 301, 310 Credit 3 hours

411 Linear Electronics Design Laboratory. Coreq uis te· ELT 410. Three hours aboratory Cred t 1 hour

415 Electronics Design Principles II. E ectron c equ p ment des gn and fabricat on prin p es and practice Comp etion of e ectron cs hardware des gn pro ect and report Prerequ s tes ELT 315 or equ va ent ELT 322 o 460 sen or stand ng Four hours ecture rec tat n laboratory Credit 2 hours.

420 Operational Electronics. D fferent a and opera tiona amp f er c rcu try feedback conf gurat ons, op- amp errors and compensat on near and non near c rcu try Appl cat ons Prerequis tes E T 301 310 Cred t 3 hours

421 Operational Electronics Laboratory. L near nte grated c rcu ts and op amp app cat ons Corequ s te. ELT 420 Three hours aboratory Cred t 1 hour

422 Electronic Switching Circuits. Ana ys s and des gn of electronic circu ts operat ng n a sw tch ng mode Waveshap ng t m ng og c Transm ss n i ne pu se ef fects Prerequ s tes· ELT 450 and 322 or equ va ent Cred t, 3 hours

423 Electronic Systems Design Laboratory. Corequ s te ELT 422 Three hours aborat ry Cred t 1 h ur

430 Measurement Systems. Measurement pr nc p es and instrumentation techn que . S gna and error ana y s s Prerequis tes ELT 301 322 r 46 ELT 450 r equ va ent Credit 3 hours

431 Measurement Systems Laboratory. Prerequ s te ELT 330 or equ va ent or coreq s te E T 430 Three hours aboratory Cred t 1 hour

440 Electrical Power Systems. E ectr ca power system ana ysis transmiss on d str but o nstrumentat on protect on and re ated system components Prerequ site· ELT 301 or 340 Cred t 3 hours

450 Digital System Principles. B ary og c comb na tional des gn and s mp f cat on ntrod ct on t sequent a c rcu ts ntroduct on to computer ar thmet c hardware and software princ p es Prerequ s te· un or stand ng Cred t 3 hours

451 Digital Electronics Laboratory. Prereq s te ELT 210 or equ valent Corequ s te E T 45 Three hou s aboratory Cred t 1 hour

452 Digital Logic Design. Ana ys s and des gn of se quent a og c networks System des gn techn ques

us ng complex bu ding b ocks programmed og c Pre requ s te ELT 450 Cred t 3 hours

453 Digital Logic Design Laboratory. Corequ s te ELT 452 Three hours laboratory Cred t 1 hour

454 Digital Hardware Systems Design. Ana ys s and des gn of sma computer systems Computer organ za t on and hardware Mach ne anguage fundamenta s and operat ons Prerequ s te ELT 450 and ASE 226 or equ valent. Cred t, 3 hours

455 Digital Systems Applications Laboratory. Coreq u's te ELT 454 or approva of nstructor Three hours aboratory May be repeated for a max mum of 3 hours credit Cred t, 1 hour

456 Minicomputer Systems and Programming. Assem b y anguage programm ng nput output off ne d agnostic programm ng Ut ty software Prerequ s tes. ASE 321 or equiva ent ELT 454 or equ vatent Four hours ecture rec tat on aboratory Cred t 3 hours

457 Minicomputer Systems and Applications. App ca tions of m n - and or m cro-computer hardware and software Spec a purpose contro ers nterface des gn and appl cat ons Prerequ s tes ELT 454 and 456 or equ va ent Credit 3 hours

460 Special Devices and Applications. Ana ys s and des gn of e ectronic c rcu ts using spec a act ve dev ces for near and non near app cat ons Prerequ s tes ELT 301 310 Cred t, 3 hours

461 Special Devices Laboratory Corequ s te ELT 460 Three hours aboratory Cred t 1 hour

470 Communication Circuits. Ana ys s and des gn of pass ve and active commun cation c cu ts Coupl ng networks f ters mpedance match ng Modu at on and demodulat on techn ques Prerequ sites ELT 301 310 Corequ site· ELT 400 Cred t 3 hours

471 Communication Circuits Laboratory. Corequ s te ELT 470 Three hours aboratory Cred t 1 ho r

472 Communication Systems I. Systems ana ys s and design of AM FM PCM and SSB commun cat on sys tems Noise and d stort on performance of communicat on systems Prerequ s tes ELT 301, 310 or ELT 476 and approva of nstructor Cred t 3 hours

473 Communication Systems II. App cat on of commu n cat on system des gn pr nc p es Pre equ s tes ELT 472· 450 or equ va ent Cred t 3 hours

474 Antennas and Propagation. Pr nc p es and charac ter st cs of e ectromagnet c energy propagat on and transmiss on Antenna pr nc p es and app cat ons, pat tern measurements. Prerequ s te. ELT 4 4 or equ va ent Cred t, 3 hours

475 Communication Systems Laboratory. Prerequ s te ELT 472 or approva of nstructo Three hours abora tory May be repeated for a max mum of 3 hours cred t Cred t 1 hour

476 Video Circuits and Systems. Radio frequency selectors v deo amp f ers synchron z ng c rcu ts k ne scopes and color demodulators. Prerequ s te ELT 322 or equ va ent or approva of nstructor Four ho rs ecture demonstration Cred t 3 hours

477 Video Systems Laboratory. Prerequ s te ELT 476 Three hours aboratory Cred t, 1 hour

478 Cable Communication System Design. Ana ys s and des gn of cab e TV systems Strand mapp ng sys tem ayout nsta lat on performance character st c measurements Prerequ s te E T 472 or equiva e t Cred t 3 hours

480 Electricity/Electronics Survey. Princ p es f elec tr c ty and e ectronics w th app cat o s. Prerequis te TST 200 or ELT 280 or approva of nstru tor Three lectures, 3 hours rec tat on demonstration aboratory Cred t, 3 or 4 hours

486 Computer Programming Applications. App cation of computer programming to the so t on of techno ogy prob ems of part cu ar nterest to e ectr n cs and e ated f e ds Prerequ s tes TST 121 and ASE 321 or equ va ent or junior stand ng and approva of nstruc tor Credit 3 hours

488 Electronic Broadcasting Principles. E ectron c communication broadcast ng pr nc p es, pract ces and regu at ons for commerc a (FCC l cens ng. Prerequ s tes· ELT 472 and 476, or equ va ent or approva of instructor Four hours ecture rec tat on Cred t 3 hours

522 Electronic Systems and Application. Ana ys s, de s gn and app ication ons of electron c c rcu ts and systems. ntegrated circu t app cat ons Prerequisite approva of nstructor Cred t, 3 hours.

552 Digital Systems and Applications. Ana ys s des gn and appl cat ons of d g ta networks and systems Pre requisite. approva of nstructor Cred t 3 hours

557 Small Computer Systems and Applications. App cat ons of smal computer systems Hardware and software Prerequ'site· approva of nstructor Cred t 3 hours

Special Courses: ELT 294 494, 498 499, 580 584 590 591 592 593 594 598 599 See page 31

GRAPHIC COMMUNICATIONS

GRC 135 General Graphic Arts. Bas c graph c arts n dustrial processes S x hours lecture and aboratory Cred t, 3 hours

136 Graphic Arts Processes. Screen process p a nography, embossing, photo-fabricat on presswork photography and bas c product on techn ques S x hours ecture and aboratory Cred t 3 hours

236 Layout and Graphic Arts Design. Bas c pr nc p es of typograph c ayout Preparat on of thumbna s roughs and comprehensives Cred t 3 hours

237 Image Preparation and Carr er Assembly. Prepar ng copy for photographic reproduct on Preparat on of mage carr ers for product on Cred t, 3 hours

238 Instruments and Controls. nstrumentat on and methodo og es for materia s test ng and qua ty contro Cred t 3 hours.

333 Offset Lithography (Presswork). Funct on of the offset press E ements requ red for press operat on chemicals nks carr ers, b anks a d so vents Six hours ecture and laboratory Cred t 3 hours

334 Offset Lithography (Camerawork). Product on of ne, ha ftone and spec a effects photograph c negat ves and pos t ves. S x hours ecture and aboratory Cred t, 3 hours

336 Color Separation. Methods of produc ng separat on negatives and pos tives Prerequisite GRC 334 Six hours ecture and aboratory Cred t 3 h ur

337 Production Management. P ann ng and contro ng work f ow of graphic arts products Cred t 3 hours.

339 Estimating and Cost Analysis. Est mat ng pr nting operat ons and materials e ements of cost f nd ng us ng selected systems Cred t 3 hours

433 Production Techniques. Systemat c product o planning exper ence. S x hours ect re and aboratory Cred t, 3 hours

435 Plant Management. ndependent documentary re search equ pment personne p ant s te se ect on and p ant management prob ems Cred t 3 hours

436 Technical and Research Problems. nd v dua ac t vities nvo v ng nvestigat on and exper mentat on Cred t 3 hours

437 Advanced Color Reproduction. Ana ys's of co or reproduct on systems S x hours ecture and aboratory Cred t, 3 hours

438 Graphic Arts Techniques and Processes. Re at ng mater a s to graph arts pr nted products product on pract ce Six hours e ture and aboratory Cred t 3 hours.

439 Photocomposition. Deta ed study of modern mage preparat on equ pment Cred t 3 hours

Special Courses: GRC 494, 498 499, 500, 580 584 590 591, 592 593 594 598 (See page 31

INDUSTRIAL DESIGN

IND 100 Introduction to Design I. Presentat on of h sto ry ph losophy pr nc p es and nfluence of ndustr a des gn. The des gner's past and present role n soc ety Credit, 2 hours.

101 Introduction to Design II. Compos tion proportion un ty, texture, form, mass and ne n two and three d mens onal app ications Prerequ s te ND 100 or APH 100 S x hours lecture and laboratory Credit 3 hours.

112 Surface Definition. Descr ptive spat a re at onsh ps between points, nes and p anes. Techn ques presented for deve oping comp ex, doub e curved surfaces and intersect ons. Prerequ s te TST 111 One lecture 3 hours laboratory Credit 2 hours

160 Sketching and Drawing. Free hand sketch ng and drawing, light and shade; two po nt perspect ve Qu ck, visua presentat ons of objects and concepts Four hours ecture and laboratory Cred t, 2 hours

161 Advanced Sketching and Drawing. Re nforcement of qu ck draw ng Fundamenta s of perspect ve Co or n var ous media Emphas s on third d mens on Prerequ s te IND 160 Four hours ecture and aboratory. Cred t 2 hours.

204 Color. Theory and pract ce of bas c co or concepts co or systems color re at onships psycho ogy of co or, color in ndustry. S x hours ecture and aboratory Cre d t, 3 hours.

210 Production Drafting. Drafting sk s and prec s on d mens oning techniques for product on draw ngs of eng neering parts Prerequ s te TST 111 S x hours ec ture and aboratory Cred t, 2 hours

211 Engineering Layout Drawing. Use of orthograph c sk s n the funct ona arrangement of components to form a comp ete des gn concept or system Prerequ s te IND 210 Four hours ecture and aboratory Cred t 2 hours.

218 Design Drafting. Drafting ski s and conventiona representat ons for des gn and working draw ngs for arch tecture/bu d ng/construct on Prerequ s te: TST 111 or ECE 104 S x hours lecture and aborat ry Cre d t, 2 hours

225 Materials. Mater a s app cat on n design Charac ter stics and propert es of ferrous and nonferrous meta s p ast cs and elastomers Cred t 3 hours

230 Design and Modeling I. ndustr a mode mak ng techn ques emphas s n paper cardboard and wo d appl cat on of des gn fundamentals conceptua des gn exerc ses Prerequ s tes: TST 111 ND 160 Four hours ecture and aboratory Cred t 2 hours

231 Design and Modeling II. Mode des gn and con struction from concept to fina presentat on Idea sketch ng, mockups, mode draw ng construct on and presentation techn ques. Prerequ s te IND 230. Four hours lecture and aboratory. Credit 2 hours

264 Basic Visual Graphics. E ements of visua des gn as they relate to the pr nt process type compos tion layout and presentat on Prerequis te. ND 161 Six hours lecture and laboratory. Cred t, 3 hours

265 Color Sketching. Felt markers; quick representa- t onal and concept communicat on sketch ng Forms n space; ght and shade mater a ref ectance propert es Prerequisite. ND 161 Four hours ecture and abora tory Credit, 2 hours

301 Product Design I. Des gn of mass produced con- sumer products Prel minary des gn sketches through f na so ut ons nc ud ng render ngs and models Prereq u s tes IND 231 265 E ght hours ecture and aboratory Cred t, 4 hours

302 Product Design II. ncreased complex ty of prob ems. Market ng cons derat ons human factors emphas zed Prerequ s te ND 301 E ght hours ecture and aboratory Cred t 4 hours

303 Human Factors in Design. Man mach ne env ron ment systems human characteris cs and behavior appl ed to design of products systems and the r oper ating env ronment Cred t, 3 hours

305 Plastics Design. Mold des gn for part requ rements, mo ded holes; threads· nserts fasten ng and o n ng decorating, extrus on design, re nforced plast cs Pre requ s te ND 225 One ecture 3 hours aboratory Cred t, 2 hours

306 Mechanical Design I. L nkages cams d mens ons determination; stress concentrat on, fasteners spr ngs screws Prerequ s te· ND 211 Corequis te TST 310 or 312 Three ectures, 3 hours aboratory Cred t, 4 hours

307 Mechanical Design II. Coup ngs, c utches; brakes gears, bear ngs; ubr cat on Prerequ s te ND 306 Co requ s te TST 311 Three ectures 3 hours aboratory Cred t 4 hours

308 Color. Theory and practice of bas c co or concepts color systems relationsh ps psycho ogy Not open to Industr a Design students Six hours ecture and abo ratory Cred t, 3 hours

350 Graphic Design. V sua des gn re at ng t products packaging d splay and s gnage M xed med a Prereq- uisites ND 264 265 S x hours ecture and laboratory May be repeated once for cred t Cred t, 3 hours

351 Package Design. Esthet c and structura cons dera tions of conta ning, protect ng and promot ng a product through packaging Prerequ s te IND 350. S x hours lecture and laboratory. May be repeated once for cre d t. Cred t, 3 hours.

370 Tool Design. Jig and fixture design Prerequisite IND 211. Two lectures 3 hours aboratory Cred t, 3 hours.

400 Professional Practice. Business procedures, man agement techn ques, accounting systems, eth ca and legal responsib ities of the des gn profess ons. Prereq uisite: jun or or sen or stand ng Cred t, 2 hours.

402 Value Analysis. Cr tica investigat on of funct ons, cost and des gn manufactur ng nterface in component development. Case h stor es Cred t 2 hours

403 Product Liability. Manufacturer s ab rty Statutes regulations and common aw ru es ro e of expert w t- nesses, insurance and product safety programs Cred t, 2 hours.

406 Mechanical Design III. ntegrat on of kinemat cs human factors, materia s and ayout of c mponents nto tota design concept Prerequis te ND 307. Three ec tures 3 hours aboratory Cred t 4 hours

407 Mechanical Design IV. Cont nuation of ND 406 Innovat ve design n broad area of product deve op ment Prerequ s te ND 406 Three ectures 3 hours aboratory Credit 4 hours.

430 Product Design III. New product deve opment f om concept on through market ng and manufactur ng At tent on to profess ona presentat on mode ng and deta l ng Prerequ s te. ND 302 E ght hours ecture and aboratory. Cred t 4 hours

431 Product Design IV. Des gn pro'ect w th emphas s on ind v dual approach Cu m nation of des gn process and techn que Prerequ site IND 430 E ght hours ec- ture and aboratory Cred t 4 hours

450 Design Project. Large scale nterd sc p nary class project nvolv ng project p ann ng and contro des gn prototype development feas bi ty study and report ng Prerequ s te senior stand ng. S x hours ecture and laboratory Cred t, 3 hours

451 Design Project. Design f na zation mode f na techn ca and summary reports graph cs, ora presenta t on of resu ts Prerequ s te IND 450 S x hours ecture and aboratory Cred t 3 hours

471 Structural Package Design. Des gn, test ng cush ion ng ndustr a standards mater a s n packag ng. Cred t 2 hours

Special Courses: ND 494 498 499 500 580 584 590 591, 592 593, 594 598 See page 31

INDUSTRIAL TECHNICAL EDUCATION

ITE 174 Basic Automotives. Operat on of automob e systems consumer educat on, preventat ve mainte

nance; m nor repairs. S x hours ecture and laboratory Cred t 3 hours

200 Integrated Industrial Studies. nd v dua and group act vit es problem app ıcat ons, des gn pr nc p es free enterprise. Combines fabr cat on processes ın meta wood, synthetic materıa s Four hours ecture 6 hours conference, 6 hours laboratory Cred t, 8 hours.

201 Integrated Power Studies. Concepts of energy conversion transm ss on contro ut l zat on of heat engines e ectr ca mechan ca dev ces f uid power and sma l engine repa r S x hours lecture and aboratory Credit, 3 hours

202 Integrated Drafting Studies. Portfo ı preparat on, presentat ons draft ng pract ces, c assroom l ustra t ons Four hours lecture and aboratory Cred t 2 hours

222 Wood Technology. Phys ca propert es products safe use of too s ma ntenance, mach nes and pro cesses project des gn and fabr cat on S x hours ecture and aboratory Cred t 3 hours

273 Automotive Electrical Systems. Prınc p es of e ec trıca systems test ng repa r and ma ntenance f battery, gn t on, startıng ght ng charg ng and acces sor es S x hours ecture and aboratory Cred t, 3 hours.

326 Experimentation with Wood. Form ng am nat ng adhesion, bend al owances, strength of mater als struc tural des gn and test ng other forestry products Six hours ecture and laboratory Cred t 3 hours

346 Modern Technology and Civilization. Amer can ndustr es product on systems patents metr cs, un ons occupat ons problems of techno ogy nterrelat onsh ps of men mater a s and processes Credit, 2 hours.

361 Industrial Crafts. Des gn and act v t es n p ast c eather apidary, ost wax process wood and metal Four hours lecture and aboratory Cred t 2 hours

377 Internal Combustion Engines. Automot ve eng ne prınc p es, des gn dısassemb y nspect on rebu ld ng, reassembly output testıng fue s carburetor operat n rebuild ng and test ng S x hours lecture and aboratory Credit, 3 hours

401 Career and Vocational Education. Pr nc p es ph - losophy and programs Re at onsh ps between vocationa career and genera educat on Trends and eg slation Credit 3 hours

402 Analysis and Course Development. Select ng n struct on un ts through task ana ys s techn ques ndustrial techn ca course and tra nıng program deve opment Credit, 3 hours

405 Improving Instruction in Drafting. Methods, eva u at on, ndustrial pract ces, draft ng prob em sequences and equ pment Cred t, 3 hours

421 Production Wood Technology. Des gn and manu facture of products, economy of mater a s structura factors, jıgs and fixtures, work env ronment assem- b ng, fin sh ng Six hours ecture and laboratory Cred t 3 hours

423 Industrial Arts for Elementary Teachers. Too and materıa centered activities re ated to teach ng ch ldren about techno ogy c assroom problems ntegrated n struct on, nstructiona a ds S x ho rs lecture and aboratory Cred t 3 hours

424 Techniques of Construction. Bu d ngs nonbu ld ings, p ann'ng, site preparation structure construct on mater a s personne Six hours ecture and aboratory Credit 3 hours.

427 Industrial Plastics. Fabr cat on techn ques phys ca qual t es manufacturing processes n ect on mo d ng vacuum form ng weldıng, am nation cast ng S x hours lecture and laboratory Credit 3 hours

442 Facility Planning and Management. Plann ng or- gan z ng and manag ng ındustr a techn ca educat on laboratories, equ pment and supply se ect on fac ty arrangement. Cred t, 3 hours

443 Industrial Safety. Acc dent prevention, acc dent factors methods of record ng and reportıng, ana ys s psycho og ca aspects att tudes recent eg s at on safety consciousness and ıabi ity. Cred t 3 hours

444 Modern Industries. Aspects of management abor p ant and product for nterpretatıon of ndustry n sec- ondary schoo ındustr a education program Cred t, 3 hours.

445 Industrial Internship. Ass gnme t commensurate with student s program Manufactur ng processes tech nical nformat on, management exper ences, spec a zed ınstruct on by ndustry D vısion majo s on y Prerequ - s te approva of advisor and TE department, jun or- sen or status Cred t 1 10 hours

446 Instructional Aids and Materials. Se ection, prepa rat on construct on and methods of use ndustr a techn cal educat on. Cred t, 3 hours

450 Industrial Training. Tra n ng techn ques and earn- ing processes P ann ng deve op ng and eva uat ng tra n ng programs n ndustry and governmental agen- cıes Cred t, 3 hours

452 Industrial Supervision. Superv sory prınc p es as appl ed to ndustr a and governmental agenc es Super- v sor employee re at ons, group mora e, eadersh p techn ques, pol cy nterpretat on and tra n ng Credit 3 hours

453 Safety Supervision. Contro l ng phys ca cond tions env ronmenta control, persona protect on contro s cost ana ys s systems safety ana ys s aux l ary funct on Cred t, 3 hours

455 Industrial Technical Programs. ndustrıa govern menta factory, and spec al school programs Prerequ s tes adv sor and TE departmenta approva and sen or status. Cred t 1 12 hours

461 Hot Metal Techniques. Propert es of meta s sand and investment castıng pattern mak ng S x hours lec- ture and laboratory Cred t 3 hours

465 General Metals. Mass product on numer cal con tro ch p ess mach n ng study n areas of spec a nterest Six hours ecture and aboratory Cred t, 3 hours

470 Contemporary Power Education. Model and ınno- vat ve power and automotive programs new concepts, problems, equ pment and serv ce procedures develop ng nstruct ona resources Cred t, 3 hours

471 Automotive Power Train and Chassis. Pr nc p es and serv c ng of c utches, transm ssions d fferentia s, steer ng suspens on brakes t res front end a gnment S x hours ecture and laboratory. Cred t, 3 hours

478 Engine Analysis. Eng ne performance and mea- surement, em ssion control dev ce op=rat on and testing, d agnos s and tune up procedures Prerequ s tes· ITE 273 377 Six hours ecture and aboratory Credit 3 hours

480 Teaching Industrial Technical Subjects. Teach ng techniques phi osophy, organ zat on p ann ng, eva ua t on of teach ng effic ency Cred t, 3 hours

485 Teaching Internship. C assroom aboratory a ıd tra nıng procedures ın post secondary nst tutions ın dustry and or governmental agenc es Prerequ s tes TE 402 480 sen or status and departmenta approva Credit 1 6 hours

491 Organization and Management of Cooperative Programs. Workstudy programs for ndustr a techn ca occupat ons n h gh schoo s and commun ty c leges Develop ng and coordinat ng programs nstructiona mater als Credit 3 hours

513 Experimental Activities. Invest gat on and solution of techn ca problems n the student s area of spec al zation nvo v ng materıa design and ana ys s Cred t, 3 hours.

540 Evaluation in Industrial Technical Education. Eva uative factors such as att tudes behav oral factors sk s, techn ca ınformat on; ınstrument construct on eva uat on of program effect'veness Credit 3 hours.

541 Vocational Education for Special Needs. Organız ing and adm n sterıng vocat ona programs to meet

special needs of youth and adults in schools, agencies, and industry. Credit, 3 hours.

542 History and Philosophy of Industrial Education. Evolution of modern programs, current concepts, future trends. Credit, 3 hours.

544 Industrial Processes in Special Education. Emphasis on task analysis in development of manipulative activities for special needs learners. Credit, 3 hours.

548 Post-Secondary Occupational Education. Trends, community surveys, needs, curricula, instruction, evaluation of occupational programs, financing, emphasis on industrial occupational education at the post-secondary level. Credit, 3 hours.

548 Administration of Industrial Technical Education. Improving instruction, fund and material control, student personnel problems, curricular patterns. Credit, 3 hours.

549 Research Techniques and Analysis. Selection of research problems, analysis of literature, individual investigations, preparing reports, proposal writing. Credit, 3 hours.

Special Courses: ITE 494, 498, 499, 580, 584, 590, 591, 592, 593, 594, 598, 599, 780, 783 784, 790, 791, 792, 799. (See page 31.)

MANUFACTURING ENGINEERING TECHNOLOGY

MET 110 Welding Survey. Oxy-acetylene, arc, brazing, resistance, and tungsten inert gas (TIG) welding procedures for ferrous and nonferrous metals. Six hours lecture and laboratory. Credit, 3 hours.

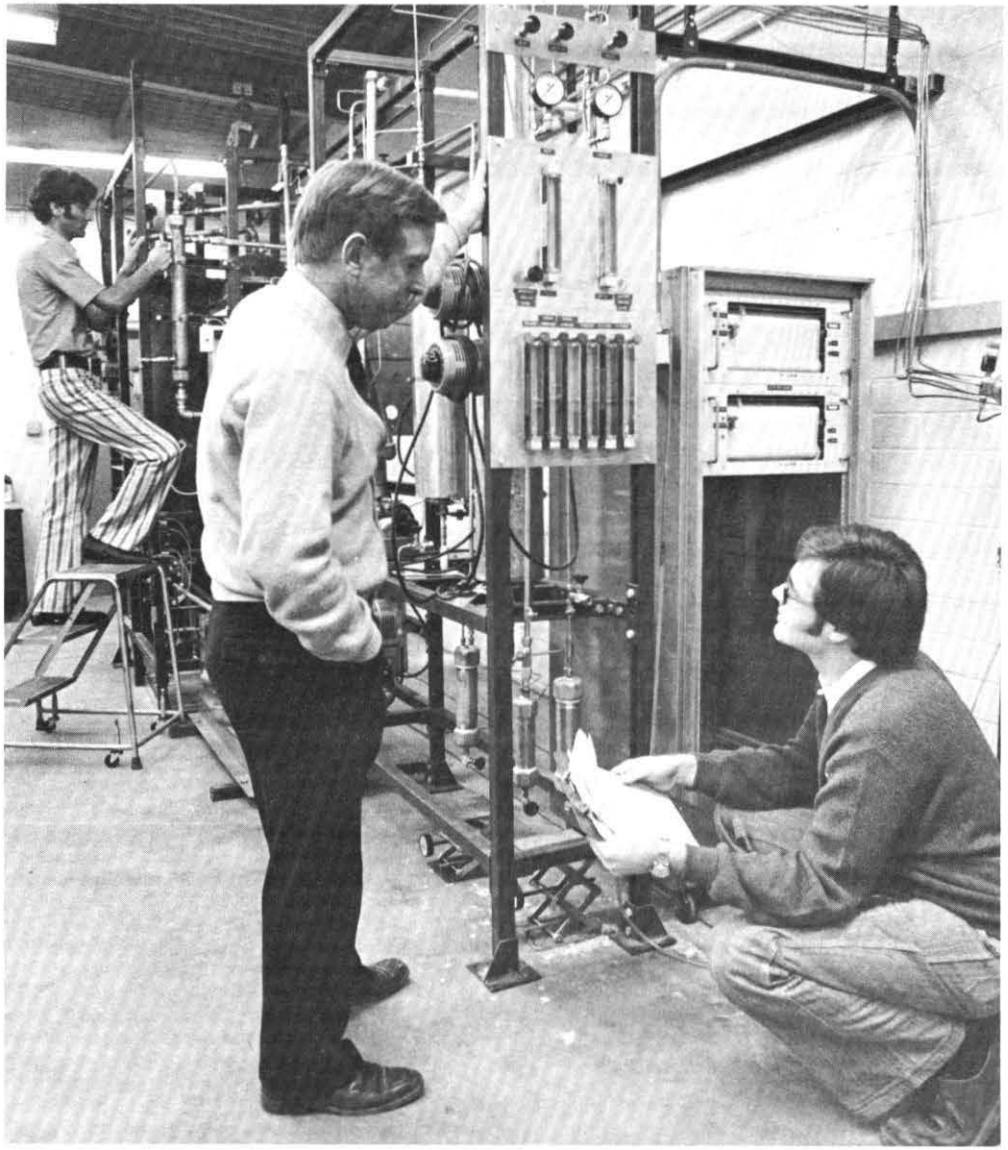
116 Aeronautical Welding. Oxy-acetylene and tungsten inert gas (TIG) welding procedures and brazing techniques used for aircraft structures. Six hours lecture and laboratory. Credit, 3 hours.

200 Manufacturing Processes. Metal removal processes emphasizing lathe turning, milling, drilling and tool bit sharpening for lathes. Emphasis on speeds and feeds. Six hours lecture and laboratory. Credit, 3 hours.

300 Production Tooling. Fabrication and design of jigs, fixtures and special industrial tooling related to manufacturing methods. Prerequisite: MET 200. Six hours lecture and laboratory. Credit, 3 hours.

301 Manufacturing Analysis. Introduction to the organizational and functional requirements for effective production. Credit, 3 hours.

302 Measuring Systems. Application of English and metric linear measuring systems, emphasizing standard gaging, calibration, and inspection tools. Credit, 3 hours.



303 Machine Control Systems. Theory and app cation of e ectromechanica hydrau c, pneumat c f u d c and electr cal contro systems for manufacturing S x hours ecture and aboratory Credit 3 hours

304 Casting and Forming Processes. Analys s of var ious cast ng mold ng, and form ng processes n terms of equipment requ rements, product character stics and manufactur ng costs. Cred t 3 hours.

305 Manufacturing Processes. Meta remova pro cesses emphasiz ng m l ng gr nd ng, shaping, turret athe tracer lathe and too sharpening. S x hours ec- ture and laboratory Prerequ s te MET 200 Cred t 3 hours

310 Welding Survey. Theory and app cat on of n dustr a we d ng processes ntroductory weld ng metal urgy and we dment des gn SMAW GTAW GMAW, oxy acety ene braz ng exper ences Three hours ecture, 3 hours aborat ry Prerequ s te upper class stand ng or nstructor s approva Cred t 4 hours

311 Welding Processes. Theory and app cat on of weld ng processes commonly used for stee plate fabr - cations; f xturing, procedures safety and codes covered. Prerequ s te MET 310. S x hours ecture and aboratory Credit 3 hours

312 Welding Processes. GTAW GMAW, PAW, EBW and other processes used pr mar ly for mater a s and jo nt configurations common to aerospace app ications Prerequisite· MET 310 S x hours lecture and abora tory Cred t, 3 hours

315 Welding Power Supply Analysis. Des gn and oper at ng character stics of welding power supp es and re ated equ pment Equ pment select on, setup and troub eshoot ng procedures covered Prerequ s tes TST 200 ELT 201 MET 310 Four hours ecture and labora tory Cred t, 3 hours

400 N/C Manual Programming. Numer ca Contro as re ated to po nt to po nt and cont nuous path systems Methods of programm ng, setup and operat on S x hours lecture and aboratory Cred t 3 hours

401 Quality Control. ntroduct on to stat stica qua ty control methods as app ied to to erances process con tro samp ing and re ab ity. Credit 3 hours

402 Specialized Production Processes. Non trad tional manufacturing processes emphasiz ng EDM, ECM ECG, CM PM HERF EBW, LBW, etc. Cred t, 3 hours

403 N/C Computer Programming. Theory and app ca t on of computer a ded N C anguages w th programm ng emphasis w th APT and su tab e postpro- cessors S x hours ecture and programm ng aboratory Prerequisites MET 400 ASE 226 Credit 3 hours

404 Applied Metallurgy. Pr nc p es of meta urgy em- phas zing concepts most relevant to typ cal manufactur ng requ rements factors affecting proper t es and evaluat on methods meta ography exper ences Two hours ecture 3 hours aboratory Credit 3 hours

405 N/C Continuous Path Programming. Numer ca Contro continuous path programming re ated to two three , and four ax s systems Emphasis on m and athe systems S x hours ecture and aboratory Prereq uisite: MET 400 Cred t 3 hours

406 Machinability Theory. App cat on of mach nab ty theory to pract ce, mp ications to adapt ve contro sys- tems production costs tool wear, surface f nish Experiments conducted Prerequ s tes. MET 305 404 Four hours ecture and aboratory Cred t, 2 hours

410 Welding Metallurgy. Meta urg ca pr nc p es ap p ied to structura steel and alum num we dments laboratory emphas s on weld ng exper ments, meta og raphy and mechanica test ng Prerequ s tes· MET 310 and 404 F ve hours ecture and laboratory Credit 3 hours

411 Welding Metallurgy. Meta urg ca pr nc p es as appl ed to sta n ess stee super a oy, t tan um and other refractory meta weldments and braze jo nts Pre requisites. MET 310 and 404 Cred t 3 hours

412 Design of Weldments. Des gn in terms of joint con f gurat ons process capabi t es codes a owab e stresses cost ana yses and other factors we d ng pro cedures emphas zed Prerequ s tes MET 31 TST 311 Cred t, 3 hours.

415 Welder Training and Qualification. Requ rements for and organ zation of ndustr a we der tra n ng pro grams; nstructional methods and qua f cat on procedures. Exper ence nstruct ng beg nn ng we ders. Prerequ s te approval of nstructor Four hours lecture and aboratory Cred t, 2 hours.

Special Courses: MET 494 498 499 500 580 584 590 591 592, 594 598 See page 31

TECHNICAL SCIENCE

TST 101 Manufacturing Processes and Materials. Bas c manufactur ng processes and eng nee ng mater a s, their propert es and typ ca app cat ons Two hours lecture 2 hours recitat on Cred t 3 hours

111 Technical Graphics. E ements of orthograph c and axonometr c projection, charts and graphs graph ca mathemat cs; ntroduction to bas c descr ptive geome try. S x hours lecture and aboratory Cred t 2 hours

121 Problem Solving. Methods for def n ng, organiz ng deve op ng deas and so ut ons to prob ems of a techn ca nature Prerequis te MAT 115 or equ valent Two ectures, 2 hours recitation/ laboratory. Cred t, 3 hours.

200 Applied Electrical Science. Pr nciples of e ectr c circu t e ements ntroduct on to d c and a-c c rcu t analys s Prerequ s te MAT 115 or MAT 117 118 Cre d t 3 hours.

310 Applied Mechanics-Statics. Vectors, force sys tems fr ct on equ ibr um centro ds and moment of nert a Prerequ s tes. PHY 111 MAT 261 Cred t, 3 hours

311 Applied Mechanics-Materials. Deformat on of members and bod es under stress Prerequ site TST 310 Four hours ecture and aboratory Cred t 3 hours

312 Applied Mechanics. Comb ned stat cs and mater als Not open to Aero Eng Tech Mfg Eng Tech Mech Eng Tech Mech Des gn Prerequ s tes PHY 111, MAT 260 Cred t, 4 hours

340 Fluid Mechanics. Stat c and dynamic propert es of f uids. F ow measurement and f u d contro des gn Pre- requisites· MAT 261; PHY 111 Four hours ectu e and laboratory Cred t 3 hours

360 Applied Mechanics-Dynamics. Masses mot on kinemat cs dynamics of mach nery Prerequ s te TST 310 or 312. Cred t, 3 hours.

362 Applied Calculus. App ied a c us nc ud ng ord nary different al equations, Lap ace transforms Prerequis te MAT 261 Cred t 3 hours

372 Applied Linear Analysis. Ordinary d fferent a equat ons, solutions of po ynom a s by numerica meth ods I near a gebra using computer techn ques, bas c stat st ca methods Prerequ site ASE 226 or 321 or equ va ent and MAT 261 Cred t 3 hours

420 Technical Writing. Wr t ng techn ques organ zati n of mater a research methods for techn ca wr ters Cre d t 3 hours

Special Courses: TST 294 494 498 591 598 See page 31

College of Architecture

Hugh Burgess, M.S. Arch.
Dean

Purpose

The central function of the College of Architecture is to educate students at the professional and graduate levels for architecture, planning and building industry careers, and to provide leadership to these professions through the development and dissemination of new knowledge resulting from research studies. The College also contributes to community efforts to conserve and improve the quality of our natural and built environments through the Architecture Foundation for Environmental Research and Community Service.

Organization

The functioning of the College is separated into two academic units: the Faculty of Architecture and the Faculty of Environmental Planning, each administered by chairs. Environmental Research, Community Service, Publications, Continuing Education and Special Studies programs are administered by coordinators. The general administration of the College is the responsibility of the Dean, who in turn is responsible to the President through the Academic Vice President.

Affiliations

The College of Architecture maintains active affiliations with the Arizona Society of Architects, the Central Arizona Chapter of the American Institute of Architects, the Associated Student Chapters of the American Institute of Architects, the Association of Collegiate Schools of Architecture, the American Institute of Planners, the Association of Collegiate Schools of Planning, the American Society of Landscape Architects, and the Council of Educators in Landscape Architecture.

Accreditation

The Bachelor of Architecture degree offered by the College is accredited by the National Architectural Accrediting Board and the Arizona State Board of Technical Registration.

Facilities

The building for the College of Architecture was first occupied in 197 , and provides classrooms, seminar rooms, design and technology laboratories, the Howe Architecture Library, student, faculty, and administrative offices. The lower level of the Architecture Building contains photographic and environmental simulation laboratories and facilities for structural model testing. Additional equipment and facilities include computer terminals, an extensive audio visual collection, lecture rooms, and construction materials exhibition spaces.

An Experimental Testing Station, located adjacent to the College building, contains space for solar, structural and building materials testing. The College also maintains 1 500 square feet of the Arizona State University rooftop testing laboratory for solar research.

The Environmental Research and Community Service Office is programmed for location adjacent to the Experimental Testing Station to provide facilities for community oriented architectural and planning services and basic research activities.

Information

Further information concerning the course of study, advice on pre professional preparation for the study of architecture, admission practices, expense and financial assistance can be found in the *Bulletin* of the College of Architecture. Requests for the *Bulletin* and for application forms should be addressed to the Office of the Dean, College of Architecture, Arizona State University, Tempe, Arizona 85281.

Students seeking admission to the College of Architecture professional program are advised

to complete the two-year minimum course of study entitled "Pre-Professional Preparation for the Study of Architecture." (Students seeking admission to the College for graduate work should review "Graduate Studies, Faculty of Environmental Planning," page 224.)

Preparatory Studies:

Architecture and Environmental Planning. The pre-professional work may be completed at any other accredited institution, including community colleges, by completion of course work equal in content to the specified ASU course titles and numbers. Students residing outside the State of Arizona are encouraged to complete all pre-professional preparatory work at their local institutions. Admission to ASU in a pre-professional status carries no guarantee of future admission to the College of Architecture, as the admission process is selective and spaces are limited.

Students seeking to complete the joint Bachelor of Architecture/Master of Science (Engineering) degree program focusing on building structures may enroll in the ASU Faculty of Civil Engineering, within the College of Engineering and Applied Sciences (or at another comparable institution), for pre-professional preparation work as specified.

If at ASU, students may be enrolled in any of the other undergraduate colleges to complete the pre-professional work; however, routine admission is made to the College of Liberal Arts in a pre-professional status.

Mimimum Requirements—
Pre-Architecture—Option "A"

(For students in other ASU colleges or community colleges).

			Semester Hours
History and Theory			
APH	100, 101	Introduction to Architecture I, II	4
APH	213, 214	History of Western Architecture I, II	6
(Replace with 10 hours of art and history or architecture electives if completing requirements at institutions other than ASU.)			
University English Proficiency			
ENG	101, 102	First Year English	6
(*Or* ENG 104 and Elective)			
Humanities—Electives			8
(Art history, music history, literature, philosophy, speech, humanities)			
Social and Behavioral Sciences—Electives			8
(Anthropology, economics, cultural geography, history, psychology, sociology, political science)			
Science and Mathematics—Required Courses			18
Mathematics:			
MAT	115	College Algebra and Trigonometry	4
MAT	260	Calculus for Technology I	3
Statistics: (one of the following)			3
PSY	230	Introduction to Statistics	
SOC	370	Social Statistics	
EDP	454	Educational Psychology	
Engineering:			
ECE	102	Introduction to Engineering	2
Physics:			
PHY	111	General Physics	3
Computers:			
AES	321	Computer Programming	3
Drawing and Design—Required Courses			12
Drawing:			
TST	111	Technical Graphics	2
IND	160, 161	Sketching and Drawing	4
or			
Design			
ARP	221, 222	Basic Design I and II	6
Minimum Total Semester Hours			62

Minimum Requirements—
Pre-Architecture Option "B"

(For students in the College of Engineering and Applied Sciences, preparing for joint Bachelor of Architecture/Master of Science degree.)

			Semester Hours
History and Theory			4
APH	100, 101	Introduction to Architecture	
University English Proficiency			3
ENG	102	First Year English (*or* ENG 104)	
Humanities—Electives			8
(Art history, music history, literature, philosophy, speech, humanities)			
Social and Behavioral Sciences			9
ECN	201	Principles of Economics (required)	3
(Electives: Anthropology, Economics, cultural geography, history, psychology, sociology, political science)			
Science and Mathematics—Required Courses			
Mathematics:			
MAT	120, 121	Calculus I, II	10
ECE	380	Ordinary Differential Equations for Engineers	3
		Approved Math Elective	2
Engineering Sciences:			
ASE	321	Fundamentals of Computer Programming	3
Engineering Core:			
ECE	102	Introduction to Engineering	2
ECE	201	Mechanics and Heat	3
ECE	211	Statics	2
ECE	351	Engineering Materials	3
Electives			10
Suggested electives from Industrial Design, Art, Architecture and Engineering to aid in establishing and developing graphic skills and in preparing a required portfolio for			

admission application to the College of Architecture:

Drawing			
IND	160	Sketching and Drawing (and/or IND 161)	4
TST	111	Technical Graphics	2
Design			
ARP	221, 222	Basic Design	6
ECE	104	Engineering Graphics	2
Other drawing, advertising design, interior and space design, and photography electives as selected			
Minimum Total Semester Hours			16

Environmental Planning. A baccalaureate degree is required as a prerequisite to admission to the graduate program in Environmental Planning. See pages 223-225.

Degrees

Bachelor of Architecture Degree. The College of Architecture offers a three-year program of studies at the advanced undergraduate and graduate levels leading to the professional degree, Bachelor of Architecture, and entry into the architecture profession and related career areas in practice, government, business, construction, and education. The professional degree also serves as preparation for graduate programs leading to specialized careers in urban planning, landscape architecture, regional planning, architectural administration, project management, solar energy technology, historic preservation and adaptive use, and environmental analysis and programming.

See Pre-Professional Preparation (for the Study of Architecture), page 213; and Faculty of Architecture, Professional Program, page 217.

Joint Degree: B.Arch./M.S.E. A program of studies is offered jointly by the College of Architecture and the College of Engineering and Applied Sciences, leading to the professional degree, Bachelor of Architecture, and the degree, Master of Science in Engineering. The two-year course of pre-professional studies may be completed at the ASU Faculty of Civil Engineering within the College of Engineering and Applied Sciences (or at another comparable institution). Qualified students may then be admitted to the College of Architecture for the three-year course of professional studies to qualify for the degree, Bachelor of Architecture. Following that, the students return to the Department of Civil Engineering to complete the one-year program to qualify for the degree, Master of Science (Engineering).

See Pre-Professional Preparation for Joint Degree, page 213, Faculty of Architecture, Professional Program, page 217; and Master of Science Degree (Engineering), page 161.

Master of Environmental Planning. The graduate program of the College of Architecture leads to the Master of Environmental Planning, a graduate degree under which various course work concentrations may be pursued within two areas of specialization.

See Faculty of Environmental Planning, Graduate Program, page 223, and Interdisciplinary program in City and Regional Planning, page 36.

Admission

Students may be admitted to the College of Architecture upon approval of admission to the Professional Program (Faculty of Architecture, or the Graduate Program (Faculty of Environmental Planning).

Students are admitted to the three-year professional program leading to the degree of Bachelor of Architecture in classes starting each Fall Semester only. For the typical requirements for admission to this degree program see page 217 in the Faculty of Architecture section.

Transfer Students. (See advanced standing admission, page 218.) It is the policy of the College of Architecture to accept, on a space available basis, transfers from the professional program of another school of architecture. A student who has completed the first or second year of the professional program with a substantially better than average grade level at an accredited school of architecture may be permitted to transfer into the ASU College of Architecture with advanced standing. A transfer applicant is considered, however, only to the extent that vacancies exist in the relevant class. All conditions shall be set forth by the College at the time of admittance. The amount of credit to be allowed for previous professional work shall also be set forth at the time of admittance.

No transfer credit is granted for courses with less than "C" grades. The College reserves the right to deny or reduce credit for particular courses. Grades received at another school of architecture are not counted in determining a student's cumulative grade-point average.

Professional Program. Admission to the graduate program in Environmental Planning requires:

1. Completion of all admission requirements and procedures set forth by the Graduate College and the following additional requirements of the College of Architecture.
2. Completion of baccalaureate degree and preferably one additional year of work or other experience acceptable to the Admissions Committee.
3. Submission and approval of a proposed course of study in a specialization offered by the College.
4. Selection of the candidate by the Faculty of Environmental Planning Admissions Committee.

(See complete information for requirements and procedures, Faculty of Environmental Planning, page 223.)

General Information

Special Honors at Graduation. At the time of graduation, students with academic distinction in the study of architecture may be awarded the respective designations *cum laude magna cum laude* and *summa cum laude*. Recipients of these awards are selected by the Architecture faculty on the basis of outstanding performance in courses for the three years.

Employment. It is difficult for an architecture student to carry part time employment while in school. Acceptance of admission to the College carries a commitment on the part of the student to an eight (8) hour day in the College in order that the necessary time will be available for professional studies. However, if there is no other solution to the financial problem, then it is strongly recommended that employment not *exceed 10 hours per week* and the Chair of the Faculty of Architecture be informed.

Financial Aid. A wide variety of financial aid and loan programs are available to students with demonstrated need without regard to race, creed, color, national origin, or sex. For further details consult the Dean's Office.

Advisement and Counseling. Student records are maintained in the Office of the Dean. Appointments may be made to discuss academic records, completion of requirements, certification for graduation, and evaluation of long term goals. It is however, the ultimate responsibility of each student to register for and to complete all required academic professional and elective course work. Day to day advisement and counseling is available on a less formal basis from all faculty members.

Resources

Architecture Foundation. The Architecture Foundation was established in June 1958, to provide for enrichment of the programs of the College of Architecture. Operating under by laws adopted October 29, 1963, as revised, it seeks to supplement rather than replace funds regularly available from appropriations and fees.

ASU Alumni Architecture Association. The Arizona State University Architecture Alumni Association was formed on September 4, 1974, with the recognition that graduates can and should bring to the College a special contribution by acting as liaison among the College, community, students and the practicing professional architects.

Student Chapter AIA. The Association of Student Chapters of the AIA was established at the College of Architecture in 1957. Its purpose is to assist students with the transition into professional life, and to acquaint them with the profession of architecture.

Alpha Rho Chi. Sitvros Chapter of Alpha Rho Chi was reorganized in 1974. Alpha Rho Chi is a national professional fraternity limiting its membership to students of architecture and the allied arts.

Retention Standards

General. To be eligible to continue in the programs in the College of Architecture, a student must successfully complete each semester according to the standards established for each program. See Retention Standards, Professional Program, Faculty of Architecture. The College also requires students to meet all standards for retention of the Graduate College. (See pages 274-276.)

Code of Professional Student Responsibility.

The purpose of this code is to promulgate standards of conduct for students of the Arizona State University College of Architecture, and to establish procedures for dealing with violations. As designers of environments, all professional students are expected to support and maintain the highest professional standards with regard to their personal conduct and the personal and common environments of the College of Architecture during their tenure at this institution. (Code adopted Fall, 1974.)

General Studies Courses

These courses are open to any student of the University meeting the stated prerequisites and are recognized in the University's program of General Studies.

(Graduate students or professional students enrolled in colleges other than Architecture may be permitted to enroll in certain courses with the approval of the Dean and the instructor. Design and technology laboratories are open only to students enrolled in the appropriate College of Architecture degree program.)

Grading. Students enrolled in Architecture General Studies courses will be graded according to the University grading system shown on page 33. The College does not give "Pass-Fail" or credit-no credit grades in General Studies courses.

ARCHITECTURAL PHILOSOPHY AND HISTORY

APH 100 Introduction to Architecture I. Understanding of our physical environment through the forms, functions and determinants of today's architecture; its continuity with the past and its relation to the developing present. Brief examination of architecture as a profession. Credit, 2 hours.

101 Introduction to Architecture II. Contemporary architecture, urban planning, landscape architecture and interior design with emphasis on career preparation for these professions. Credit, 2 hours.

213 History of Western Architecture I. Representat ve works of western architecture, anc ent through med e-val Credit, 3 hours

214 History of Western Architecture II. Architecture of the Renaissance to the end of the 19th Century Cred t 3 hours

304 American Architecture. Arch tecture n the U S from earl est co onia t mes to the present Cred t, 3 hours.

305 Contemporary Architecture. Europe and America from the foundat ons of the modern movement to the present Cred t, 3 hours

411 Ancient Architecture. The anc ent Med terranean world w th se ective emphas s on ma or h stor ca com p exes and monumenta sty es Prerequ s tes APH 213 Cred t, 3 hours

413 Renaissance Architecture. Europe and Amer ca n the 15th and 16th centur es Prerequ s te APH 213 or 214. Cred t 3 hours

414 Baroque Architecture. Europe and Amer a from the late 16th to the m dd e 18th century Prerequ s te APH 214 Cred t 3 hours

415 19th Century Architecture. Europe and Amer ca from neo-c ass c sm to art nouveau Prerequ s te APH 214. Cred t, 3 hours

ENVIRONMENTAL ANALYSIS AND PROGRAMMING

ANP 431 Programming for Public Health and Safety. Ana ys s of pub ic hea th and safety requ rements for the bu t env ronment water qual ty san tat on c mate contro fire safety bu d ng structure human factors exceptiona users persona se urity and cr me preven-t on. Consideration of code requ rements ega precedents and research f nd ngs Cred t 3 hours

433 Building Codes and Ordinances. Analys s of na-t onal state and loca bu ld ng codes and o d nances re at ve to their impact on architectu al programm ng design and construction documentat on Cred t 3 hours

444 Energy Conservation in Buildings. Impact of natu-ra forces on the des gn of bu ldings w th emphas s on pre-design dec s ons and past construct on pract ces lead ng to m n mum energy consumpt on nvest gat on of new energy resources Credit 3 hours

LANDSCAPE ARCHITECTURE AND REGIONAL PLANNING

ALP 441 History of Landscape Architecture. Phys ca record of man s att tude toward the land. Anc ent through contemporary and p ann ng and des gn. Cred t, 3 hours

541 Landscape Theory and Methods. Ecology as the bas s for land planning and andscape des gn theory, methods and mater al vocabu ary Cred t 3 hours

544 Landscape Planning for Arid Regions. nventory and analys s of the form, forces and features of the natu-ra and man-made andscapes Cred t 3 hours

URBAN PLANNING

AUP 371 Introduction to Urban Planning. The theoret cal and practica aspects of c ty p ann ng emphas z ng urban design. Interrelat onsh ps between phys ca p an n ng government and soc ety See CEE 371 page 186 Cred t, 3 hours

472 Evolution of Human Settlements. Anc ent and con temporary and use patterns evo ved through the progress ve human accu turation over h stor ca time Cred t, 3 hours

473 The Planned Environment. Esthet c soc a eco nom c pol t ca and other factors creating 20th century and use patterns and nfluenc ng urban deve opment Cred t, 3 hours

474 History of the City. The c ty from ts anc ent or g ns to the present day emphas zing the c t es of Europe and America dur ng the ast f ve centur es Cred t 3 hours

475 Interdisciplinary Urban Planning. Bas c theor es and methods of urban plann ng w th ntroduct on nto substant ve ssues of concern to p anners nte d sc p nary w th v s t ng lecturers Cred t 3 hours

476 Community Housing. History pract ces trends and forms of hous ng ncludes growth of pub c pro grams nat onal and oca programs zon ng aw hous ng d str bution p ann ng pr nc p es and po c es des gn rev ew standards, and pr vate deve opme t pract ce. Cred t, 3 hours

477 Housing Environments. Contemporary housing env ronments, housing types and fe sty es as deter mined by user preference, dens ty deve opment and property standards cost, community and privacy se u-rity, dent ty, movement and the need for open space Cred t 3 hours

571 Planning, Society, and the Law. Law as a determ nant of urban p ann ng and deve opment both n h story and n the context of present laws on pol ce power, em nent doma n tax po cy and governmenta pro grams. S ide l ustrated lectures Cred t 3 hours

572 Planning and Development Control Law. Case studies of the aw affect ng and development and pub ic p ann ng Pol ce power and em'nent doma n zon ng subd vision contro s off cia mapp ng urban renewa housing, design contro s, h storic preservat on and ex clus onary pract ces. Cred t 3 hours

573 Interdisciplinary Urban Planning Practicum I. Comprehensive p ann ng workshop dea ng w th actua problems in an Ar zona community Data gather ng and ana ysis formu at on and recommendation of a ter nat ve p ans po icies and strateg es nc us ve of nterrelated socia econom c phys ca and governmen tal cons derat ons. nterdiscipl nary open to upper c ass and graduate students with approva of the nstructor Credit 6 hours

574 Interdisciplinary Urban Planning Practicum II. nterdiscipl nary workshop emphas z ng arge ca e phys ca , project plann ng in an urban new commun ty or reg ona context w th deve opment by e ther a pub c agency or pr vate enterpr se. Deve opment feas b ty urban and andscape des gn h us ng transportat on eng neer ng eco ogy, and reg ona p ann ng. Open to upper class and graduate students w th approva of the nstructor Credit 6 hours

VISUAL COMMUNICATIONS

AVC 221 Basic Design I. Stud o expe ments space human sca e and mot on form and co or ead ng to a first understand ng of the esthet c tech cal and human object ves of the env ronmenta des gn profess ons Laboratory demonstration and ectures Prerequ s te APH 100 Cred t 3 hours

222 Basic Design II. Cont nuat on of ARP 221 Cred t 3 hours

380 Architectural Rendering Techniques. De neat on techn ques and the use of var ous med a for design stud es and presentat ons Four h urs n stud o Cred t 2 hours

382 Water Color. Paint ng n transparent water co or Emphasis on techn ques compos t on and co r as they re ate to architectura subjects and the r env ronment 4 hours stud o Cred t 2 hours

452 Photography for Architects and Planners. For ar ch tecture and p ann ng students on y Prepares profess ona students to understand and make use of the photograph as a v sual too n both academ c and profess ona l fe 1 hour lecture 2 hours aboratory Cred t 2 hours

Special Courses: APH, ANP ATE ADE AAD ALP AUP, ARP 294 494 498 499 500 584, 590, 591 592 593, 594, 598 599. See page 31

Faculty of Architecture
PROFESSIONAL PROGRAM

Purpose

The professional program of study in the College of Architecture is designed for full time students over a three year period, paralleling other professional curricula such as law and medicine. It concentrates and combines fully integrated lecture and laboratory coursework involving both individual and team experiences. It is aimed at giving students skill and facility as they prepare for the practice of architecture. The curriculum assumes each student has previously acquired a liberal arts education and provides for applications of this preparatory education, but the program thrust is toward acquiring competency in professional skills in a rapidly changing and increasingly competitive technological society. The professional curriculum is designed to aid students in their quest for a successful career in architecture. One summer of experience internship in an architect's office under the direction of an approved preceptor and licensed practitioner is required and provides a direct educational experience.

Organization

The Faculty of Architecture's professional program is organized under the direction of the chair, and is administered by faculty coordinators in charge of the respective design levels, the technology courses, and the philosophy and history courses. Subject matter is organized in the following manner: architectural philosophy and history; architecture technologies, architectural design and technology laboratories, architectural administration, environmental analysis and programming, landscape architecture and regional planning, urban planning and clinical internship. The area of special studies, including continuing education, is administered by a coordinator.

Bachelor of Architecture Degree

The College of Architecture offers a three year program of studies leading to the professional degree, Bachelor of Architecture, and entry into the architecture profession and related career areas in private practice, government, business, construction, and education. The professional degree also serves as preparation for graduate programs leading to specialized careers in urban planning, landscape architecture, regional planning, architectural administration, production management, solar energy technology and environmental analysis and programming.

To fulfill the requirements for a Bachelor of Architecture degree, a student must satisfy all of the following.

1. Admittance to the College of Architecture as a candidate for the degree and satisfaction of any conditions imposed at the time of admission or prior to graduation during the course of his study.
2. Satisfaction of full time residency course and attendance requirements for the College of Architecture.
3. Successful completion of a minimum of 110 hours of academic professional studies credit with a cumulative weighted average of 70 or better.
4. Completion of all College of Architecture required courses.
5. Maintain a personal code of conduct in keeping with the highest standards of a professional student and as defined in the *Code of Student Responsibilities* and the *College of Architecture Handbook of Policies, Procedures Organization and Curriculum*.

A student must be in residence on full time attendance for a minimum of six semesters or their equivalent, with the exception of those students who transfer with advanced standing from another accredited professional college or school of architecture. A semester in residence is earned when a student has been enrolled and maintained, without dropping course work, a minimum of 7 to 18 credit hours as specified by the curriculum. A student admitted with advanced standing must complete the work of at least two semesters in the College of Architecture immediately preceding the granting of a degree.

Admissions

Each year many more students apply than can possibly be accommodated within the educational program of the College. Accordingly, the admission process is selective. The Admissions Committee carefully considers all aspects of each application in selecting students for the limited number of spaces available in the class entering the College each fall semester.

Entrance Requirements. The freshman requirements for admissions typically are:

1. Qualified admission in good standing, Arizona State University.
2. A cumulative grade index of 3.0 (B), or above for academic work completed at all institutions attended.
3. ACT test composite scores of 23 or above or SAT test scores of 550 or above.
4. Completion of all of the specified and elective course work and requirements entitled "Pre Professional Preparation (for the Study of Architecture" as specified on page 213.
5. Established skills in drawing and sketching, basic drafting, two and three dimensional design, as well as evidence of creative ability in the visual arts.

6. Good character evidenced by supporting letters, attendance records and other records from high school and previous college experience
7. Selection of the candidate by the Faculty of Architecture Admissions Committee

In an unusual circumstance when the admission standard deficiency is slight, evidence of extenuating circumstances is convincing, and promise for success is evident, a student may be granted admission on probationary basis. Continuance in the program beyond the first semester of the first level course work is contingent upon academic achievement higher than the minimum standard. Students who meet a substantial number of the above requirements are encouraged to apply.

Application Procedures. Application to the College of Architecture is separate from, and in addition to, the required admission to *Arizona State University*. (Students must first contact the ASU Director of Admissions to obtain *University* application forms, materials, and procedures.)

Students, having completed the entrance requirements and those competency requirements by work in progress in the Spring Semester), shall then submit *Application Documents* to the Admissions Committee, College of Architecture *prior to the deadline of February 1.*

Application Documents. (All in addition to documents submitted to the ASU Director of Admissions for University admission.) All documents must be obtained by the applicant and submitted at one time, bound together in 8½" x 11" portfolio format, using a notebook similar to a Full Vu CB 1 presentation binder with plastic sleeves. Items shall be in order as follows:

Page 1 College of Architecture application form, completely filled out, *with page 1 visible.* (Available upon request Dean's Office College of Architecture

Page 2 College application with page 4 visible.

Page 3 High school transcripts from all schools attended, including attendance and personal records

Page 4 Certificates of ACT or SAT test scores

Page 5 College transcript, from all schools attended showing current and pre professional requirement. ASU transcripts may be omitted. They will be obtained by the College

Page 6 Names and addresses of persons who are supplying letters of reference for this application sent directly to the admissions committee, College of Architecture

Page 7 Blank for letters when received

Pages following Examples showing the level of development of the applicant's graphic skills and creative ability in the visual arts: a) Four or five examples of sketches and drawings; b) four or five examples of two and three dimensional design, and c) two or three examples of basic drafting skills

Additional examples of selected sketches and creative work that the applicant believes may best represent his/her aptitude, skills, and motivation for professional architecture course work may be included as desired

Original examples or slides shall not be submitted. All examples shall be photographed or otherwise reproduced

Application documents remain the property of the College, however, graphic examples may be returned provided the applicant encloses a self addressed return mailer with sufficient prepaid postage or personal designs for return of the examples following the selection date. Examples not returned will be discarded by the College after retention for one year.

Advanced Credit Examinations. Advanced credit exams may be taken by persons who believe they have already taken courses required in the program. If the exam is passed and the course waived, then the student shall select in advanced elective courses in the same general area. The elective selected must be approved by the Chair. Students must take a minimum total of 110 semester hours credits specified in the professional program and carry the semester course load required for all students.

All advanced credit examinations must be taken before completion of the drop add period of the semester in which the courses scheduled to be taken.

Advanced Standing Admission. It is the policy of the College of Architecture to accept, on a space available basis, transfer from the professional program in other school architecture. Students who have completed first or second year with substantially better than average grade level at an accredited school of architecture may be permitted to transfer into the College with advanced standing, as spaces in the year level of the program may then exist. Applicants requesting advanced standing for second and third levels will be reviewed by the Committee to determine a) if qualified for admission, and b) if so, the proper level for admission. The Committee may recommend admissions to a level other than that requested by the applicant.

Evaluation Factors. The Admissions Committee will carefully evaluate all aspects of the individual application documents. The limited number of spaces available each year will be awarded to applicants evidencing the highest promise for professional success in architecture career including evidence of ability and prospect for significant public service in

the practice of architecture As a st ite nstitution, the College weighs res dency as a factor in admission

Tentative Admission. Highly q ialif ed applicants (includ ng those comp eting requiren ents in Spr ng Semester but submitting documents to meet the stated dead line) m ay be granted early, *tentat ve admission* However, t is important to under stand that the fina sen ester's transcript must show completion of all entrance requirements and that the applicant's grade index was not significantly reduced A tent ative admiss on may be revoked, if on rece pt of final tran scripts, the applicant's ieadern c record is substantial y lower than at the time of n tial application or if al requ rements have not been completed

Final Admission and Notification. F n l evaluations are made by the Adn ss ors Committee upon rece pt of transcripts which must include Spring Semester or ides (Students not in attendance at ASU must submit final transcr pts on or about . une 5, but not later than the final select on d te of July 1) All applicants can expect to be n formed, by etter, of admiss on or non-admission on or about July A signed receipt of admission cond t ons is required to be re turned by successful app e ants prior to f na certification of adn ission and reg strat on for classes

Professional Curriculum

Bachelor of Architecture

A student seeking the Bache or of Arch tec ture degree must sat sfactorily complete a curriculum of 110 semester hours beyond the 62 hours pre-architecture requirements Tl e major categories of course work are c assified as follows.

Architectural Administration and Management (AAD) develops the organ zational and mana gerial aspects of architectural practice These studies examine the professional processes of architectural pr ictice

Architectural Design and Technology Labora tories (ADE) dem nd and encourage synthesis of the knowledge and underst nding the student has gained from course work and all other sources in the comprehens ve design of architectural pro ects. These laboratories inte grate the reasons, analytica methods, and technical sciences of irchitecture.

Architectural Philosophy and History APH) develops an understanding of architecture as both a determinant and a consequence of man's behavior in the past and present These studies are concerned with the reasons for de sign and construction

Architectural Technology ATF deve ops knowledge of the technical determ nants, resources and processes of architecture These studies are concerned with the techn c sci ence of design and construct on

Environmental Analysis and Programming ANP) develops capabilities t analyze and program natural environment and hu man factors as pre cond tions for architectural de sign. These studies are concern ed with the analytical methods used by architects

Landscape Architecture and Regional Planning (ALP) explores the reasons for, and the tech niques involved in, the analysis, pl nning and design of the exter or er viron ment, both n atu ra and man made.

Urban Planning (AUP) exposes the studer t to the theories, methods, ar d nterd scip nary concerns of the urb n pl nn ng profess n and the related area of urb n des g

Visual Communications VC provides the student w th an opportun ty t reinforc spe cial areas of sk ll and expert se such s graphics, communications and design

Special Studies (ARP) provides students with residency opportunities and educat onal expe rience at off campus locations

Professional Studies—Required Courses

First Professional Year

		Fall	Semester Hours
ATE	351	Bui d ng Systems I	3
ATE	353	Architectural Const uct n I	3
ANP	33	Ana ysis and Pr gr n ng I	3
APH	316	20th Centurv Architecture I .	3
ATE	301	Communications I . .	2
ADE	321	Elements f A ch tecture	3
		Tota	7
		Spring	
ATE	362	Bui ding Structure I	3
ATE	354	Architectural C nstruct n I	3
ANP	332	Anlys s and Pr gr n ng I	3
APH	317	20th Centurv Arch tecture II .	3
ATE	302	Commun cat ns II	2
ADE	322	Hun n Hab t t s	3
		T tal . .	17
		Summer	
ARP	450	Clinica Internsh p	4
		r between sec nd and th rd pr fess o al eve s	

Second Professional Year

		Fall	
ATE	461	Bu d ng Structures II	3
ATE	45	Architectura C nst uct n II	3
ATE	453	Bu lding S ste s I	3
ATE	457	Construct n D cun er s	3
ADE	421	Commun ty Fa t es .	6
		Tota . .	5
		Spring	
ATE	462	Building Struct res III	3
AAD	454	Profess n l Pract e I	3
ATE	454	Building Syste s III	3

ALP	442	Landscape Const uction and Materials	3
ADE	422	Building Complexes	6
		Total	18

Summer

ARP	451	Fie d Study	6

(Optiona may be used for professional emphasis requ rement with ch ir approva)

Third Professional Year

Fall

ATE	481	Bui ding Structures IV	3
AAD	455	Profess on l Pract ce II	3
ALP	471	Theory of Urban Planning	3
*ARP	498	Building Pr gramn ng or Pr fes sional En phasis Requirement	3
ADE	431	Multi-Story Urban Bu ding Comp exes I	6
		Tota	18

Spring

ATE	482	Build ng Structures V	3
AAD	456	Professiona Pra tice II	3
		Professi n l En phasis Requirement	3
		Professiona Emphasis Requir n ent	3
ADE	432	Mult -Story Urban Bu d ng Comp exes II	6

(or ADE 434 Arch tectura Design Opti ns

		Tota	18

*ARP 498 is prerequ site r ADE 434

Total Credit Hours:

Pre Professiona Pr gr m	6
plus Pr fessional Pr gram	172

Clinical Internships. A l students at the College of Architecture are required to partic ipate in the internship program dur ng the summer between the first and second or sec ond and third years by enroll ng in the ASU Summer Sessions program is detern ined n the first year of the professional program

Credit for a full time internsh p is 4 elective credits Although a student may enroll in more than one internship (subject to the availability of positions), the max mum cred t permitted toward graduation is 4 hours unless the Fac ulty of Architecture specifically changes the limitation.

Professional Emphasis Course Work

Each student w ll select an "emphasis area" and will present a plan consist ng of n ne credit hours of supporting course work for approval during the Spring Sen ester of the second year of the program from one of the following emphasis areas

Architectural Office Managen ent
Architectural Production Management
Architectural Design and Communications
Landscape Architecture
Architectural Technolog es
Architectura Phi osophy and History
Env ronmental Analysis and Programming
Historic Preservation and Adaptive Use
Urban Planning
Field Study

Grading

Performance in all profess onal program courses is graded under the following nu meri cal scale:

99 90	A Distinction
89 80	B. Exce ent
79 70	C. Good
69-60	D. Deficient
59 and below	E. Fa l ng

Incomplete Grades. A grade of 'I Incomplete may be given on y when a stu dent is unable to complete all of the course work because of illness or ther seri us per sonal reason. Each student receiv ng an "Incomplete" must contact the instructor to determine the work to be completed to enable the grade to be changed to an appropriate grade. If the work is not thus completed within one calendar year, or within such shorter period as may be required by the in structor, the instructor is expected to change the "Incomplete" to a fa ling grade If the student elects not to complete the work, the "Incomp ete' 'I' grade becon es a part of the student's record and no credit is recorded for the course If the instruct r is no longer available, the Dean may act in h s place

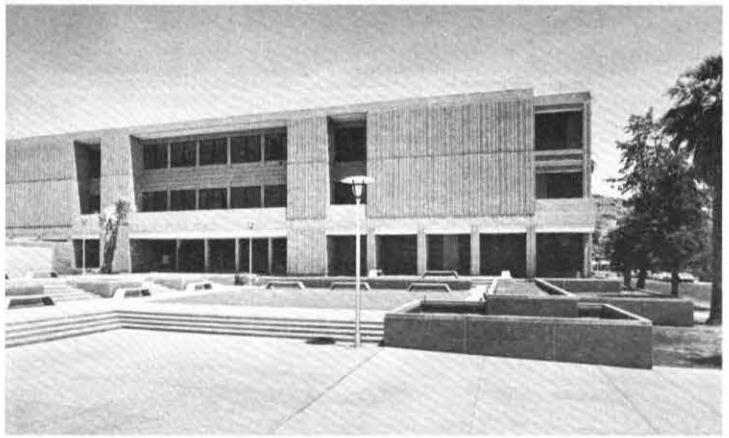
All incompletes n modu ar and sequential course work in the professional program must be removed prior to registrat on for the next semester.

Students contemplating gr duation should remove an incomplete grade no later than two months prior to the graduat on date n order to qualify for certification of candidacy

Withdrawal. The profess onal program is modular and sequential and, therefore, a stu dent may not withdraw from an nd vidu l course. All required course w rk of each eve must be completed in sequence Students may withdraw from the College of Architecture or Arizona State University by proper proce dures A grade of 'W' in al their Arch itecture courses wil be given if pass ng at th e time of withdrawal Otherwise, a fa l ng grade w ll be recorded.

Examinations. A student m y be excused from taking an examination nly for health reasons or other serious personal d ff culties. Any excuse shall be reviewed by the chair n consultation with the appropriate faculty member

In unusual cases, and with the instructor's permission, a student may be a lowed to take a late or special examinat on



Retention Standards

To be eligible to continue in the College of Architecture professional program, a student must successfully complete each required course and maintain a grade average of 70 or better for each semester completed. Any student is automatically placed on probation under the following conditions:

a. failure in (or to complete) any single course
b. semester grade average below 70% - 'C'
c. design/laboratory grade of 69-60% - 'D'
d. violation of the *Code of Professional Student Responsibility*

Continuation of enrollment shall be contingent upon such terms and conditions as determined for each individual by the College Standards Committee.

Any student on a probationary status must correct all deficiencies and be eligible for removal from probation by the end of the summer session preceding the next level of advancement, or be subject to automatic dismissal from the College. Dismissed students may petition the faculty through the Office of the Dean for readmission. If granted, continuation in the College will be conditioned on achieving a level of performance higher than the minimum academic standards until all terms and conditions determined for each individual case have been satisfied and probationary status is removed.

Any failed course must be successfully completed by a student, in addition to the full course schedule, at the next time the course is offered, including summer sessions if offered. Any failed course must be passed by the second attempt. Failure to do so will result in automatic dismissal from the College. No course in the College of Architecture may be repeated more than once, including replacement or substitute courses. Records of individul student rankings for each semester are maintained in the Dean's Office and are available to the student upon request.

Attendance. Required attendance at classes, laboratories, and seminars is a vital part of architectural studies and is an essential element in determining whether a student is in residence for purposes satisfying requirements for graduation. Admission to the College implies a commitment by the student to an eight (8) hour day in the College. As a general matter, if absences are noted in a particular course, the student will be asked to confer with the chair; continued absence after such invitation may result in a student being administratively withdrawn from the program.

Leave of Absence. Students may request a leave of absence from the College by written petition to the Dean's Office, for periods of one year increments. Leave may be approved for personal reasons, travel, work, or additional study in other disciplines. Students on leave must make written request to the Dean's Office for readmission prior to July 1 of the year of return to the program, in order that a space may be reserved.

Faculty of Architecture
PROFESSIONAL PROGRAM

PROFESSORS:
STRAUB (ARCH 141), BURGESS, ELLNER, OLIVER, WHIFFEN

ASSOCIATE PROFESSORS:
FLYNN, HINSHAW, JAKOB, MUMMA, PETERSON, RAPP, SAMUCHIN

ASSISTANT PROFESSORS:
BERTELSEN, CHRISTENSEN, PERRELL, SCALISE, SHEYDAYI, WOOLDRIDGE

LECTURERS:
CLARK, FELLOWS, JONES, MILLER, COULTER

PROFESSORS EMERITUS:
LOWENSTEIN, STRAUB

Professional Program Courses

Bachelor of Architecture

These courses are open only to students admitted to the professional or certain graduate programs of the College of Architecture (see page 217).

Other architectural courses open to any student meeting the stated pre/co-requisites are listed under the College of Architecture General Studies offerings. See page 215 for listing of these other courses.

ARCHITECTURAL PHILOSOPHY AND HISTORY

APH 316 20th Century Architecture I. Europe and America from the foundations of the modern movement to the culmination of the international style. Prerequisite: APH 214. Credit, 3 hours.

317 20th Century Architecture II. Developments in architecture since the international style. Prerequisite: APH 214. Credit, 3 hours.

ARCHITECTURAL TECHNOLOGIES

ATE 301 Architectural Communication. Basic graphic skills, use of material and equipment, architectural drafting, drawing conventions, values, graphic symbols

and ettering, sketching and presentation vocabu ary Two afternoons n aboratory per week Credit 2 hours

302 Architectural Communication. Cont nuat on of ATE 301. Credit 2 hours

351 Building Systems I. ntroduct on to bu d ng struc tural mechanica , and electrica systems Credit 3 hours

353 Architectural Construction I. Bas c mater a s and methods of arch tectural construct on Cred t 3 hours

354 Architectural Construction II. Cont nuat on of prev ous work w th bu d ng mater a s and the r use n construction Prerequ s te ATE 353 Cred t 3 hours

362 Building Structures I. Stat cs and strength of ma ter a s. Elast c ty of structura mater a s, properties of sect ons e ast c stress ana ys s of determ nate struc tures, computer app cat ons Pre m nary des gn of s mp e structura systems Prerequ s te ATE 351 Cred t, 3 hours

451 Architectural Construction III. Se ect on and em p oyment of mater a s and systems accord ng to the r nature and the techn ques of the r use and bas c con struction cost est mating procedures for arch tects Prerequisite: ATE 354. Cred t 3 hours.

453 Building Systems II. Techn cal problems of c mate control, acoust cs, ight ng, commun cat ons and other mechanica and electrical systems Prerequ s te ATE 351 Cred t, 3 hours

454 Building Systems III. Cont nuat on of prev ous work with techn ca prob ems of cl mate contro acoust cs ght ng commun cations and other mechanica and e ectr ca systems Prerequ s te ATE 453 Cred t 3 hours

457 Construction Documents I. Product on of arch tec tura working drawings ega status, organ zat on layout, site survey p ans sect ons, elevat ons deta ls schedu es, and coordinat on Cred t 3 hours

458 Construction Documents II. Cont nuation of ATE 457. Cred t 3 hours

461 Building Structures II. Ana ysis and des gn of wood and t mber structura systems and connect ons Latera ana ysis and design, uti iz ng wood shear wal s and d a- grams Computer app cat ons Prerequ s te· ATE 382 Cred t, 3 hours

462 Building Structures III. Ana ys s and des gn of steel bu ldings and frames. Latera (wind and se smic) ana y sis of stee systems. Use of ex st ng computer programs Prerequ sites. ATE 354 461 Cred t, 3 hours

481 Building Structures IV. Ana ys s and des gn of con crete systems, considering continu ty, mult story frames and shear wa ls and ateral ana ys s Computer app ication of existing programs Prerequ sites ATE 462, ARP 450. Credit 3 hours

482 Building Structures V. Total bu ding des gn Ad vanced topics emphasizing comp ex structura systems wind and se sm c ana ysis and des gn of foundat ons Prerequ s te ATE 481 Cred t, 3 hours

563 Soil Mechanics and Foundations. So character s t cs elementary soi mechan cs deve opment of f ow d agrams and computer programs for pre m nary foun dat on des gn Prerequ s te ATE 562 Cred t 3 hours

565 Architectural Acoustics. Phys ca propert es of sound. Ref ection, absorption, and d ffract on of sound waves. Sound absorptive materia s and construct ons Room acoustics and resonance d ffus on and decay of sound Des gn ng for opt mum reverberat on t me Acoustical defects and how to avo d them Acoust ca design Noise transm ss on Cred t 3 hours

567 Building Transportation Systems. Mechan ca electrical and vacuum systems for hor zontal and vert ca transportat on of persons and supp es in bui d ngs Cred t 3 hours

568 Architectural Lighting. L ght as an aspect of inte rior and exterior building des gn Deve op ng br ghtness re ationships n internal spaces, appraisa of a terna t ves Daylight and electr c l ght as a sing e system Evaluat on of ight sources for d str but on co or, and cost Des gn methodology experiments and case stud es. Credit 3 hours

ARCHITECTURAL DESIGN AND TECHNOLOGIES LABORATORIES

These courses are open only to students adm t ted to the profess onal program of the College of Architecture Each semester a l academ c course work is ntegrated w th the design and techno - ogy laboratories. The common format of a l major projects nc udes env ronmental analys s and programming, site p ann ng, schemat cs des gn deve opment, construction deta ling and specificat ons, structura , mechan ca and e ectr cal systems design, professiona adm nistrat on documents and cost estimates Per od c exam - nat ons and sketch projects complement major projects and are in add tion to the norma sched ule sted with each course.

ADE 321 Elements of Architecture. Arch tectura de sign, graph c ski s and the pr nc p es of order app ed to architectura form space and t me with n the context of natural and man-made sensory env ronments Sketch projects and exam nations three afternoons n lab per week Credit 3 hours

322 Human Habitation. App ications of the comprehen s ve process of architectura pract ce to dwe l ng un t design and s te plann ng Sketch projects and examina- tions; three afternoons in lab per week Prerequisite· ADE 321. Credit 3 hours

421 Community Facilities. Des gn of specif c commu n ty fac l t es w th n an urban or natura environmenta sett ng. Sketch projects and exam nat ons; five after- noons n lab per week Prerequ s te ADE 322 Credit 6 hours

422 Building Complexes. Programmat c and compre hens ve development of bu d ng comp exes relat ng to community deve opment and urban serv ces Sketch projects and exam nations f ve afternoons n ab per week Prerequ s te ADE 421. Cred t 6 hours.

431 Multi-Story Urban Building Complexes I. Compre hens ve arch tectura design and techno ogy of multi story bu ldings as re ated to urban complexes Locat on and econom cs of community fac ty d str but on nclud- ing the pub c and pr vate sectors of the deve opment process with a major fac ty as a generator of urban growth. Sketch projects and examinat ons, five after noons per week in ab Prerequ s te ADE 422 ARP 450 Credit 6 hours

432 Multi-Story Urban Building Complexes II. Cont n uation of ADE 431 Five afternoons per week in ab Prerequ s te ADE 431. Cred t 6 hours.

434 Architectural Design Options. Se ected design program options wi be offered by each sect on of this course These w l include comprehensive arch tectura des gn and techno ogy of var ous comp ex bui d ng types, each incorporat ng a spec a emphasis area such as energy conservat on, solar energy urban plann ng andscape deve opment, except ona user s needs ar- ch tectural barriers, ar d reg on design and other relevant spec al zed determ nants Sketch problems and examinations five afternoons per week n ab. Prerequ site· ADE 431 and ARP 498 Pro Sem nar Bu ld ng Programm ng 3 hours. Cred t 6 hours

ARCHITECTURAL ADMINISTRATION

AAD 454 Professional Practice I. Deve op ng systems used n the preparation of contract draw ngs spec fica t ons and documents. Use of bu ld ng codes and zoning ord nances. Prerequ s te· ATE 451 Credit 3 hours

455 Professional Practice II. Econom c and contractura aspects of professiona pract ce nc uding finance sources, project fund ng, partnersh ps corporate prac t ce, nsurance, and admin strat on of bu d ng contracts. Prerequis te third year stand ng AAD 454 ARP 450 Cred t 3 hours

456 Professional Practice III. Legal and management

aspects relat ng to profess onal pract ce nc ud ng ega responsib l t es and abi it es management of t me and peop e, and account ng and market ng serv ces Prereq uis te. th rd year stand ng Prerequ s te AAD 455 Credit, 3 hours

559 Construction Specifications. Preparation of arch tectura construct on spec f cat ons; ega status re at onsh p to working draw ngs organ zation methods of spec fy ng bidd ng genera condit ons contracts bonds, guarantees technical sect ons terpretat on Cred t 3 hours.

ENVIRONMENTAL ANALYSIS AND PROGRAMMING

ANP 331 Analysis and Programming I. The natura and human environments of arch tecture as a bas s of the programming and des gn of bu lt env ronments Empha s s on site and c imate analys s Cred t 3 hours

332 Analysis and Programming II. Programm ng and des gn methodo og es inc ud ng prob em seeking goa dent f cation, code search observation quest on ng descr pt ve stat st cs re ationsh p d agrams, bra n-storming space a locat on, and s mulat on as techn ques for process ng information for bu d ng de s gn. Credit 3 hours

LANDSCAPE ARCHITECTURE AND PLANNING

ALP 442 Landscape Construction and Materials. De s gn construction, mater als and s te eng neer ng aspects of andscape architecture Credit 3 hours

URBAN PLANNING

AUP 471 Theory of Urban Planning. ntroduct on to theoret ca and pract ca aspects of c ty p ann ng and urban design, ncluding nterre at onsh ps between phys ca p ann ng, government and soc ety Cred t 3 hours Prerequ s te: ARP 450

SPECIAL STUDIES

ARP 450 Clinical Internship. Fu t me nternsh p under the superv s on of pract t oners n the Phoen x area or other ocales Credit, 4 hours.

451 Architecture Field Studies. Organ zed f e d study of arch tecture in specif ed nat ona and nternat ona locations Credit 1 6 hours May be repeated

Special Courses: APH, ANP ATE ADE AAD ALP AUP, ARP 294, 494, 498 499 500 580 594 590 591 592 593, 594 598 599. See page 31 A so consu t ASU Extens on Cata ogs for specia course offer ngs

Faculty of Environmental Planning

GRADUATE PROGRAM

Purpose

The purpose of the graduate program of the College of Architecture at Arizona State University is to produce professionals uniquely equipped to deal with the problems of building design and human settlement in arid regions. It leads to the Master of Environmental Planning, a graduate degree under which various course work concentrations may be pursued within the above two areas of specialization. Course work concentrations available in the 1977 79 academic years include

Building Design
- Architectural Administration and Management
- Environmental Analysis and Programming
- Historic Preservation and Adaptive Use
- Solar Architecture and Technology

Human Settlement in Arid Regions
- Urban and Regional Planning

Goals

The explicit goals of the graduate program are

a) To advance the student's ability to conduct research relevant to the architecture profession

b) To enable students to develop their capabilities to fill specific professional roles of individual interest

c) To render service to the university, profession, community, state and region by pursuing research and design projects directly related to them

d) To expand the store of knowledge about building design and human settlement in arid regions

Organization

The Faculty of Environmental Planning is administered under the direction of the chair supported by faculty advisers responsible for the various course work concentrations. The course subject matter is organized in the following manner architecture technology laboratories, architectural design and technology laboratories, architectural administration, environmental analysis and programming, historic preservation and adaptive use, landscape architecture and regional planning, urban planning, and special studies

Master of Environmental Planning Degree Program

The Master of Environmental Planning degree curriculum consists of two segments a basic program of 24 hours and an advanced program of 30 hours for a total of 54 semester hours of credit for those students not admitted directly into the advanced program

The basic program is required of all students in the Building Design course work concentrations who do not hold a previous professional degree in architecture, and in the Human Settlement in Arid Regions concentrations who do not hold previous degree in the planning area for which they are applying. The basic program is intended to equip students entering from various disciplines with sufficient professional preparation to undertake the course work required in the advanced program. In this regard, faculty advisory committees are especially constituted to establish the length of the student's basic program and to approve the courses to be taken

The advanced program typically consists of 30 hours of course work in the concentration selected, as agreed by the faculty advisory

committee when the student completes the basic program. The work includes required courses, coordinate electives, and an individual research project or thesis

Course work in the advanced program for each of the concentrations is typically divided as follows

	Semester Hours
Required Courses	18
Coordinate Electives	6
Research Project or Thesis	6
Total	30

It is intended that within each course work concentration there be individual choice by the student with approval of the Faculty Advisory Committee as follows

Selection of coordinate electives offered in the College of Architecture or in other colleges of the University

Selection of specific subjects for research or thesis projects.

Current listings of required courses and approved coordinate electives for each course work concentration are available from the Office of the Chair, Faculty of Environmental Planning.

Courses

Courses offered in the graduate program are typically available on the following basis

1. Six-credit hour laboratory or workshop courses are open to only those admitted to the graduate degree program of the College of Architecture unless otherwise indicated
2. Three credit hour, 500 level courses are open with the instructor's approval to all graduate students in the University and to second and third-year students in the professional program in architecture
3. Three-credit hour, 600 level courses are open with the instructor's approval to all graduate students in the University

Admission

Admission to the graduate program in Environmental Planning requires

a) Completion of all admission requirements and procedures set forth by the Graduate College and the following additional requirements of the College of Architecture
b) Completion of a baccalaureate or first professional degree and preferably one additional year of professional employment or other experience acceptable to the Admissions Committee
c) Submission and approval of a proposed course of study in a specialization offered by the College.
d) Selection of the candidate by the Faculty of Environmental Planning Admissions Committee. At the time of admission, students are enrolled in either the basic or advanced program depending on the type and amount of undergraduate course work preparation

Note: Undergraduate students at Arizona State University interested in applying for the Urban Planning course work concentration are advised to enroll in the Interdisciplinary Program in City and Regional Planning. See the College of Architecture Bulletin.

Application. The following should be submitted to the Admissions Office, Graduate College, Arizona State University, Tempe, Arizona 85281:

a) The application for admission to the Graduate College.
b) Two transcripts from each institution that the applicant previously attended (except ASU).

The following should be submitted to the Office of the Chair, Faculty of Environmental Planning, College of Architecture, Arizona State University.

a) Statement of the applicant's qualifications, including previous degree(s), employment, and travel history.
b) Examples of the applicant's work evidencing prior preparation for the proposed course work concentration
c) Statement of the applicant's educational objectives and a proposed program of study in sufficient detail to indicate that they are congruent with the aims and capabilities of the College
d) Certificate of Graduate Record Examination score
e) Names and addresses of persons who are supplying letters of reference for this application.
f) Blank pages for letters when received.
g) At least three letters of reference from the applicant's undergraduate instructors or others able to comment knowledgeably on his/her ability to do graduate work Such letters shall be on the form provided by the College and sent directly from the referee to the Office of the Chair, Faculty of Environmental Planning

The above listed documents must be submitted at one time, bound together in 8 " x 11" portfolio format, using a notebook similar to a Ful Vu CB 10 presentation binder with plastic sleeves.

Additional evidence will be accepted and received only if bound and in 8 ½" x 11" format

Application documents remain the property of the College; however, graphic examples may be returned provided the applicant encloses a self-addressed return mailer with sufficient prepaid postage or personally signs for return of the examples following the selection date. Examples not so returned will be discarded by the College after retention for one year.

Selection Procedures. Because of the limitations of faculty, space and resources, not all applicants can be admitted and the College must pursue a selective admissions policy. The Admissions Committee evaluates all aspects of applications with the object of selecting for the available spaces those students who have the most reasonable prospect for success in the program of study that they propose. Those students whose applications are complete by March 1 will be advised about April 1 as to whether or not they are admitted. Qualified students submitting applications after March 1 may be admitted if positions remain available.

Financial Aid. University scholarships, fellowships, grants, and financial aid are available as outlined in the *Graduate Catalog*. Information about additional financial aid is available through the Office of the Dean at the College of Architecture.

Assistantships. Assistantships are granted to the College each year to help to support graduate students with financial need. Information on assistantships is available through the Office of the Chair, Faculty of Environmental Planning.

Faculty of Environmental Planning

GRADUATE PROGRAM

PROFESSORS:
HERSHBERGER (ARCH 141), BURGESS, COOK, ELMORE

ASSOCIATE PROFESSORS:
BOYLE, JAKOB, LAI, MUMMA, RUMMELL

ASSISTANT PROFESSORS:
LARSON

DISTINGUISHED VISITING PROFESSORS:
SOLERI, YELLOTT

LECTURERS:
COULTER, MILLER

Graduate Program Courses

These courses are open to students admitted to the professional and graduate programs of the College of Architecture (see pages 217, 223).

Other architectural courses open to any student meeting the stated pre/co-requisites are listed under the College of Architecture General Studies offerings. See page 215 for listing of these other courses.

ARCHITECTURE TECHNOLOGIES

ATE 501 Energy Environment Theory. The historical, theoretical and practical influences of energy and other resource systems on the designed environment: architectural, landscape, urban and regional implications of resource strategies, especially emphasizing solar and other renewable resources. Credit, 3 hours.

551 Desert Habitation Technology. Analysis of habitation approaches in non-technological and technological societies arising from the nature of desert areas; includes aridity, availability of solar radiation, and extremes of temperature fluctuation, both diurnal and annual. Credit, 3 hours.

552 Solar Energy Technology. Utilization of solar radiation and nocturnal cooling for heating and cooling buildings in arid and other regions. Credit, 3 hours.

554 Experimental Building Systems and Structures. Design calculations and testing of experimental or advanced building systems and structures. Credit, 3-6 hours.

555 Building Materials and Systems Research. Empirical analysis of architectural and structural materials and systems. Individual or team research. Credit, 3-6 hours.

ARCHITECTURAL DESIGN AND TECHNOLOGY LABORATORIES

ADE 621 Climatic Architectural Design. Laboratory and field experience in architectural synthesis emphasizing climatic criteria and analysis. Comparative climatic cases including arid and semi-arid regions. Emphasis on appropriate technology and passive thermal systems. Credit, 6 hours.

622 Solar Architectural Design. Laboratory and field experience in architectural synthesis emphasizing solar energy and related renewing and natural means for heating and cooling of a variety of building types in several climates. Credit, 6 hours.

ARCHITECTURAL ADMINISTRATION AND MANAGEMENT

AAD 551 Architectural Management I. Advanced professional management methodology and techniques; including organizational, legal and economic aspects of professional practice. Office organization, personnel policies, organizing and managing the production team, scheduling, production budgeting and control. Credit, 3 hours.

552 Architectural Management II. Advanced production and professional management; including bookkeeping and cost accounting, record keeping, "fast track" production methods, comprehensive services, advanced production techniques. Selection, negotiations and contracts with outside consultants and clients; cost-based compensation and techniques of liability loss prevention. Credit, 3 hours.

553 Construction Administration I. Responsibilities of the architect during the construction phases of architectural services; includes preparation of bidding documents, issuance of addenda, bid evaluation, negotiation of construction contracts. Field office organization, legal responsibilities, construction contract agreements; use of Critical Path Method (CPM). Credit, 3 hours.

554 Construction Administration II. Continuance of AAD 653 with emphasis on field observation of construction, shop drawings, reports and materials testing. Meetings, records, field orders, schedules, arbitration of

disputes, architect's responsibilities to client during construction, applications for payment and project closeout. Credit, 3 hours.

ENVIRONMENTAL ANALYSIS AND PROGRAMMING

ANP 500 Research Methods. Theory of science, problem definition, research design, techniques of observation and questioning, sampling procedures, experimental design, methods of analysis, and interpretation of data. Credit, 3 hours.

531 Computer Applications. Use and potential in such areas as programming, specifications, accounting, calculations, control, design and graphics as applied to architecture and urban and regional planning. Credit, 3 hours.

631 Building Evaluation. Case studies of existing buildings to determine their success or failure in meeting program objectives and client/user requirements; includes site considerations, form, function, human factors, expression, safety, durability, economy, time and change. Credit, 3-6 hours.

632 Building Programming. Preparation of feasibility studies and architectural programs for specific buildings; includes goal formulation, site and climate analysis, code interpretation, functional requirements, human factors, space priorities, relationship diagrams, space planning, phasing, and cost control. Credit, 3-6 hours.

HISTORIC PRESERVATION AND ADAPTIVE USE

APA 500 Research Methods. Principles and practices of recording and documentation of existing structures; problems and techniques in historic preservation and adaptive use. Credit, 3 hours.

501 Historical Building Materials and Technology. Nature and application of the materials of historical architecture; problems in restoration and conservation. Structural systems and construction practices in historical architecture. Credit, 3 hours. May be repeated.

580 Practicum. Directed field work. Prerequisites: APA 501, 502. Credit, 6 hours.

LANDSCAPE ARCHITECTURE AND REGIONAL PLANNING

ALP 641 Landscape Design for Arid Regions. Design of landscape projects in arid regions. Preparation of landscape construction documents as integral parts of the design process. Credit, 6 hours.

642 Land-Use Analysis for Arid Regions. Individual and collaborative land use analysis and planning problems in arid regions emphasizing systems analysis and modelling; includes the physical, social, economic, and political determinants of environmental design. Credit, 6 hours.

643 Resource Analysis. Principles and procedures for basic land and water resource inventory and analysis including techniques and applications of remote sensing and aerial analysis. Credit, 3 hours.

URBAN PLANNING

AUP 671 Urban Statistical Analysis. Quantitative analysis in the urban context, demographic analysis, data processing, planning application and urban systems. Credit, 3 hours.

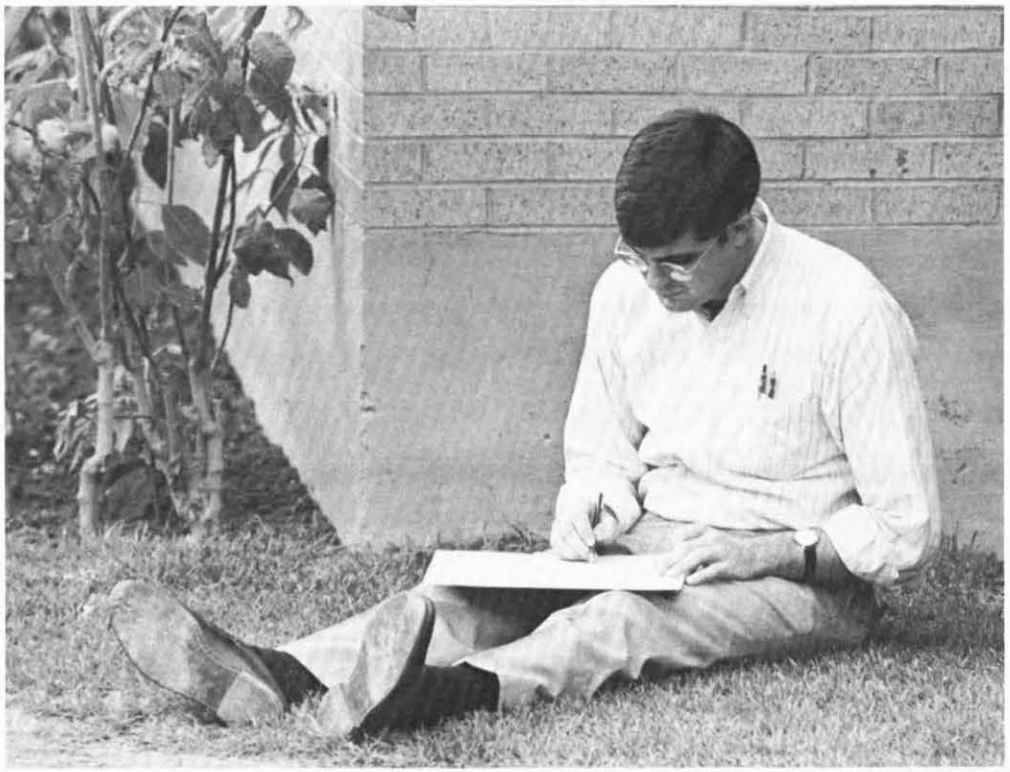
672 Land Economics. Economic determinants for urban and regional planning; analytical techniques, elementary market analysis and feasibility studies; economic incentives in urban planning. Credit, 3 hours.

673 Urban Planning for Arid Regions. Laboratory course directed toward the planning of cities in arid regions; conservation of water and energy resources are primary considerations. Credit, 3-6 hours.

674 Community Planning I. Design problems focusing on large scale community design or housing projects in arid regions. Credit, 6 hours.

675 Community Planning II. Continuation of previous course. Credit, 6 hours.

Special Courses: ANP, APA, ATE, ADE, AAD, ALP, AUP, ARP 498, 499, 500, 580, 584, 590, 591, 592, 593, 594, 598, 599, 600, 680, 683, 684, 690, 691, 692, 693.
(See page 31.)



College of Nursing

Juanita F. Murphy, Ph.D.
Dean

Purpose

The faculty of the College of Nursing acknowledges its responsibility to the health service consumers for the preparation of individuals who will provide nursing care of professional quality through teaching, research and service. The purpose of the College is to provide an educational program which prepares nursing practitioners and specialists who consider the emotional, biophysical, sociocultural and ecological needs in the prevention and treatment of human ills. This nursing care is based on the belief that all human life has dignity and worth, that there is potential for growth in every individual, and that every individual should have the opportunity to achieve and maintain health.

It is the belief of the College of Nursing that professional preparation for nursing is most appropriately composed of a combination of liberal and specialized educational content, and that the professional nurse is committed to the utilization of knowledge and skills to help other human beings achieve and maintain well being. We also believe that the professional nurse must be prepared as a change agent for the betterment of patient and health care.

Organization

The College of Nursing is organized as follows:

Baccalaureate Program

The baccalaureate program is a generic four year curriculum leading to the Bachelor of Science in Nursing degree. It is designed with an upper division nursing major. The first two years of the four year baccalaureate program consist of required pre nursing and elective courses. All students seeking the Bachelor of Science in Nursing degree are admitted to the generic baccalaureate program, including graduates of Diploma and Associate Degree in Nursing programs.

Graduate Program

This program has emphases in the following fields:

- Community Mental Health Psychiatric Nursing
- Maternal Child Nursing
- Medical Surgical Nursing
- Community Health Nursing
- Administration and Management of Nursing and Health Care

Continuing Education Program

This program presents a variety of course offerings both on and off campus, some of which are for academic credit, and all of which are designed to assist Registered Nurses to increase the knowledge and skills needed in their professional roles.

Degrees

Bachelor of Science in Nursing. The completion of a four-year curriculum in nursing leads to the degree of Bachelor of Science in Nursing. The purpose of the baccalaureate program in nursing at Arizona State University is to prepare beginning professional nurses who possess clinical competence to function in various health care settings. The graduates are prepared to deliver nursing care services to individuals, families and communities. The program provides a foundation for graduate studies in nursing.

The program objectives for the baccalaureate curriculum are directed toward preparation of graduates with general stabilities. With a base of theoretical and empirical knowledge from the humanities, physical, biological and behavioral sciences and nursing, graduates are prepared to provide competent

hensive patient care in concert with individuals, families, and other health team members, by utilizing skills of observation and assessment, decision making, intervention and evaluation; 2) assume responsibility for the provision of nursing care and accountability for identifying and evaluating outcomes of that care; 3) apply the scientific process and utilize research findings in the delivery of health care; 4) assume a leadership role in the promotion, maintenance and restoration of health through teaching and collaborative planning within the interdisciplinary team, and 5) continue professional development in response to trends in health care, changing nursing roles, and the impact of these and other health issues on the consumer

The candidate for the degree of Bachelor of Science in Nursing must complete a minimum of 126 semester credit hours The curriculum is planned to include 40 semester credit hours of General Studies required by the University for graduation These 40 credit hours are a part of the approximately 58 semester credit hours required before entering the nursing major. The upper division nursing major consists of 48 semester credit hours There are 7 semester credit hours of additional elective credits required to meet the minimum number of credits for graduation Up to 12 of these may be in approved upper division baccalaureate level elective nursing courses Clinical nursing courses are encouraged. A limit of six semester credit hours in upper division courses with the NCE prefix *may be* substituted here and applied to the baccalaureate nursing degree either as general electives or as nursing electives, providing these courses have had prior approval by the Baccalaureate Curriculum Committee and Baccalaureate Standards Committee Lower division nursing course credit will not be accepted toward the Bachelor of Science in Nursing degree

Master of Science. The College of Nursing offers a four semester program leading to a Master of Science degree. Requirements for this program are given in the *Graduate Catalog* Persons interested in applying for admission to the program should write to the Arizona State University Graduate College for a catalog and application form

General Information

Accreditation. The baccalaureate and master's programs of the College of Nursing are accredited by the Arizona State Board of Nursing and the National League for Nursing The College is a member of the Council of Member Agencies for the Baccalaureate and Higher Degree Programs of the National League for Nursing, and the Western Council on Higher Education for Nursing

Scholarships and Financial Aid. For information regarding scholarships and loans, see page 27 of this catalog. Information about scholarship and loan funds for nursing students may be obtained from the Director of Financial Aids or from the program chair

Student Activities. The nursing student is a member of the general student body of the University, and selects and participates in those campus activities which are of interest to him/her. Students are represented on University and College of Nursing committees Students enrolled in the baccalaureate program of the College of Nursing, in the pre nursing major as well as the nursing major, are eligible for membership in the Arizona Association of Student Nurses, the National Student Nurses Association, and ASASU Students are represented in the Student Senate of ASASU.

Sigma Theta Tau. Beta Upsilon chapter of Sigma Theta Tau was chartered at Arizona State University College of Nursing in 1976 Membership in Sigma Theta Tau is an honor conferred on students in baccalaureate and graduate programs who have demonstrated excellence in their nursing programs

Graduate Nurse Organization. The Graduate Nurse Organization (GNO) is the coordinating body for nursing students in the graduate program It provides programs, information, and orientation services for graduate students and complements the academic experiences A GNO member serves as an official representative to the Graduate Student Council of Arizona State University.

Learning Resources. The College of Nursing offers learning resources which include the University's Hayden Library and the College of Nursing's multi-media learning resources laboratory

Clinical Facilities. Learning experiences with patients and families are provided through federal, state, county, and private health and other agencies under the supervision of qualified nursing faculty. The College of Nursing has contracts with more than 50 different agencies in the Phoenix metropolitan area Thus a variety of clinical laboratory facilities is available to students in this significant component of the program

Student Transportation. Students will provide their own transportation to the health agencies and other selected experiences, such as home visits to patients and families.

Bachelor of Science in Nursing

The program leading to the Bachelor of Science in Nursing degree at Arizona State University is divided into the pre nursing major and the upper division nursing major. The pre nursing major consists of the 58 semester credit hours of prescribed prerequisite courses The upper division nursing component consists of the planned four semester upper division nursing

ing sequence The remaining 20 semester credit hours are electives, non nursing and or nursing as prescribed Students are advised to have no more than 12 elective hours outstanding at the time of enro ling in the upper division nursing courses

Admission to the upper-division nursing major is *not* automatic Students admitted to Arizona State University declaring nurs ng as their interest are classified as pre nursing majors. There is a separate College of Nursing procedure for admission to the upper-d vis on nursing major.

Students are adm tted to the upper d vision nursing major e ch f ll nd spring semester Admissions are competitive and selective due to program limitations n terms of College of Nurs ng physica f cilit es, c nic l res urces, and availability of qualified faculty The num ber of qualified app ic n ts may exceed the n mber whic can be accepted nto each en tering class

Pre-Nursing Major

Admission Requirements. St dents admit ted to the University nterm t cal y qu f y for admiss on to the pre nursing ma or

Academic Advisement. Students admitted to the pre nursing ma or are adv sed by the College of Nursing ac dem c adv sors A students are encouraged to seek adviser ent in order to plan an appropr te program of stud ies Students in the upper-d v s on nursing major are advised by Col ege of Nurs o bac calaureate faculty

Pre-Nursing Curriculum. There are appr x mately 58 semester credit hours o prerequ s te course work Comparab e c urses may be comp eted at other accredited o eges or u v versities. Credit for transfer is n t a y evaluated by the Adm ssions O f ce of ASU In addition, the C l ege of N rs ng Bac lau reate Standards Committee reviews each transcript to determine course equivalency with the prescribed prerequisite courses and applicability of credit toward the Bachelor of Science in Nursing degree. The College of Nursing does not accept credit toward the baccalaureate nursing degree for lower level courses in nursing or other course work with a technical vocational or entation Course work completed more than ten years before the date of application may not be accepted as prerequisite courses

Prerequisite Courses

	Semester Hours
ENG 101 and 102 *or* ENG 4 n rs)	3 6
COM 100 or 200 or 300 Hu a t es	3
An additiona five h urs f human ties electives are required Sce Humanities under General Studies, page 35 .	5
Socia and Behaviora Sciences	
PGS 10 Psych l gy	3
SOC 10 r 301 S ci l gy	3
ASB 102 or 351 Anthr pol gy	3
CDE 232 or EED 3 3 or PGS 34 Human or Child Development	3
FAS 331 or SOC 4 5 F y Re t ns ip	3
Science and Mathen atics	
CHM 01 Inorg n c Chem stry	4
CHM 231 Organic Chem stry . .	4
MIC 201 nd 202 Microb l gy	4
ZOL 201 and 20 An t y Phys l gy	5
BIO 340 or ZOL 24 Hu n Gen t cs	3
FON 141 Human Nutr t n	3
EDP 454 Statistics	3
Other statistics c urses may be approved	3
	58

Any pre-nurs ng course substitut n must be p proved n advance t rough the Of e of the Pre Nursing Acade c Advis rs Ba ure te N rs ng Pr gram .

Nursing Major

Eligibility for adm ssion to the upper divis on nursing major is a process separate from ad mission to Arizona State Un versity and the pre-nursing ma or Individuals are responsible for initiating the application procedure and submitting the required documents in accor dance with the designated deadlines Qua if cation requirements and application procedures are described in the fo ow ng sec tions

Admission Requirements. M nimum re quirements for admission to the upper division nursing progr m include:

1 Admission to Arizona State University and classified in good standing,
2 Completion of all prescribed prerequ site courses with a grade of "C" or better in each;
3 Attainment of a m n m num grade po nt av erage of 2.5 for in st te students and 2 75 for out-of-state students in the prerequisite courses as we l as in the cumulative gr de point average for the total number of credit hours earned
4 *The domicile status s that which has been designated by the Classification Off cer on Tuition Status at the deadl ne date for f l ng of application to the nurs ng major*
5 Submission of t documents to the Office of Pre Nursing Academic Advisors, Bacca laureate Nursing Program

Application Procedures

1 Deadlines
   a Appl cations for adm ission to the upper division nursing ma or for Fall Semester must be submitted by J nuary 31 of the s me ca endar ye r
   b Applic tions for adm ss on to the uppe division nurs ng m ajor for the Spr ng

Semester must be submitted by August 30 of the preceding year.

In order to meet the stated deadlines, applications may be submitted on the basis of the completion of three semesters' preparatory work with a plan to complete all prerequisite at the end of the semester in progress. Provisional admission may be granted on this basis. Full admission may be granted to those applicants who already have completed all prerequisites. The limited number of spaces available each year will be awarded to those applicants evidencing the highest promise for success in professional nursing.

2. Documents
   The following documents must be received in order for a student to be considered for provisional admission to the upper division nursing major:
   a. Certificate of Admission to Arizona State University.
   b. Completed application to the upper division nursing major. Obtained from the Office of Pre-Nursing Academic Advisors, Baccalaureate Nursing Program, College of Nursing.
   c. Official transcripts of completed college work at other colleges or universities directed to the Office of Pre-Nursing Academic Advisors, Baccalaureate Nursing Program, College of Nursing. This is in addition to the transcript submitted to the Admissions Office, Arizona State University, on initial application.
   d. College of Nursing Health History Inventory and Record of Physical Examination completed within three months prior to deadline for application. Both forms are available in the Baccalaureate Program Office, College of Nursing.

Applicants may be requested to come in for interview and/or submit additional documents in the event that further information is deemed necessary.

Selection and Notification of Admission. The Baccalaureate Standards Committee of the College of Nursing evaluates the application documents. The limited number of spaces available for each entering class will be awarded to those qualified applicants who have met the minimum criteria for admission to the nursing major and have given evidence of the most reasonable prospect for success in the nursing major. Provisional admission to the nursing major will be *automatically* revoked if all prescribed prerequisite courses are not completed with attainment of the required cumulative and prerequisite grade point averages.

Applicants will be informed by June 15 (for Fall Semester entrance) and by December 31 (for Spring Semester entrance) of their admission status to the upper division nursing major.

Re-admission. Students who have not been in continuous enrollment in the upper division nursing major at Arizona State University must submit an application for re-admission to the major. Re-admission is not automatic.

Student Health. In addition to the general policies of the University, the applicant to the nursing major is responsible for submitting College of Nursing Health History Inventory and a record of physical examination completed prior to and within three months of submission of application to the nursing major. The student enrolled in the upper division nursing major is responsible for fulfilling the requirements outlined in the current health policies of the College of Nursing, which is available from the Baccalaureate Program Office, College of Nursing. All students enrolled in the upper division nursing major must carry health and accident insurance as outlined in the current health policies of the College of Nursing. Students are encouraged to carry their own professional liability insurance.

Grading Policy for Nursing Courses in the Baccalaureate Program. Grades of "A", "B", and "C" are assigned to represent levels of achievement in terms of meeting the course objectives. The grade of "D" is not given by the baccalaureate nursing program inasmuch as it does not reflect acceptable performance.

The grade of "E", and marks of "I" or "W" are assigned in accordance with the Arizona State University grading system (see page 33). Students must reapply to the College of Nursing Baccalaureate Standards Committee for readmission to the upper division nursing major if an "E" or "W" has been received in a required upper division nursing course. An "I" must be completed to proceed further. A grade of "E" requires reenrollment for the entire course. Students *may repeat* a required nursing course *only once*. Two successive "E's" in any single required nursing course automatically constitutes ineligibility for readmission to the upper division nursing major.

Retention in the upper division nursing major is contingent upon maintaining sound physical and mental health. Students who appear to lack the degree of physical and mental health necessary to function successfully as a professional nurse may be required to have a medical examination and the results made available to the Baccalaureate Standards Committee of the College of Nursing. Qualifications of students whose behavior and/or performance has been questioned will be reviewed by the College Standards Committee. The student shall be informed of the results of the medical examination, and may appear in

person before the committee and personally present information relevant to the committee's review. Such additional information may also be presented in writing without personal appearance. The decision of the committee to continue or discontinue the student's clinical nursing experience is final.

Nursing

PROFESSORS:
MURPHY (NURS 457 BARDEWYCK, BRANSTETTER JOHNSON MANSELL McLEOD

ASSOCIATE PROFESSORS:
BEEMAN, BRUNER HICKS KASSELMAN KINSINGER, MUHLENKAMP, STEFFL STUMPF THEOBALD ZORNOW

ASSISTANT PROFESSORS:
ABBOTT, BAGWELL BEEBE BLEWETT, BRUSH, COREY DANTONO, FANCHER, FELLER, FINCH FOOTE, GARRITY LUDLOW, MELVIN OSBORN PORTER REID, RICCI, RIEKE, RIPPKE SANDLING, SEHESTED, SHERIDAN SPICER STENGEL STORLIE TETTING, TOBIASON, WHERRY, WHITE WURZELL ZEHR

INSTRUCTORS:
BRAMOWETH CONNELL COPELAND DAVIS DEMPSTER, DOWNS FARBURN FARGOTSTEIN, GISS, HAMBLET DORIS HENSON, DOROTHY HENSON HINDMAN JASPER, KURTH, BIMILLER VIMILLER MOORE, OLSON, ROCKOFF SLOKA, STANSKY, STEWARD, VANDERLINDEN WARWICK, WHITE

Prerequisite course numbers marked with a dagger (†) have further prerequisites. Each student is required to take the indicated prerequisite courses.

NUR 301 Professional Development I. Principles of management, change and learning provide a framework for the student to examine the process of professional development and factors influencing the nursing professional. Enrollment restricted to students admitted to the upper division nursing program. Credit 2 hours.

302 Professional Development II. Role socialization and individual development relationships with other health professionals, and legal responsibilities as they relate to professional development. Prerequisites: NUR 301†, 310†, 320†. Credit 2 hours.

310 Human Development and Adaptation I. Adaptation theories provide a framework to examine human behavior and the holistic nature of man. Focus on primary prevention for promotion of optimum health. Enrollment restricted to students admitted to the upper division nursing program. Credit, 3 hours.

311 Human Development and Adaptation II. Persons experiencing an acute disruption of health selected altered psychological, physiological and environmental factors. Prerequisites: NUR 301†, 310† 320†. Credit 3 hours.

320 Nursing I. Systematic approach to decision making provides framework to plan for own learning and nursing intervention. Clinical experience develops skill in decision-making, instrumental and expressive functions of nursing. Prerequisites or concurrent: NUR 301† 310†. Two lectures, 2 hours conference, 9 hours laboratory. Credit 7 hours.

321 Nursing II. Systems approach to planning nursing care. Expressive and instrumental functions directed toward assisting patient to achieve health related goals. Prerequisite or concurrent: NUR 302† 311†. One lecture, 2 hours conference, 12 hours laboratory. Credit 7 hours.

401 Nursing Research. Concepts underlying the research process. Significance of research within nursing profession. Prerequisites: NUR 302† 311† 321† and MAT 226† or PSY 230† or SOC 390† or EDP 454. Credit 2 hours.

402 Leadership in Nursing. Contemporary issues that influence theoretical frameworks of organization, management, and change. Prerequisites: NUR 401†, 410† 420†. Credit 4 hours.

410 Human Development and Adaptation III. Adaptive responses of individual and families to actual or potential stressors in life-threatening and chronic disrupted states. Interrelationships of bio psychosocial environmental stressors and adaptations. Prerequisites: NUR 302†, 311† 321†. Credit 3 hours.

420 Nursing III. Application of leadership, decision-making, expressive and instrumental modes of intervention, and human adaptation development in clinical situations involving life threatening and long-term disruptions in health. Prerequisite or concurrent: NUR 401† 410†. Two lectures, 15 hours laboratory. Credit 7 hours.

421 Nursing IV. Applies theories of leadership in selected clinical settings. Prerequisite or concurrent: NUR 402†. Two hours conference, 18 hours laboratory. Credit 8 hours.

494 Special Topics. Advanced study and/or supervised practice in an area of nursing. Lecture and/or lab to be arranged. Credit may be accumulated to 12 hours. Prerequisite: 12 hours in the nursing major and approval of instructor. Credit, 1-4 hours.

498 Pro-Seminar. Small group study for advanced students with their major area. Prerequisite: 12 hours in the nursing major and/or approval of the instructor. Credit 1-7 hours.

499 Independent Study (Honors). Formulate and execute an independent study on a nursing care problem. Prerequisites: NUR 4 1† 410†, 420† 3.40 GPA application form FL 38 completed eight weeks before beginning course. Credit 1-3 hours.

500 Research Methods I. Investigative methods. Purposes, aims of research. Review of research in nursing. Credit 2 hours.

500 Research Methods II. Research design and thesis proposal development. Role of theory, methods of data collection. Prerequisite or concurrent: graduate course that includes inferential statistics. Credit 2 hours.

580 Advanced Nursing Practicum I. Required concurrently with NUR 581. Three hour laboratory. Credit 1 hour. Conference included.

580 Advanced Nursing Practicum II. Required concurrently with NUR 582. Three hour laboratory. Credit 1 hour. Conference included.

581 Advanced Theory I. Analysis of health care delivery systems with emphasis on current roles, issues, trends and legislation. Concurrent practicum required (NUR 580. Prerequisite: approval of instructor. Credit 2 hours.

582 Advanced Theory II. Theories of health and illness behavior with emphasis on coping and adaptation. Concurrent practicum required (NUR 580. Prerequisite: approval of instructor. Credit 2 hours.

599 Thesis. Credit, 1-6 hours. 4 hours required.

680 Advanced Nursing Practicum III. To be taken concurrently with NUR 681. Credit 2-6 hours required.) Conference included. Sections and subjects are:

1. Maternal-Child Nursing
2. Community Mental Health Psychiatric Nursing

3. Medical-Surgical Nursing
4. Community Health Nursing
5. Administration and Management of Nursing and Health Care

680 Advanced Nursing Practicum IV. To be taken concurrently with NUR 682. See sections, subjects listed under NUR 680 III. Credit, 2-6 hours (2 hours required). Conference included.

681 Advanced Theory III. Advanced specialized theory. Sections and subjects same as NUR 680 III. Prerequisite: NUR 581, 582, undergraduate genetics and approval of instructor. Concurrent practicum: NUR 680 III. Credit, 2-4 hours (2 hours required).

682 Advanced Theory IV. Continuation of advanced specialized theory. Sections, subjects same as NUR 680 III. Prerequisite: NUR 681 and approval of instructor. Concurrent practicum: NUR 680 IV. Credit, 2-4 hours (2 hours required).

Special Courses. NUR 580, 590, 591, 592, 598, 680, 690, 691. (See page 31.)

HUMAN DEVELOPMENT

HDE 586 Origins of Human Behavior. Critical examination of theories, issues and research in the developmental period of infancy through adolescence. Biological, social, psychological and cognitive factors. Prerequisite: CDE232 or equivalent. Credit, 3 hours.

588 Development in Adulthood and Aging. Developmental changes in adulthood and aging. Biological, social, psychological influences related to adult roles, life style, health status and problems of aging. Credit, 3 hours.

CONTINUING EDUCATION

Full descriptions of courses, topics and prerequisites are publicized each semester and are also available in the Continuing Education Program office.

NCE 194 Current Topics. Courses designed to provide new knowledge about selected health care areas. Offered primarily for consumers. May be repeated for credit under different specific titles. Credit, 1-4 hours.

294 Special Topics. Introductory courses in selected health care areas. Offered for R.N.s; other health related providers by instructor permission. May be repeated for credit under different specific titles. Credit, 1-4 hours.

394 Special Problems in Health Care. Content chosen from various health care fields. Offered for R.N.s; other health related professionals by instructor permission. May be repeated for credit under different specific titles. Credit, 1-6 hours.

494 Special Topics. Advanced study in an area of health care. Offered for R.N.s; other health related professionals by instructor permission. May be repeated for credit under different specific titles. Credit, 1-4 hours.

Special Course: NCE 598. (See page 31.)

College of Fine Arts

Jules Heller, Ph.D.
Dean

Purpose and Program

The College of Fine Arts functions within the general framework and philosophy of the University. In addition to providing services and courses in the General Studies program of the University, the College provides thorough professional training for properly qualified students, supported by a broad background of courses designed to prepare the student for responsible citizenship

The College, through its programs in art, dance, music, communication, speech and hearing science, theatre, the interdisciplinary humanities, and religious studies, reflects the wide range of challenges facing the artist and scholar in the 20th century As an integral part of a University with strong supporting departments, the College offers each of its students a balanced foundation of theory and practice, strengthened by work in the arts, humanities, social sciences, and the sciences

In addition to the curricula offered by each department of the College, close ties are maintained with other colleges of the University through courses and curricula designed to meet the educational goals of those colleges. The College of Fine Arts also enriches the life of the University community through its extension and studio offerings with a broad variety of art exhibitions, the operation of the University Art Collections, the Boulton Collection of World Music and Musical Instruments, and myriad concerts and recitals, dramatic productions, musical theatre, lectures, and various diagnostic and clinical services.

Special Programs

Pass-Fail Courses. Students enrolled in the College of Fine Arts may take pass fail courses consistent with the general University requirements pertaining to such enrollment (see pages 53-54 of this catalog)

Transfer of Community College Credits. Credits transferred from accredited junior or community colleges will be accepted up to a maximum of 64 semester hours Additional credit may be accepted only upon authorization of the standards committee of the college in which the student is enrolled at Arizona State University Community college students planning to transfer to Arizona State University at the end of their first or second year should plan their community college courses to meet the requirements of the curriculum selected. Students will be permitted to follow the degree requirements specified in the Arizona State University catalog in effect at the time they began their community college work, providing their college attendance has been continuous.

Courses transferred from community colleges will not be accepted as upper division credit at Arizona State University Students are urged to choose their courses carefully, in view of the fact that a minimum of 50 semester hours of work taken at the University must be upper division credits It is therefore suggested that they elect General Studies courses and lower division courses in their major field while attending a community college

Religious Studies Program. The program of religious studies, offered through the Center for the Humanities, provides a full range of opportunities for the academic study of religion Courses in religious studies may be elected to meet the General Studies requirements in humanities and fine arts. Also, religious studies may be selected as a related field program complementing numerous major fields of specialization.

For the humanities major interested in religious studies, there are two alternatives religious studies may be selected as the first or second field of study either (1) in addition to the standard interdisciplinary core in humani

ties, or (2) in addition to a religious studies oriented core in humanities, developed in consultation with the advisor.

The program of religious studies offers courses in the following fields: Near and Middle Eastern Religious Traditions, Western Religious Traditions, Eastern Religious Traditions, Religion in America, Contemporary Religious Thought, Native American Religious Traditions, Religion and Literature, Bible, Talmud, History of Religions, Ethics, Society, Culture.

Undergraduate Credit for Graduate Courses. To enable interested students to benefit as much as possible from their undergraduate studies, the Graduate College and the College of Fine Arts extend to seniors with a grade point index of at least 2.50 the privilege of taking 500-level graduate courses for undergraduate credit. Application for admission to a graduate course for undergraduate credit must be completed in advance of the regular registration period. The application must be approved by the instructor of the class, the student's advisor, by the chair of the department, and dean of the college in which the course is offered.

Honors Programs. The Honors Programs in the College of Fine Arts are intended for the outstandingly competent student whose interests and specific curriculum indicate that definite advantages may accrue from a program emphasizing individual study. For details of the programs in the College of Fine Arts, consult with the Assistant Dean. For a general description of Honors work, see page 54 of this catalog.

Pre-Professional Programs. The College of Fine Arts offers, through its regular degree programs, the opportunity to prepare for admission to graduate professional programs in law, medicine, dentistry, and theology. Students seeking to follow a pre-professional program should enroll in either a Bachelor of Arts or Bachelor of Science degree program. For special advisement and assistance in developing the appropriate program of study, students should consult with the Assistant Dean in the College of Fine Arts office.

In addition, students preparing for admission to professional graduate schools should obtain information regarding admission requirements by writing directly to schools in which they may be interested.

Secondary Education Programs. In cooperation with the College of Education, a student majoring in the College of Fine Arts may obtain a baccalaureate degree from the College of Fine Arts and meet the requirements for a secondary education certificate. The student must meet all the requirements established by the College of Education, including professional education courses and directed teaching, and all the College and departmental requirements for the major degree program in the College of Fine Arts.

Students intending to prepare for a teaching certificate within the College of Fine Arts curricula should indicate this to the office of teacher certification in the College of Education by the end of the sophomore year.

Degrees

Bachelor's Degrees. The College of Fine Arts offers work leading to four baccalaureate degrees: Bachelor of Arts, Bachelor of Science, Bachelor of Fine Arts, and Bachelor of Music. In general, the distinction among these curricula lies in the degree of specialization permitted in the major field, with the Bachelor of Arts degree providing a broader humanistic program, and the other three placing greater emphasis upon the major field while maintaining the principle of General Studies required of all University students. In cooperation with the College of Education, each department of the College of Fine Arts also offers major and minor programs designed to provide teachers of art, music, speech, theatre, and humanities for the public schools.

Bachelor's degrees are offered in the following fields:

Bachelor of Arts

- Art
- Art History
- Communication
- Humanities
- Interdisciplinary
- Music
- Theatre

Bachelor of Science

- Communication
- Speech and Hearing Science

Bachelor of Music

- Choral General Music
- Instrumental Music
- Jazz Performance
- Music Theatre
- Music Therapy
- Performance (Accompanying, Keyboard, Orchestral Instrument, Voice)
- Theory and Composition

Bachelor of Fine Arts

- Ceramics
- Crafts
- Dance
- Drawing
- Graphic Design
- Interior Design
- Painting
- Photography
- Printmaking
- Sculpture
- Theatre (Child Drama, Directing)

Bachelor of Arts in Education. In cooperation with the College of Education. Offered with a focus on art, communication arts, dance, humanities, music, speech communication, theatre.

Master's Degrees. A graduate program consisting of a minimum of 30 semester hours of approved work leads to a master's degree in the following fields

Master of Arts

Art Education	Music History and Literature
Art History	Theatre
Communication	
Humanities (Interdisciplinary)	

Master of Fine Arts

Ceramics	Painting
Crafts	Photography
Drawing	Printmaking
Interior Design	Sculpture

Master of Music

Choral Music	Music Theatre
Composition	Performance
Conducting	Performance Pedagogy
General Music	
Instrumental Music	Theory

Master of Science

Communication Disorders

Master of Arts in Education (Secondary Education) (in cooperation with the College of Education)

Art Education	Music Education
Communication	Theatre

Doctoral Degrees: In cooperation with the College of Education, the doctoral programs in Education are offered with minor in Secondary Education with content or focus in Art Education and Music Education

Bachelor Degree Requirements

General Degree Requirements. There are requirements that pertain to each baccalaureate degree program in the College of Fine Arts

General Studies Requirements: To meet the General Studies requirement, students in the Bachelor of Arts and the Bachelor of Science degree programs must take a minimum of 54 semester hours of credit in General Studies Students in the Bachelor of Fine Arts and Bachelor of Music degree programs must meet the University minimum requirement of 36 hours of credit in General Studies In addition, students must meet the University requirement of the equivalent of two semesters of English composition. A minimum of 6 hours of course work must be taken in the following areas Humanities and fine arts, social and behavioral sciences, and science and mathematics

For modification of above requirements for programs in communication and theatre, see pages 243 244. Courses in the field of specialization may not be used to meet the General Studies requirement, but courses included in related fields normally considered as part of the major may be included See page 35 for complete description of the University General Studies program.

Graduation Requirements: At least 126 semester hours and a cumulative scholarship index of 2.00 are required for graduation (See exception to this grade point requirement in the Humanities, Speech and Hearing Science, and the BFA Theatre curriculum)

Upper Division Courses: Of the total of 126 hours required for graduation at least 50 credit hours must consist of upper division courses. No credit will be granted toward fulfilling major requirements in any upper division course in the student's major unless the grade in that course is at least a "C"

Specific Degree Requirements. In addition to the above general degree requirements, each of the degree programs offered in the College of Fine Arts has specific requirements

Bachelor of Arts Degree: The curriculum for the degree Bachelor of Arts is designed to give the student a broad, general background in the principal fields of human knowledge and a reasonable amount of specialized training in a selected area This degree is offered in the fields of art, communication, humanities, music, and theatre At least 18 semester hours of credit in the major field must be in upper division courses

Major Requirements The major consists of at least 45 semester hours of credit. Normally, not more than 30 semester hours will be taken in the field of specialization and approximately 15 semester hours in one or more related fields The exact content of the major is selected by the student in consultation with his/her advisor under the rules and regulations of the department concerned.

General Studies Requirement In the field of science and mathematics the student must elect at least one course in a laboratory science

Foreign Language Requirement Knowledge in one foreign language equivalent to the level obtained through 16 hours of instruction is required This requirement may be fulfilled in whole or in part through language instruction in secondary schools or by other means If required in secondary school, two years of instruction in one foreign language will be considered the equivalent of one year of instruction on the college level Students who transfer from other colleges with less than two years of credit in a foreign language will be placed in a course at the next level above the work completed Majors in communication

and theatre should consult their advisor on modification of the foreign language requirement.

Bachelor of Science Degree: The curriculum for the degree Bachelor of Science is designed to give the student a broad, general background in the principal fields of human knowledge and an opportunity to specialize in one specific selected area. This degree is offered with majors in communication and speech and hearing science.

Major Requirements. The major consists of from 45 to 55 semester hours of credit. The content of the major is selected by the student in consultation with his/her advisor under the rules and regulations of the department concerned.

General Studies Requirements. In the field of sciences and mathematics the student must elect at least one course in the physical sciences, one course in the life sciences, and one course in mathematics. One of these courses must be a laboratory science.

Bachelor of Fine Arts Degree: The curriculum for the degree Bachelor of Fine Arts is designed to meet the needs of the student with specific professional interest in creative performance in a specialized field of the arts, while providing a broad, general background in the principal fields of human knowledge. This degree is offered in the fields of art and theatre, and is also available with a major in dance through the Department of Health, Physical Education and Recreation. Students enrolled in the dance major will register in the College of Fine Arts.

Major Requirements. A major in one of the areas of art consists of 75 semester hours of credit, divided between the core curriculum and the area of specialization. A major in theatre requires 84 hours. The major in dance consists of a minimum of 70 semester hours of course work in dance and related fields. See pages 87-88 of this catalog for detailed requirements in the dance program.

General Studies Requirement. In the field of sciences and mathematics the student must take at least one course in a laboratory science.

Bachelor of Music Degree: The curriculum for the degree Bachelor of Music is designed to give the student a broad, general background in the principal fields of human knowledge and training of a professional caliber in music performance, music theory, music theatre, jazz, composition, music therapy, and the teaching of choral-general music, and instrumental music.

Placement tests in theory, piano, and a major performing medium are required of all freshmen and transfer students.

Major Requirements. The major consists of 84 semester hours of credit in music. The content of the major is selected by the student in consultation with his/her advisor under the rules and regulations of the Department of Music.

Foreign Language Requirement. Students specializing in voice performance must earn 16 semester hours of credit in more than one foreign language, chosen from French, German, or Italian. A student may elect one year of one language and either one or two semesters of the other(s), chosen in conference with the advisor. For other means by which the student can meet this requirement see the statement above pertaining to foreign languages in the Bachelor of Arts degree program.

There is no foreign language requirement in any other major leading to the Bachelor of Music degree.

Art

PROFESSORS:
(ART 102), BRECKENRIDGE, BROADLEY, CINDRICH F NK GOO, GR GSBY, HALE, HELLER, JACOBSON LINDERMAN, SCHAUMBURG, STULER J J TAYLOR WAGNER WOODS

ASSOCIATE PROFESSORS:
CHOU, GASOWSK HAHN HALL KAMPEN MAGENTA, REZN KOFF, SCHM DT, WATSON WITT

ASSISTANT PROFESSORS:
DE MATT ES, ECKERT, FARNESS, FRONSKE, GILL NGWATER, GULLY JAY KRONENGOLD, KUNZ, LAWRENCE P LE PIMENTEL REVELLE ROD, SHARER SH PP, SM TH-BRUNET, J. R TAYLOR URRY, WEST N, YOUNGBLOOD

INSTRUCTORS:
ANTONIE BR TTON, HAJICEK

LECTURER:
PETERSON

Departmental Major Requirements

For advisement purposes, a students reg ster ing in an art degree program will enroll through the College of F ne Arts Spec al id v sement check sheets are ava able in the Department of Art office for each degree pro gram and area of specia zation

Bachelor of Arts Degree Curriculum

Art—Consists of a minimum of 45 semester hours of cred t as appr ved by the student's advisor A major in stud o art requires 3(credit hours in studio and 15 hours in re ated field(s) Normal y the related f e d is art history. At least 8 of the 45 hours must be upper division credit All upper divis on credit applied to the major must be a "C" or better Courses ART 110, 1 1; ARH 101 and 102 are required. The foreign language requirement of the B.A degree is optional but strongly rec ommended.

Art History Consists of a minimum of 45 semester hours of credit as approved by the student's advisor. A major in art history re quires 30 credit hours of art history courses and 15 in a related field(s) Norma ly the re lated field is studio At least 18 of the 45 hours must be upper division credit All upper division credit applied to the n ajor must be with a "C" or better The art history areas of Ancient, Medieval, Renaissance, B roque, Modern and Non western Art must each be represented with at least one course S tisfac tory completion of ARA 459, Methodology and Bibliography, is required before the senior year Other requirements are ARH 101, 102, two ARH 498 Pro Sem nars; ARA 450, ART 110 and 111 with at least one additional course chosen from ART 203, 214, 223, 231, 271, 272, 274, or 276 Know edge in at least one foreign language s requ red equiva ent to the level obtained through 16 sem ester hours of instruct on

Bachelor of Fine Arts Degree Curriculum

Art Consists of 75 semester hours of cred t, with a concentration n one rea of spec aliza tion selected on the basis of the student's interests and professiona intentions The fol lowing areas of special zat on are ava ab e to the student ceramics, crafts, drawing, graph c design, interior design, painting, photpgr aphy, printmaking and scu pture Courses required are ART 110, 111, ARH 101 and 102 In ad dition the student will se ect six credit h ours from ART 203, 211, 214 223 and 227, six hours from ART 231, 261, 27 , 272, 274 and 276, and six hours of upper d v sion art hist ry courses The requ rements and recor mendat ons for the area of spec a zat on are deter mined by the faculty advisors of the area, and are listed on departmental checksheets. At least 30 upper division credit hours must be earned within the major, with a minin um of 12 credit hours within the area of specializa tion All upper division work counted in the major must be "C" or better. Courses from other departments may apply to the major, when it is determined they make a special con tribution to the student's progr m of study

Departmental Major Teaching Field Requirements

Bachelor of Arts in Education Degree Curriculum

Art Consists of 60 semester hours of credit in art. Courses ART 10, 111, 2 4, 223, 231, 261, 271, ARH 101, 102, ARE 301 or 302, 412, 425 and 480 are required Addition al hours to complete the m r or are to be ap proved by the advisor in consultation with the student. At least 24 semester hours n ust be in upper division courses, 3 of which must be in art history.

Students transfer to the College of Educa tion at the end of the sophomore year, but retain their Art Education advisor.

Departmental Minor Teaching Field Requirements

Elementary Education Major: Minor in Art Consists of 24 semester hours ne uding ART 110; ARE 301 and 420 which are re quired The remaining 15 semester hours are to be selected in consultation with an art edu cation advisor

Secondary Education Major: Minor in Art Cons sts of 24 semester hours ne uding ART 110, ARE 412, 425 and 480 which are required. The rem in ng 12 semester h urs are to be selected in consu tation w th in art edu cation advisor

Secondary Education Major: Minor in Photography—Consists of 24 semester hours including ART 110, 203, 302, 304, 305, ARE 480; ARH 460, and one additional upper division photography course

Departmental Graduate Programs

The Department of Art offers programs leading to the degree of Master of Arts with a major in art education or art history and the Master of Fine Arts degree with an emphasis in ceramics, crafts, drawing, interior design, painting, photography, printmaking or sculpture. In cooperation with the College of Education, the degrees of Master of Art in Education, Doctor of Education and Doctor of Philosophy are offered with a major in art education. Consult the *Graduate Catalog* for requirements for graduate degrees.

ART

ART 110 Introduction to Studio Art. Development of perceptual, imaginative and expressive responses through problem solving, discussion and critical evaluation. Emphasis on individual creative solutions, knowledge of media, visual organization and contemporary art concepts. Six hours a week. Credit 3 hours.

111 Beginning Drawing I. Fundamental technical and perceptual skills using common drawing media and their application to pictorial organization. Directed toward the student with no previous college art experience. Six hours a week. Credit 3 hours.

DRAWING

ART 211 Beginning Drawing II. Continued development of technical and perceptual skills. Prerequisite: ART 111. Six hours a week. Credit 3 hours.

214 Beginning Life Drawing. Development of skill and expressiveness in drawing the basic form, construction and gesture from the human figure. Prerequisite: ART 111. Six hours a week. Credit 3 hours.

311 Intermediate Drawing. Emphasis on composition, exploration of drawing media. Prerequisite: ART 211. Six hours a week. Credit 3 hours.

314 Intermediate Life Drawing I. Drawing from the model with greater reference to structural, graphic and compositional concerns. Prerequisite: ART 214. Six hours a week. Credit 3 hours.

315 Intermediate Life Drawing II. The human figure as the subject for drawing. Emphasis on conceptual alternatives and management of materials. Prerequisite: ART 314. Six hours a week. Credit, 3 hours.

411 Advanced Drawing. Visual and intellectual concepts through problem solving and independent study. Emphasis on the individual creative statement. May be repeated for credit. Prerequisites: ART 311 and approval of instructor. Six hours a week. Credit 3 hours.

412 Drawing Techniques of the Old Masters. Historical techniques of drawing from early Renaissance to the present. The making and use of materials and tools including silverpoint, bistre, ink, quill pens, pastels and chiaroscuro drawings as used by Michelangelo, Rembrandt, Tiepolo and other masters. May be repeated for credit. Prerequisite: approval of instructor. Six hours a week. Credit, 3 hours.

414 Advanced Life Drawing. Various media and techniques on an advanced level. The human figure as an expressive vehicle in various contexts. Encouragement of innovative approaches. May be repeated for credit. Prerequisite: ART 315 and approval of instructor. Six hours a week. Credit 3 hours.

415 Art Anatomy. Study of human anatomical structures as applied to the practice of figure oriented art. Prerequisite: ART 214. Lecture, studio, six hours per week. Credit 3 hours.

PAINTING

ART 223 Beginning Painting. Composition, color and technical mastery of painting media. Prerequisites: ART 110 and 111. Six hours a week. Credit 3 hours.

227 Beginning Watercolor. Painting in a water soluble media. Emphasis on technique, composition and color. Prerequisites: ART 110 and 111. Six hours a week. Credit 3 hours.

323 Intermediate Painting I. Advanced problems in painting. Prerequisite: ART 214 and 223. Six hours a week. Credit 3 hours.

324 Intermediate Painting II. Continuation of ART 323. Advanced problems directed toward development of a personal style. Prerequisite: ART 323. Six hours a week. Credit 3 hours.

325 Figure Painting. The human figure, clothed and nude as the subject for painting, in selected media. Prerequisites: ART 314 and 323. Six hours a week. Credit 3 hours.

327 Intermediate Watercolor. Explorations using a variety of surfaces, a combination of media and materials in a continued search for creative form. Prerequisite: ART 227. Six hours a week. Credit 3 hours.

423 Advanced Painting. Problems for those with a serious interest in painting. May be repeated for credit. Prerequisite: ART 324. Six hours a week. Credit, 3 hours.

425 Advanced Figure Painting. Continued use of the human figure in various environmental and conceptual situations. May be repeated for credit. Prerequisites: ART 315, 324 or 325. Six hours a week. Credit 3 hours.

427 Advanced Watercolor. Experimentation toward a more personal expression. May be repeated for credit. Prerequisite: ART 327. Six hours a week. Credit 3 hours.

INTER MEDIA

ART 328 New Media Concepts. Studio, lecture, discussion, survey of selected interdisciplinary art styles, working with newer art media. Repeatable once for credit. Prerequisites: ART 110 and 111. Six hours a week. Credit 3 hours.

329 Mixed Media. Discovering visual effects by combining traditional and non-traditional methods, techniques and concepts. Repeatable once for credit. Prerequisites: ART 110 and 111. Six hours a week. Credit 3 hours.

PHOTOGRAPHY

ART 203 Beginning Photographic Art. Photography as an art medium. Prerequisite: ART 110. Two lectures, 3 hours laboratory. Credit 3 hours.

302, 303 Intermediate Photography. Commonly employed materials, processes and techniques by fine silver printers, selected advanced camera techniques. Prerequisites: ART 203 or 302 and approval of instructor. Six hours a week. Credit 3 hours.

304 Advanced Photography. Interpretation and manipulation of light as a tool in the performance of expressive photography. Prerequisite: ART 303 and approval of instructor. Six hours a week. Credit, 3 hours.

305 Introduction to Color Photography. Application of color transparencies and prints to photographic art. Prerequisites: ART 304 and approval of instructor. Six hours a week. Credit 3 hours.

401 Nonsilver Photography. Recognition of the inherent characteristics of nonsilver processes and the use of these processes in the communication of ideas. Prerequisite: ART 302 and approval of instructor. May be repeated once for credit. Six hours a week. Credit 3 hours.

402 Extensions of the Photographic Image. Nontraditional uses of photography. Photo related environmental installations, works incorporating photo

graphs with other media and the use of photography as documentat on or notat on of deas Prerequ s te ART 303 and approva of nstructor S x hour a week. Cre d t 3 hours

403 Black and White Photography. Advanced expl ra t on of experimenta nterpret ve and stra ght photography May be repeated for red t Prerequ s tes ART 304 and approva f nstructor S x hours a week Cred t 3 hours

405 Advanced Color Photography. ntens ve use of subtract ve co or process n photograph c pr nt ng Pre requis tes ART 305 and approva of nstructor May be repeated for cred t S x hours a week Cred t 3 hours

407 Independent Film Production. F mmak ng as a persona express ve art form super 8 and 16mm camera hand ng exposure ed t ng ound track con s derat ons and an mat o nc udes ectures demon strat ons and v ew ng f mportant work by recent f m art sts. Emphas s on both techn que and express on Prerequ s te ART 303 and approva of nstructor S x hours a week Credit 3 hours

409 Photographic Exhibition. Care of photograph c pr nts, pr nt presentat on and exh b t on Pract ca expe r ence in gal ery operat ons Prerequ s te ART 304 and approva of instructor May be repeated for cred t S x hours a week Cred t, 3 hours

506 Photographic Education. Ma nta n g a photo graph c aboratory and teach ng photograph c stud o courses May be repeated once for credit Prerequ s te ART 403 and adm ttance to the MFA program Cred t 3 hours

PRINTMAKING

ART 351 Intaglio. Trad t ona concepts and techn ques for black and white pr nts nclud ng drypoint, mezzot nt etch ng, engrav ng aquat nt sugar l ft soft ground and contemporary approaches Use and care of ntagl o press acids, hand too s solvents nks paper and pr nts for stud o safety and et quette Prerequ s te· ap prova of nstructor S x hours a week Cred t 3 hours

352 Lithography. Process us ng stone and p ates ncor porat ng draw ngs transfer, photo transfer and co or techniques Prerequ s te approva of nstructor S x hours a week Credit 3 hours

353 Relief Printmaking. Process us ng wood, mas n te co or and other re ef techn ques. Prerequ s te approva of instructor S x hours a week Cred t 3 hours

354 Screen Printing. Var ous methods and app cat ons nclud ng the photograph stenc and transfer tech n ques. Prerequ site approva of nstructor S x hours a week Cred t 3 hours

355 Photo Process for Printmaking. ntroduct on to photograph c pr nc p es and sk s to conce ve and de velop transparenc es for photo-mechan cal pr ntmak ng processes nc uding photo-s kscreen photo tho and photo etching Prerequ s te approva of nstructor S x hours a week. Cred t, 3 hours

451 Advanced Intaglio. S ng e and mu tip ate co or pr nts nc ud ng stenc a a poupé and v scos ty meth ods of color app cation Photo mechan ca etch ng process for zinc, copper brass, a um num and magne s um. May be repeated for cred t Prerequ s te approva of nstructor S x hours a week. Cred t 3 hours

452 Advanced Lithography. Cont nuat on of ART 352 May be repeated for cred t Prerequ s te approva of nstructor S x hours a week Cred t 3 hours

453 Advanced Relief Printmaking Cont uat o of ART 353. May be repeated for cred t Prerequ s te approva of nstructor S x hours a week Cred t 3 hours

454 Advanced Screen Printing. Cont nuat on of ART 354. May be repeated for cred t Prerequ s te approva of nstructor S x hour a week Cred t 3 hours

SCULPTURE

ART 231 Beginning Sculpture. Exp orat on and expres- s on of sculptura form through deas and concepts re ated to bas c mater a s Emphas s on form re at on sh ps vo ume movement and space ntroduct on to the means of scu pture stud o safety. S x hours a week Credit 3 hours

331 Intermediate Sculpture. Cont nued search for form and personal express on through a med a w th empha sis on des gn and nd v dual nstruct on Prerequ s te Art 231 S x hours a week Cred t 3 hours

332 Advanced Sculpture. Sculptura prob ems re ated to arch tecture and man s env ronment Exp oration n a med a Co or re at onships as app ied to sc pture Prerequ s te ART 331. S x hours a week Cred t 3 hours

431 Special Problems in Sculpture. Deve opment of a persona approach to scu pture, emphas s on form nd v dua prob ems and re ated co or techno ogy Profess ona pract ces and presentat on May be re peated for credit Prerequ s te ART 332 S x hours a week. Cred t 3 hours

432 Experimental Sculpture. Extend ng the awareness of man s tota env ronment as reso rce for mages and deas for any art form Exper mentat on n nontrad t ona methods. Use of natura and synthet c mater a s nterrelat ng d sc p nes e g photography pa nt ng May be repeated for cred t Prerequis te ART 332 r approva of nstructor S x hours a week. Cred t 3 hours

433 Materials and Techniques in Sculpture. Broad approach to form-materia re ationsh p n sculpture Use of natural and synthetic mater a s and atmospher c, k netic aud o and e ectron c art forms May be re peated for cred t Prerequ s te. ART 332. S x hours a week Cred t 3 hours

434 Figure Sculpture. The human form as a means of contemporary express on n scu pture Freedom toward an nnovative anatomica reconstruct on of the f gure ead ng to a persona statement May be repeated for cred t Prerequis te ART 332. S x hour a week Cred t 3 hours.

435 Color in Sculpture. Creat ve on eptua and es thet c deve opment n co o form context re at nsh ps A ter ng of nherent co ors of mater a to the app at o of co ors through synthet c and ndustr a techno ogy Understand ng psycho og ca v sua mpact of o or to ach eve persona express on May be repeated for cre d t Prerequ s te ART 332 S x hours a week Cred t 3 hours

436 Architectural Sculpture. Scu ptura concepts as re ated to arch tecture and other man made env ron ments. Scu pture prob ems and solut ons to def ned arch tectura spaces nd v dua creat ve approa h Sca e draw ng and mode s and fu sca e free stand g and re ief scu pture for wa s and facade May be re peated for cred t Prerequ s te ART 332 or approva of nstructor S x hours a week Cred t 3 hours

CERAMICS

ART 261 Ceramic Survey. Handform ng methods throw ng on the whee decorat ve processes g aze ap p cat on Prerequ s tes ART 110 and 111 S x hours a week Cred t 3 hours

262 Ceramic Throwing. Des gn analys s and product on of funct ona pottery Emphas s on throw ng techn ques surface enr chment and glaze app ication Prerequ site ART 261 S x hours a week Cred t 3 hours

361 Ceramic Handbuilding. Search for form and per sona expression through hand bu ding techn ques K in f r ng and related prob ems Prerequ s te ART 231 and 262 S x hours a week Credit 3 hour

362, 363 Ceramic Clay and Glaze. ART 362 research nto various c ay body formu at ons, oca natura materials s ip g azes and engobes Offered n fa se mester ART 363· g aze formu at on and ca cu ation Offered n spr ng semester Prerequ s tes ART 361 and approval of nstructor S x h urs a week Cred t 3 hours

461 Advanced Ceramics I. Stud o prob ems and n struction w th emphas s on a search for perso a express on through advanced assignments Profes

s ona methods of presentat on and documentation of work. Prerequ site ART 223, 361 and approva of in structor. S x hours a week. Cred t, 3 hours

462 Advanced Ceramics II. Continued emphasis on persona expression w th n a structure of schedu ed sem nars, critiques and stud o work May be repeated for credit Prerequis tes ART 461 and approva of n- structor Six hours a week Cred t 3 hours

CRAFTS

ART 271 Introduction to Crafts. Stud o survey of con temporary crafts Ass gned prob ems n a var ety of med a, nclud ng fabr c f ber meta and wood Stress on the deve opment of profess ona d sc p nes and att tudes Prerequ s te ART 110 S x hours a week Credit 3 hours

272 Beginning Jewelry. Emphas s on fabr cat on in jew e ry making Bas c techn ques of form ng cutt ng and p erc ng forg ng and so der ng Six hours a week Cred t 3 hours.

274 Beginning Wood Art. Fundamenta woodwork ng techn ques to produce creat ve funct ona three dimens ona objects Prerequ s te ART 110 Six hours a week Credit 3 hours

276 Beginning Fiber Arts. Invest gat on of the structura use of f ber nc ud ng crochet, basket techniques tw n ing and p att ng, sp nn ng and natura dye ng. Surface treatment of fabr cs ncluding bat k b ock pr nt ng fo d and t e-dye Prerequ s tes ART 110 and 111 S x hours a week Cred t, 3 hours

372, 373 Jewelry and Metalworking. ART 372 fabr cated approach to jewe ry mak ng Techn ques n stone sett ng and surface embe shment are covered ART 373 hot and cold forging compress on d e and stretch form ng Prerequ s te ART 272 Six hours a week Cred t 3 hours

374 Intermediate Wood Art. nd v dua and d rected prob ems n wood, re ated to the product on of un que functional art objects Prerequ s te ART 274 S x hours a week Cred t 3 hours

376 Intermediate Fiber Arts. Cont nued nvest gat on of surface treatment of fabr c with emphas s on s k screen ng. Loom contro ed techn ques se of dyes w th emphas s on develop ng persona express on Pre requ s te ART 276 S x hours a week Credit, 3 hours

472, 473 Jewelry and Metalworking. ART 472 ewe ry mak ng w th emphas s on deve op ng persona state ments and excel ent craftsmansh p. ART 473, fo g ng and form ng techn ques n a more nd v dua d rect on May be repeated for cred t Prerequ s te ART 372 or 373 and perm ss on of nstructor S x hours a week Credit 3 hours

474 Advanced Wood Art. Extended exper ence and advanced techn ques in the use of wood to create func t onal works of art May be repeated for cred t Prerequ site. ART 374 and approva of nstructor S x hours a week Cred t, 3 hours

476 Advanced Fiber Arts. Cont nued explorat on and exper mentat on w th advanced techn ques n fiber and fabr c Emphas s on persona concepts and deve op- ment of profess onal sk May be repeated for credit Prerequisite· ART 376 and approval of nstructor S x hours a week Credit 3 hours

GRAPHIC DESIGN

ART 180 Lettering and Typography I Exp orat on of type forms as both spec f c and abstract e ements of commun cation Bas c etterform des gn type compos tion and ind cat on, creat ve and techn ca aspects of typography Prerequ s tes ART 110 and 111 S x hours a week Cred t, 3 hours.

181 Graphic Design I. Des gn concepts and creat ve so ut ons to problems of v sua commun cat on Explo rat on of bas c perceptua symbol c and sequent a approaches to des gn. Deve opment of techniques and ski s required for spec a zat ons w th n the graph c de s gn profess on Prerequ s tes ART 110 111 and 180 wh ch may be taken concurrent y S x hours a week Cred t 3 hours

280 Lettering and Typography II. Advanced use of et terforms and typefaces n graph c des gn Creat ve use of ex st ng letters and design of type for spec fic uses such as ogos and s gnage Prerequ s tes ART 180 and 181 S x hours a week Cred t 3 hours

281 Graphic Design II. Cont nuat on of prob ems and deve opment of sk lls ntroduced n ART 180 and 181 Prerequ sites ART 180 and 181 May be taken concur rently w th 280 S x hours a week Cred t 3 hours

282 Illustration I. Med a and methods of contemporary i ustrat on. Perceptua problems requ r ng creat ve and i ustrat ve so ut ons Prerequ sites. ART 180 and 181· ART 214 and 223 recommended May be taken concur rent y w th 281 S x hours a week Cred t 3 ho rs

381 Graphic Design III. Cont nuat on of ART 281 Pre- requisites: ART 280 and 281 S x hours a week Cred t 3 hours

382 Illustration II. Cont nuat on of ustrat ve prob em solv ng with deve opment and ref nement of sk s ntro duced n ART 282 Prerequ s tes ART 281 and 282 May be repeated for cred t S x hours a week. Cred t 3 hours.

383 Reproduction Design. Des gn and preparat on of art for print ng and reproduct on Pasteups mechan ca s, co or separat ons graph c des gn considerat ons and methods of specif cation for reproduct on pro cesses. Prerequisites· ART 280 and 281. S x hours a week. Credit 3 hours

481 Portfolio Preparation. Deve opment or entat on and preparat on of a portfo o for the graphic design profess on Prerequisites ART 381 and 382 May be repeated for credit S x hours a week Cred t 3 hours

484 Graphic Design Workshop. Professiona graphic des gn exper ences n actua c ent des gner s tuat ons nvolvement n the comp ete graph c des gn process from concept to f nished p ece Advanced graph c de s gn majors on y. Prerequ sites Portfo o presentat on and approva of nstructor Six t twe ve hours a week Credit 3-6 hours

INTERIOR DESIGN

ART 140 Design Fundamentals. Deve opment of perceptual sk s and abil ty to d st ngu sh among env ronmenta attributes bas c structures processes effects and context wh ch n re at on to t me prov de subjects for visua commun cat on and express on Pre requisites ART 110 and 111 S x hours a week Cred t 3 hours

141 Design Simulation I. Exp orat on of two and three d'mens onal representat on methods emp oyed as de script ve ana yt ca conceptua and documentary aspects of des gn processes Prerequ s tes ART 110 and 111. Six hours a week Cred t 3 hours

240, 241 Design Simulation II. Cont nuat on of 141 Pre- requisite ART 141 or 240 S x hours a week Cred t 3 hours.

242 Interior Design I. Fundamenta of research analys s, design and eva uat on methods app ed to organizat on of conceptual behav ora , perceptua and techn ca aspects of the near env ro ment for ind v du als sma l groups and commun t es Prerequis tes ART 140 and 141 S x hours a week Cred t 3 hours

243 Interior Design II. Interd sc p nary conceptua framework ntegrat ng know edge from arts and sc - ences developed to understand creat ve process that shapes sett ngs for human soc a and b o og ca func tion ng Prerequ s tes ART 240 242 244 and PGS 100 Six hours a week Cred t 3 hour

244, 245 Design Technology. Fundamental concepts of structures, construct on methods and environmenta contro systems Current and exper menta structures are bu' t and ana yzed Prerequ s te ART 140 or 244 S x hours a week Cred t, 3 hours.

342 Interior Design III. Expl cat on of dynam c optim za tion, key conceptua and emp r ca concerns Des gn act v ties focus on interface between rgan zat ona

structure of funct ons to be accommodated and phys cal fabr c of interior env ronment Prerequ s tes ART 241 243 PGS 306. S x hours a week Cred t 3 hours

343 Interior Design IV. Env ronmenta resources and technolog cal processes nvo ved n the des gn mp e mentation and use of nterior spaces and products Total design concepts deve oped n re at on to social phenomena. Prerequ s tes ART 342, 344 and 348 S x hours a week Cred t 3 hours

344, 345 Design Technology Workshop. Mater a s ex p orat on des gn idea deve opment and appl cat on basic methods for construct ng furn shings and nter or components. Prerequis te ART 245 or 344 Six hours a week Cred t, 3 hours

348 Theory of Built Environment. Intens ve study of bu t environmental forms, the r theoret ca foundat ons and re at ons to soc a processes Prerequ s tes ART 140 or approva of nstructor. S x hours a week Cred t 3 hours

349 Professional Practice Seminar. Genera bus ness procedures inc ud ng types of bus ness and trade con tracts, major design trade sources, and resource f ng systems Field trips to reg ona trade markets senior portfol o and interv ews w th potential emp oyers n the des gn f e d are requ red Prerequ s te ART 342 344 and 348 Six hours a week. Cred t 3 hours

443 Interior Design V. ndependent work on approved term na project pursu ng nd v dua nterest under the guidance of facu ty consultants Forma expos t on of research and creat ve work requ red Prerequ s tes ART 343 345 and 349 Twe ve hours a week Cred t, 6 hours

449 Professional Practice Internship. Exper ence n work ng w th c ents under the superv s on of profes s ona des gners and adv sors App cat ons must be made the preced ng semester Prerequ s te ART 343 345 349 and approva of nstructor Twe ve hours a week Cred t, 6 hours.

SPECIAL STUDIO COURSES

ART 621 Studio Problems. Advanced study n the fo ow ng areas

(a) Draw ng	e Sculpture
(b Painting	(f Ceram cs
(c) Photography	g Crafts
(d) Pr ntmak ng	(h nter or Des gn

Prerequ s te approva of nstructor May be repeated for cred t S x hours a week each sect on Cred t 3 hours each sect on

680 M.F.A. Exhibition. Stud o work in preparat on for requ red M.F A. exh b t on Pub c exh bit to be ap proved by the student s supervisory comm ttee and accompan ed by a f na ora exam nation Photograph c documentat on and written statement of prob em Pre requ s te approva of the student s superv sory committee Cred t 1 15 hours

Special Courses: ART 294, 493 494 498 499 591 592 594, 598 (See page 31)

ART EDUCATION

ARE 301, 302 Art in the Elementary School. Se f understand ng through the use of art, concurrent w th the study of ch ldren's art work from ear y chi dhood to m d ado escence One ecture 4 hours aboratory Cred t 3 hours

412 Curriculum Problems in Art Education. Pract al development of curr cu um for e ementary and se ond ary art. Major focus s upon curr cu um organ zat on for c assroom practice. Required of a art educat on ma jors Prerequ s te ARE 480 or concurrently Cred t 3 hours

420 Crafts for the Elementary School Teacher. Pract cal aboratory experiences stress ng a var ety of med a that ch ldren can use Emphas s on three d mens ona act v ties su tab e for c assroom teach ng One lecture 4 hours laboratory Cred t 3 hours

425 Crafts in the High School. Teaching contemporary crafts n the secondary schoo A ternate teach ng strat eg es survey of mater a s, too s ar d procedures appl cab e to today s h gh schoo crafts programs Pre requisites. ARE 480 and 412 or c ncurrent y One lecture 4 hours aboratory Cred t 3 hours.

480 Art in the High School. Strateg es f r teaching secondary art nc uding theory, organ zat on, mater a s and pract cum Requ red of a art educat on ma ors. Prerequ s tes ARE 301 or 302 SED 311 or concur rent y. One ecture 4 hours aboratory Cred t 3 hours

510 Art in the Self-Contained and Open Classroom. A ternate teach ng earn ng strateg es art concepts sk l s and express ve ob ect ves re evant to e ementary school art exper ences for teachers Deve opmenta aspects of art behav or among e ementary ch dren var ous earning env ronments Cred t 3 hours

511 Issues in Art Education. H stor ca survey of ssues n art and educat on wh ch focuses on the ana ys s of assumpt ons wh ch under e the ana ys s of art and the or entat ons of educators n art and re ated f e ds Cred t 3 hours

515 Foundations of Art Education. Behav ora founda t or s of educat on as re ated to art educat on. Emphas s on psycho og ca and ph losoph ca frame of reference Cred t 3 hours.

520 Learning Theory Modules in Art Education. Re search nto the nature of creat ve behav or especia y as it app es to the visual arts Creat v ty and its re at on to student growth and performance for contemporary teach ng Credit 3 hours

525 Art and Society. nterre at onship of art, soc ety and social change Art as a cu tura communication sys tem and ts re at onsh p to areas such as government museums, and techno ogy. Cred t 3 hour

530 Research in Art Education. App cat on of research methods to concepts and issues n art educat on Credit 3 hours

535 Sensory Awareness Strategies for Teaching. Ex perient a and exp oratory ana ys s of sensory attributes related to teach ng art Sharpening perceptua aware ness through v sua tact e aud tory and other sensory modes and the r app cat on to the classroom. Cred t 3 hours

545 Perception and Learning. ntroduct on to concep tions of percept on and earn ng that under e the ana ys s of art and the orientat ons of educators n art and re ated f e ds. Cred t, 3 hours

550 Esthetic Inquiry. Introduct on to terature on esthetics methods of nquiry n esthet cs and mp ca t ons of esthetics for art and educat on Cred t 3 hours

555 Studio Art and Technology. Exp orat on of art con cepts to expand one s understand ng of art us ng contemporary med a and subject matter Lect re d scuss on read ngs, and stud o experiences re ated to the teaching of art Cred t 3 hours

570 Criticism, Issues, and Contemporary Art. ssues n contemporary art cr t c sm and the mp cat ons of these ssues for art educat on Cred t 3 hou s

575 Curriculum in Art and Education. L terature n art educat on and educat on on ex st ng strateg es for de ve op ng curr cu um, the ssues and prob ems of differ ng curr cu um or entat ons and art superv s on Cred t, 3 hours

610 Issues and Trends in Art Education. Recent prob ems and d rection in contemporary art educat on Cred t, 3 hours

611 Curriculum Development in Art Education. Devel opment of curr cu um in terms of ph losoph ca psycholog ca and soc o og ca foundat ons Re at on ship of objectives to pract ce Cred t 3 hours

Special Courses: ARE 294, 493 494 498 499 590 591, 592 593, 594, 598, 599 600 690 691 692 790 791, 792 799 (See page 31.

ART HISTORY

ARH 100 Introduction to Art. Development of under stand ng and enjoyment of art and ts relat onsh p to

everyday life through the study of pa nt ng scu pture arch tecture and design May not be taken for credit by student who has comp eted ARH 300, nor used as art history credit by art majors or minors Cred t, 3 hours

101 History of Art from the Dawn of Civilization to the Renaissance. Anc ent Near Eastern Egypt an Greek Roman and med eva European art to the Renaissance Credit 3 hours

102 History of Art from Renaissance to the Present Day. Occ denta art dur ng the Rena ssance manner st baroque, rococo neo c ass c, roma t c and modern epochs Cred t 3 hours

103 Introduction to Asian Art. Art of nd a Ch na and Japan from pre h stor c t me t the pre e t Cred t hours

105 Introduction to Islamic Art. Arch tecture pa nt ng and m n r arts of the Arab countr es, Ira Turkey North Afr ca Mugha nd a and s am c Spa n Cred t 3 hours

110 Introduction to American Indian Art. H sto y of Amer can nd an art n North Centra and South Ame ica to the t me of European contact Cred t 3 hours

300 Introduction to Art. Course ontent same as ARH 100 but requ res a h gher eve of accomp shment and comprehens on May not be taken for cred t by student who has completed ARH 100 nor used as art h story cred t by art majors or m nors Cred t 3 hours

401 American Art I. H story of art n the Un ted States from European sett ement of the New Wor d to the Co lumb an Expos t on of 1893 Prerequ s tes ARH 101 and 102 or approval of nstru t r Cred t 3 hours

402 American Art II. H story of the Un ted States from the ast decade of the 19th century to Wor d War Prerequ s tes ARH 101 and 102 or approva of nstruc tor Cred t, 3 hours

403 Pre-Columbian Art. Amer can nd an art from Ce tra Mexico to South Amer ca from ts or g ns to the t me of European contact Prerequ s tes ARH 101 and 102 or 110 Cred t 3 hours

404 North American Indian Art. Amer can nd an art from northern Mex co to A aska Prerequ s te ARH 101 and 102, or 110 Cred t 3 hours

405 Southwest Indian Art. Amer ca nd an art n the southwestern states from ts or g ns to the present day Prerequ s tes ARH 101 and 102 or 110 Cred t 3 hours

406 Mexican Art. Art of Mexico and re ated Centra Amer can cu tures from the preh st r c to the contem porary schoo s Prerequ s tes ARH 102 and 110 or approva of nstructor Cred t 3 hours

409 History of Printmaking. History of the pr nt as an art form and ts re at on to other modes and forms of art st c expression Prerequ s tes. ARH 101 and 102 or approval of nstructor Cred t, 3 hours.

410 Ancient Neareastern Art. H story of pa nt ng scu p ture and arch tecture n Mesopotam a Egypt and the Aegean Prerequ s tes. ARH 101 and 102 r approva of nstructor Credit 3 hours.

411 Greek Art. Art and arch tecture of Gree e and the He en st c Emp re Prerequ s tes ARH 101 and 102 or approva of nstructor Cred t 3 hours

412 Roman Art. Art and arch te ture f Etrur a Rome and the Roman Emp re Prerequ te ARH 101 and 102 or approva of nstructor C ed t 3 hours

414 Early Christian and Byzantine Art. Art and arch tecture of the ear y church and the Byza t ne Emp re from the 4th to the 15th ce t ry Prerequ s te ARH 101 and 102 or approva of nstructo Cred t 3 hours

420 Early Medieval Art. Arch tecture scu pture and pa nt ng n the Lat n West from the 7th ce tury to the end of the Otton an Per od Prerequ s tes ARH 101 and 102 or approva of nstructor Cred t 3 hour

422 Romanesque Art. Scu pture pa nt ng arch te t re and m nor arts n western Europe dur ng the Roman esque per od Prerequ s tes ARH 101 and 102 or approva of instructor Cred t 3 hours

424 Gothic Art Pa nt ng scu pture and arch tecture n western Europe dur ng the Goth per od Prerequ s te ARH 101 and 102 or approva of instr tor Cred t 3 hours

428 15th-Century Art in Northern Europe. Pa nt ng scu pture and arch tecture dur ng the 1400s north of the A ps Prerequ s tes ARH 101 and 102 or approva of nstructor Cred t 3 hours

430 16th-Century Art in Northern Europe. Pa nt ng scu pture and architecture north of the A ps fr m 1500 to 1600 Prerequ s tes· ARH 101 and 102 or approva of nstructor Cred t 3 hours

432 Early Renaissance Art in Italy. Pa nt ng scu pture and arch tecture n ta y from 1300 t 1500 Pre equ s tes· ARH 101 and 102 or approva of nstructor Cred t, 3 hours

434 Art of the Italian High Renaissance and Mannerism. History of art dur ng the 16th century espec a y the ach evements and nf uence of Leonardo da V nc Raphae , and M che ange o Prerequ s tes ARH 101 and 102 or approva of nstructor Cred t 3 hours

440 Art of the 17th Century in Southern Europe Pa nt ing, scu pture and arch tecture n 17th century ta y Spa n and Portuga Prerequ sites ARH 101 and 102 or approva of nstructor Credit 3 hours

442 Art of the 17th Century in Northern Europe. Pa nt ng scu pture and architecture n 17th century F anders Ho land France, Germany and England Prerequ s tes ARH 101 and 102 or approval of instructor Cred t 3 hours

444 Art of the 18th Century in Northern Europe. Pa nt ng scu pture arch tecture and andscape garden des gn concentrat ng on deve opments n Eng and and France. Prerequ s tes ARH 101 and 1 2 or approva of nstructor Cred t 3 hours.

446 Art of the 18th Century in Southern Europe Art of Ita y, Spa n Austr a and Southern Germany dur ng t e 1700s Prerequ s tes ARH 101 and 102 or approva of nstructor Cred t 3 hours

450 Art of the Early 19th Century Art from the eve of the French Revo ut on to the Par s Wor d s Fa r f 1855 Emphas s on the neo class c romant c and rea st movements Prerequ s tes ARH 101 and 102 r a prova of nstructor Cred t 3 hours

452 Art of the Late 19th Century. Art from the m d century to 1900 Emphas s on the pre Raphae te m press on st post mpress on st symbol st and art nouveau movements Prerequ s tes ARH 101 and 102 or approva of nstru tor. Cred t, 3 hour

454 Art of the 20th Century. Deve opments and d rect ons n art between 1900 and Wor d War Pre requ s tes· ARH 101 and 102 or approva of nstructor Credit, 3 hours

456 Contemporary Art. Recent a d current trends n art s nce Wor d War I w th cons derat o of new con-cepts and exper mentat on w th med a and m des of presentation Prerequ s tes. ARH 101 1 2 and 454 or approva of instructor Cred t 3 hours

460 19th Century Photography. Early h story of photog-raphy from the medium s pre h story to 1914 persona t es processes mages and deas Prerequ s te approval of nstructor Cred t 3 hours

462, 463 20th Century Photography. Deve opments in h story of photography persona t es processes m ages and ideas. ARH 462 1914 to 195 ARH 463 1950 to present Prerequ s tes. ARH 460 or 462 or approva of instructor. Cred t, 3 hours

466 Photographic Publications of the 19th Century. Photographs for magaz ne and book ustrat ns from Fox Ta bot s *Pencil of Nature* to St eg tz s *Camera Work* Prerequ s te ARH 460 or approva of nstructor Credit 3 hours

470 Art of India. Paint ng scu pture and arch tecture of nd a and Southeastern Asia. Prerequ s tes ARH 103 or approva of instructor Cred t 3 hours

471, 472 Oriental Art. ARH 471 study of ma o forms n

Ch nese art ritual bronze scu pture ceramic ca graphy, pa nt ng and architecture. ARH 472 survey of Japanese art from the Jomon period to the present Prerequ s tes ARH 101 and 102 or 103, or approval of instructor. Credit 3 hours.

474 Chinese Painting: From Ku K'a -ch n to Ch i Pa sh h. Major artists styles and movements in Ch nese pa nt ng. Prerequis te· ARH 103 or approva of q in structor Credit, 3 hours

476 Islamic Architecture. Survey of major sty es and movements of Islamic arch tecture from 8th through 17th century. Prerequisites: ARH 105 or approval of n- structor Credit, 3 hours

477 Islamic Painting. Survey of manuscr pt luminat on and painted pottery in ran Turkey Arab countr es and Mugha Ind a as well as Iranian o l pa nt ngs and fo k art Prerequisites ARH 105 or approva of instructor Credit 3 hours

478 Persian Art. Survey of arch tecture pa nt ng pottery carpets and m nor arts of ran from the 9th through the 17th century Prerequ s tes ARH 105 or approva of nstructor Credit 3 hours

498 Pro-Seminar. Prerequ s te approval of nstructor Cred t of 3 hours; Top cs se ected from the fo ow ng Prob ems in:

(a) Chinese Art
(b) Anc ent Art
(c Med eva Art
(d Rena ssance Art
e Baroque Art
f Modern Art
g) Amer can ndian Art
(h Is am c Art
( ) Photograph c H story

591 Seminar. Prerequ s te· approva of nstruct r Top cs se ected from the fo lowing Prob ems in

(a Ch nese Art
(b Ancient Art
c Medieva Art
(d) Rena ssance Art
e) Baroque Art
f Modern Art
g Amer can nd an Art
h Is am c Art
Photograph c H story

Special Courses: ARH 294, 492 493 494, 499 590 592 598, 599. (See page 31

AUXILIARY COURSES

ARA 450 Museography I. ntroduct on to museums and their operat ons· method theory and pract ce Prerequ - site approva of instructor Credit 3 hours

451 Museography II. Museum exhib t on and educa- t ona program· method, theory and pract e Prerequisites ARA 450 or approva of nstructor Cred t 3 hours

454 Museology I. Introduct on to the history of mu seums. History of co lect ng connoisseurship, and conservation. Prerequisite: approval of nstructor. Credit, 3 hours.

455 Museology II. H story of 20th century museums Prerequisite· ARA 454. Cred t 3 hours

457 Conservation. Introduct on to the care preserva tion and restoration of museum collect ons· method theory and practice Prerequ sites. ARA 450 or approva of nstructor Credit 3 hours.

459 Methodology and Bibliography. Mater a s and methods of art h stor ca research. Credit 3 hours

Special Courses: ARA 294, 494 498 584, 591 594 598 (See page 31.)

Communication and Theatre

PROFESSORS:
ARNOLD (STAUF 412) CLUFF, DAVIS DOYLE, MOWRER, PERRILL, RICHARDS, STITES, YEATER

ASSOCIATE PROFESSORS:
AKINS, CASE, CHUBR CH, DOBK N DORMAN ELSEA, GOHEEN, JA N, UNDERWOOD K VALENT NE, WITT

ASSISTANT PROFESSORS:
ABRAMSON AUSBERGER BARTZ, BULEY, DAVEY, EAKINS, FRANKS H RSCH LUND REINARD TALLMAN, C VALENT NE, V NING W GAND, WR GHT

Departmental Major Requirements

Bachelor of Arts Degree Curriculum

Communication Consists of 45 semester hours, of wh ch at least 30 hours must be in Communication courses, with a minimun of 15 hours in one or more related fields ap proved by the advisor The core c ourses, COM 100 and 333, are required, and at least 18 hours of the major must be upper division courses. Within Communication, the fo ow ng areas of emphasis are available group com munication, intercultural communication, interpersonal communication, interpretation, organizational communication, political legal communication, and speech communication Specific course work will be determined by the student in consultation with the advisor This Communication major provides a libera edu cation in the study of human communication, as the basis for careers in various professions, business and industry, education, or public service

Theatre—Consists of 45 semester hours of credit selected in consultation w th an advisor to provide a balanced representat on of courses within areas of theatre specialization. The se- lected program must include THF 100, 320, 321, THP 101, 213, 215, 330, 340, 345, at least two hours credit in THP 301, chosen from at least two different production opt ons, and at least three hours of credit in THE 325. The theatre major normally will include 15 semester hours of course work in such related work studies as art, dance, Engl sh, mass communication, music and commun cation

General Studies: To n eet the General Studies requirement for the B A. degree in Comm unication or Theatre, al students must take a minimum of 54 semester hours of credit of which 12 semester hours must be n the hu manities and fine arts, 12 in social and behavioral sciences, and 6 in sc ences and mathematics. Majors in Comm un c ation or Theatre have somew hat different specific re quirements in General Stud es, therefore, students should refer to current check sheets for recommended courses Courses in the field of specialization may not be used to meet the General Stud es requirement, but courses n- cluded in related fields norm l y cons dered as part of the ma or may be inc uded

Foreign Language Requirement: Know edge c f

a foreign language is optiona but all foreign language courses may be used as general studies electives.

Bachelor of Science Degree Curriculum

Communication Consists of 45 55 semester hours, of which at least 30 hours must be in Communication courses, and a minimun of 15 in one or more related fields approved by the advisor Core courses, COM 100 and 333, are required, and at least 18 hours of the major must be in upper division courses Within Communication, the following areas of emphasis are available group communication, intercultural communication, interpersonal communication, interpretation, organizational communication, political legal communication, and speech communication In General Studies, the student must meet college requirements for the Bachelor of Science degree and must complete at least 12 semester hours in the social and behavioral sciences and at least 12 semester hours in science and mathematics Specific courses are selected by the student in consultation with the advisor This Communication major provides a scientific behavioral emphasis in the study of human communication, as the basis for careers in various professions, business and industry, education, or public service

Speech and Hearing Science Consists of a minimum of 55 semester hours of credit emphasizing the developmental and scientific aspects of language, speech and hearing. Admission to the major is by application Forms are available in the Speech and Hearing Clinic Due to limited faculty staff, and facilities, and due to the pre professional nature of the program, those students will be admitted who demonstrate the potential of successful completion of a graduate degree in communication disorders Freshmen may apply for admission to the major if they are in the upper third of their high school graduating class. Students above freshman standing may apply for admission to the major if their cumulative grade point average, at the time of application, is 2.75 or above After admission to the major, students will be required to make up any deficiencies which may be determined, by their academic advisor, to exist at the time they are admitted Normally, students pursuing this major will take courses, in addition to those required for the major, in the areas of linguistics, child development, psychology, statistics, and the physical sciences including courses in algebra, trigonometry, physics and electronics).

Bachelor of Fine Arts Degree Curriculum

Theatre—This professional degree is available in the areas of child drama or directing only Applicants must have completed at least 15 hours of course work in theatre, including THP 215, with a 3 00 average or above in the major Students in child drama must also complete THP 311 Freshman students should register in a B A program until these requirements are met A 3 00 average in the major is also required for retention in the program The core curriculum for the degree shall include 36 hours in General Studies with a minimum of 12 hours in approved courses in the humanities and fine arts, 12 in social and behavioral sciences and 8 in sciences and mathematics with at least one laboratory course Courses in the major or areas related to the major may not be counted as General Studies A minimum of 84 hours is required in the major. Students should refer to current check sheets for recommended electives in these programs The student in the child drama emphasis is required to take THE 100, THP 101, 105, 106, 113, 213, 215, 301, 311, 318, 330, 340, 345, 411, 418; COM 480, EDF 200 or SED 310; EDP 310; SED 311, 413, 433, ELE 314, 333, 335, REA 467, 480 The student in the directing emphasis is required to take THE 100, 320, 321, 325; THP 101, 105, 106, 113, 205, 206, 213, 215, 301, 305, 315, 316, 340, 345, 415, 416, 417, and 450, with remaining courses selected from electives in the major or approved courses in areas directly related to the major

Departmental Major Teaching Field Requirements

Bachelor of Arts in Education Degree—Secondary Education Curriculum

Communication Arts Consists of 60 semester hours and is designed to provide preparation for teaching in three fields Students may place their major emphasis in either Theatre or Communication Students placing their major emphasis in Theatre must complete a minimum of 24 hours in Theatre 18 hours in Communication, and 18 hours in a related field, preferably English Students placing their major emphasis in Communication must complete a minimum of 24 hours in Communication and 18 hours in each of two approved related fields. Those in Communication must complete the core courses, COM 100 and 333, and at least 12 hours must be in upper division course work Communication Arts majors must earn a minimum of 2 hours in two separate activities courses (COM 301 and or THP 301) but not more than six hours in activities courses may be counted toward the major Specific courses, from the minor fields options, are selected by the student in consultation with the advisor

Communication Consists of 36 semester hours and anticipates the addition of an approved minor of at least 24 hours The core courses, COM 100 and 333, are required and at least 18 hours must be in upper division course work A minimum of 2 hours must be earned in two separate activity courses (COM

301) but not more than 6 hours in activity courses may be counted toward the major. Specific courses to comp ete the major and the minor are selected by the student in consu ta tion with his advisor

Theatre—Consists of 42 semester hours Re quired courses include THE 00, 320, 32 , 325 (d), THP 101 113, 213, 215, 301 (two hours minimum, from d fferent producti n options), 315, 330, 340, 345, 494 (c). A teach ing minor in Commun cat on or English is strongly recommended

Minor in Communication C nsists of 24 semester hours n Commun cat on and wi normally include COM 10 , 220, 333 nd 480. At least 9 hours n ust be in upper div s on courses

Minor in Theatre C nsists of 24 sen ester hours in theatre courses THE 10(THP)1 213, 215 are requ red; plus one add ti n course in theatre history and two add tion al courses in technica theatre

Departmental Graduate Programs

The Department of Communication ind Th ea tre offers programs le ading t the degrees of Master of Arts and Master of Science Con sult the *Graduate Catal g* for req r ren ents

COMMUNICATION

COM 100 Introduction to Human Communication. Focus on the bas c theory and d mens ons of human nteraction, nc ud ng ind vidual and group exper ences n human commun cat on Cred t 3 hours

110 Personal Communication I. Demonstrat on and practice of comun cation techn ques for meet ng peo- p e, deve oping rapport, chang ng re at onsh ps and ma nta ning a relat onsh p over time Cred t 3 hours

200 Human Communication Systems. Human commu nication processes and systems major areas of theory and research, and the sc ent f c bases of human com munication behavior Cred t, 3 ho rs

210 Personal Communication II. Explorat on of theo retica ethical, and ph osoph ca approaches to com municat on in human re at onsh ps Prerequisite COM 110 Credit 3 hours

220 Survey of Speech Communication. ntroduct on to theory and pract ce for students deve op ng a teach ng m nor or contemplat ng a major w th n the Secondary Educat on curr cu um Credit 3 hours

221 Voice Improvement. ntensive persona and group experience to improve normal vocal usage, inc ud ng articulat on and pronunciat on. Cred t 3 hours

241 Introduction to Oral Interpretation. The commun cat on of terary materia s through the mode of performance Verba and nonverba behav or, nterface of nterpreter w th l terature and audience, and rhetor ca and dramat c ana ys s of terary modes Cred t 3 hours

243 Interpreters Theatre Workshop. Students w l create and pract ce ensemb e nterpretation of terature us ng a var ety of media in d verse sett ngs. Cred t 3 hours

263 Minority Communication. Commun cat on behav ors and strategies of m nor t es through ana ysis of Black Amer can, Mexican Amer can Nat ve American and other domest c socia movements. Credit 3 hours

265 General Semantics. Analys s of relationsh p to language to real ty nature of mean ng eve s of ab stract on app cat on of genera semant cs to everyday contexts Credit 3 hours

294 Special Topics. Specia top c courses, nc ud ng the fo ow ng wh ch are regu ar y offered are open to a students. See Departmental sy abus for course descr p tions Cred t 3 hours.

(a) Commun cation Effects
(b) Commun cation and Soc a Movements
(c) Freedom of Speech
(d) Pol tical mage Mak ng
(e) Commun cat on Perspect ves f r the Teacher
(f) Message Construct on and Commun cation
(g) Commun cat on Design
(h Women s Commun cat on

300 Group Communication. Princ p es and processes of smal group commun cation Att tudes and sk s for effective part c pation and leadersh p n sma groups Sma l group prob em-so ving and dec s on-mak ng Not open to freshmen Cred t 3 hours

301 Communication Activities. Part c pat on n foren sics or nterpreters Theatre or for student teachers enro led in SED 433 May be repeated for credit Pre requ s te approva of nstructor Cred t 1 hour.

302 Classroom Apprenticeship. For students extend ng their study of a content area by assist ng with c ass- room supervision and exercises n other COM courses May be repeated for credit to a maximum of 6 hours. Prerequ site: approval of app icab e course instructor Credit, 1 3 hours.

303 Interviewing. Pr nc p es and pract ce for nterv ew ers n various settings, such as nformat on gather ng, employment and appra sa Train ng as interv ewees for job p acement nterv ews Not open to freshmen Cred t, 3 hours.

304 Job Interview Training. Min semester workshop 15 c ass hours) prepares students as nterv ewees for job placement nterv ews Resumé preparat on commu n cation pract ce and s mulated nterviews Not open to freshmen or students with cred t n COM 303 Check Department Off ce for spec f c dates and t mes. Cred t 1 hour.

305 Large Group Communication. Theory methods, and nd v dua commun cat on behav or re evant to arge group interaction systems Pub ic discussion and par a mentary procedure in var ous types of pub ic and del berative assemb es. Not open to freshmen Cred t, 3 hours

311 Public Speaking. Verba and nonverba commun cat on n p atform speak ng D sc ss on and pract ce in voca and phys ca de very and n purposefu organiza tion and development of pub ic commun cat on Prerequ site· COM 100 or approva of nstructor Cred t 3 hours

312 Argumentation and Debate. Ph osoph ca and the oret ca foundations of argumentat on and forens cs emphas z ng prob ems in argumentat on and debate Credit, 3 hours.

320 Communication and Consumerism. Critica eva u ation of messages designed for pub c consumption Perce v ng, evaluating and respond ng to po t cal, so- cial, and commerc a commun cat on Credit 3 hours

330 Nonverbal Communication. The effects of space t me, body language environment objects and vo ce qua it es on communicat on Credit, 3 hours

333 Criticism and Research Methods in Communica- tion. Cr t ca ana ys s and h stor cal, descr pt ve, and quant tat ve research methods for commun cat on Credit 3 hours.

341 Interpretation in Social Contexts. Adaptat on and performance of terature in s tuat ons of crisis and con f ict notab y n prisons menta hosp ta s and centers for the aged Prerequis te COM 241 r approva of n structor. Credit 3 hours.

363 Intercultural Communication. Processes and prob lems of commun cation between peop e from different

racial, ethn c, and cu tural backgrounds n both domestic and nternat ona sett ngs Not open to freshmen Credit 3 hours.

365 Language, Culture, and Communication. Cu tura nf uences of language on commun cation nc ud ng soc a functions of anguage b ngual sm, b cu tura sm, and b d a ectism. Cred t 3 hours

400 Leadership in Group Communication. Theory and process of eadership n group commun cat on, empha s zing phi osoph ca foundat ons, contemporary research, and app cations to group s tuat ons Prereq uisite COM 300 or approval of nstructor Cred t 3 hours

405 Communication in Business and Profession. nter persona group and pub c commun cat on methods and practices n bus ness and profess on. Cred t 3 hours

406 Organizational Communication. Commun cat on systems, processes and prob ems n forma organ za t ons Prerequ s te Upper d v s on stand ng Cred t, 3 hours

407 Organizational Communication Internship. Super v sed practice n the ana ys s and management of communicat on systems w th n a forma organ zat o Prerequis te COM 406 and approva of nstructor May be repeated once for cred t. Cred t 3 ho rs

412 Advanced Argumentation. Advanced study of ar gumentat on theor es and research as app ed to pub forum adversary scholar y and ega sett ngs Prereq- u s te COM 312 or approva of nstructor Cred t 3 hours

415 Communication Behavior in the Elementary School. Communicat on behav or of e ementary ch dren methods of fac l tating express ve recept ve and nterpersonal commun cat on nteract on among teach ers, students parents and adm n strators Credit 3 hours

433 Quantitative Methods in Communication Research. ntroduct on to the ph osophy and pract ce of emp r ca communicat on research Prerequ s te COM 333 or approval of instructor Cred t, 3 hours

441 Interpretation as Literary Criticism. Commun ca tion of iterature through the med um of performance Prob ems of content structure and sty e n poetry drama and prose Prerequ s te COM 241 or approva of nstructor Credit 3 hours

442 Interpretation and the Mass Media. The re ation sh p of modern med a rad o TV and f m) to ora nterpretat on and terature Cred t 3 hours

443 Interpreters Theatre: Theory and Practice. Stud es in visual percept on audience psychology, theory, and cr t cism; pract ce in directing, analyzing script ng, and staging of iterature Prerequ site· COM 243 or approva of nstructor Credit 3 hours

450 Topics in Public Address. The h story and cr t c sm of· (a) Amer can speakers (1700 to 1900 b contempo rary speakers (1900 to present ; and (c) Brit sh speakers. Top cs offered a ternate semesters. Cred t 3 hours each semester

467 Communication of Innovations. Ro e of commun - cat on n diffus on of nnovat ons Princ p es for effect ve use of commun cation for p anned change n var ous socia systems Prerequisite· upper d vis n stand ng. Credit 3 hours

473 Persuasion. Commun cat on var ab es wh ch nf u- ence and mod fy att tudes and behav or of rece vers Prerequ s te COM 100 or 312 Cred t, 3 hours

476 Political Communication. Theory and research re lated to po itical campa gn communication The persuasive process of po t ca campa gning the ro e of the med a the cand date and nage creation P erequ s te upper d v s on standing Cred t 3 hours

477 Legal Communication. The ega sett ng as a com mun cation event, featuring discuss on of ury se ect on egal nterv ew ng, negotiat ons and jury behav or Pre requ s te. upper d v s on stand ng. Cred t 3 hou s

480 Methods of Teaching Communication and Theatre. Analys s, organ zation, and presentat on of textua and other c assroom mater a s Cred t, 3 hours

481 Teaching Practicum. Teach ng h gh schoo stu dents the fundamentals of forens cs Offered n S mmer Sess on only Cred t 2 hours

494 Special Topics. Spec a topics cou ses, nc ud ng the fo low ng wh ch are regu ar y offered are open to a students freshmen by approva of nstructor on y Cred t 3 hours

a Critic sm of Emp r ca Research
(b) Measurement in Commun cat on
(c) Quant tative Methods n Commu cat on Research
(d) Relationsh p Commun cat on
(e) Urban Communicat on
(f) Cr s s Communicat on
g) nternationa Commun cat on
h Stud es n Commun cat on Educat on
(i Speech Wr ting and Manuscr pt Speak ng
j) Preachers and Preach ng
(k Women s Commun catio
) Ethics n Commun cat on
m) Methods of Ag tat on and Contr
(n) Med ca Commun cat on
(o) Commun cation and the Ag ng
(p) Trans Rac al Commun cat on
(q) App ied Genera Semant cs
(r) Research Studies n Aesthet cs
(s) Voca Behav or in Language

591 Seminar. Top cs may be se ected from those sted be ow Credit 3 hours

(a) Commun cat on Stud es he Rhetor a Trad t on
b) Commun cat on Stud es Contemporary Rhetor ca Perspect ves
(c Contemporary Rhetor ca Theory
d Rhetor ca Cr t c sm
e) Persuas on
f) nterpretat on H stor ca Funct on
g) Interpretat on: Contempo ary Perspe t ves
h Group Communicat on
Emp r ca Research n Commun at n
j) Theor es of Commun cat on
k Organ zationa Commun cat n
Commun cation Education
m Theory and Mode Construct on n Communication
(n Intercu tura Commun cation
o) Po t ca Communicat on
p Language n Commun cat on

Special Courses: COM 500, 580 584 590 592 593 594 598 599 (See page 31)

COMMUNICATION DISORDERS

CDX 305 Survey of Communication Disorders. Ro e of the parent teacher and others in support of eva uat on and treatment of commun cat on d sorders Not open to Speech and Hear ng Sc ence majors Cred t 3 hours.

306 Fundamentals of Communication Science. ntro duction to perception and memory pro esses n speech and language Cred t 3 hours

310 Anatomy and Physiology of Speech. Anatomy and phys ology of the neura muscular and ske eta systems which subserve human speech behav or C ed t 3 hours

311 Anatomy and Physiology of Hearing. Anat my and phys o ogy of the per pheral and centra systems wh ch subserve hear ng Cred t 2 hours.

315 Acoustics in Communication. Nonca cu us ntro duct on to acoust cs with emphas s toward the

measurement of human commun cation processes Three hours lecture 3 hours rec tat on Prerequ s te a gebra trigonometry phys cs C ed t 4 hours

320 Introduction to Audiology. Aud tory funct on ts measurement and mportance Prerequ s tes· CDX 311 315 Cred t 3 hours

330 Management of Hard of Hearing People. nforma t on about hear ng mpa rment and hear ng impa red persons Cred t 3 hours

350 Phonetics. Speech sounds and the app cat on of the nternationa Phonet c A phabet to Amer can speech Cred t, 3 hours

367 Language Acquisition in Early Childhood. The process of anguage deve opment n the norma ch d from birth through preschoo Open to Speech and Hear ng Science majors as freshmen Cred t 3 hours

375 Speech Science. The normat ve aspects of speech hear ng and anguage Prerequ s tes CDX 310, 311 Credit 3 hours

380 Introduction to Communication Disorders. Com par son of norma w th d sordered commun cat ve processes Prerequis te CDX 375 Cred t, 3 hou s

390 Problems of Articulation. Deta ed ana ys s of d s orders of art cu ation Prerequ s te CDX 380 or approva of nstructor Cred t 2 hours

395 Methods of Modifying Communicative Behavior. Princ p es and techn ques of mod fy ng speech and an guage behav or Two hours e ture 4 hours aboratory Prerequ s te. approva f nstructor Cred t 4 hours

400 Methods of Audiometry echn ques and nstru mentat on used n measur ng aud tory thresho d and aud ogram nterpretation Three ectures 2 hours abo ratory Prerequ s tes CDX 315 320 Cred t 4 ho rs

425 Acoustic and Physiologic Phonetics. The acoust c and phys o og c character st cs of speech sounds Pre requ s tes· CDX 315 350 Cred t 3 hours

427 Experiences in Hearing Conservation: Part c pa t on n the un vers ty hear ng onservat on program Two hours exper ence per week per hour of cred t May be repeated for cred t. Prerequ s tes CDX 400 and ap prova of nstructor. Cred t 1 3 hours

430 Psychology of Hearing Handicapped Children: The effects of hear ng mpa rment on ch d a guage acqu s t on inte ectua deve opment persona ty deve opme t and educat ona p acement Cred t 3 hours

432 Aural Rehabilitation Children heor es and pract ces n the rehab tat on of hear ng hand capped ch dren Credit 3 hours

435 Noise and Society. Effects of no e on nd v dua s and communit es and pract ca so ut ons to no se prob-lems. Prerequ s te CDX 315 or approva of nstructor Credit 3 hours

445 Perception and Production of Speech. Recent advances n speech percept on and product on re evant to commun cat on d sorders May be taken concurrent y w th CDX 425 Prerequ site CDX 375 or approva of n structor Credit 3 hours

450 Observation of Practicum. Superv sed observat on of a m nimum of 25 c ock hours of eva uat on and ther apy represent ng the areas of anguage speech and hearing Prerequ s te approva of nstructor Cred t, 1 hour

465 Child Language Acquisition. Cons derat on of the most recent deve opments n the study of ch ld an guage acquisition Cred t, 3 hours

470 Psychology of Language. The nat re of anguage and the effect of anguage acqu s t on on thought Credit 3 hours

485 Language and the Mentally Retarded Child. The specia d ff cu t es that menta y retarded ch dren encounter in acqu ring anguage a d anguage nterven t on strateg es for retarded ch dren are exam ned Persons enrol ed w observe and whe poss b e work w th a retarded ch d Cred t 3 hours

491 Disorders of Fluency. Causes therap es and cur rent trends n prob ems of speech f uency Cred t 3 hours.

501 Procedures of Audiometry. Methods f obta ng and eva uat ng aud ometr c measures Three ectures 2 hours aboratory Prerequ s tes CDX 315 320 Cred t 4 hours

502 Advanced Audiology. Procedures n d ffe ent a d agnosis of aud tory patho og es Three hours lecture 2 hours aboratory Prerequis tes CDX 400 Cred t 4 hours.

504 Auditory Prosthetics. Operat on and app cat on of ampl fy ng dev ces re at ve to the aura y hand capped Three hours lecture 2 hours ab Prerequ s te CDX 4 0 Cred t 4 hours

519 Research Procedures in Communication Disorders. Research ph osophy and mode s as app ed to data co lect on, evaluat on and report ng n the f e d of commun cation d sorders Cred t 3 hours

520 Stuttering. Trends n understand ng and work ng w th persons who stutter Cred t, 3 hou s

521 Treatment of Disorders of Fluency D s uss on of procedures currently used to mprove speech f uency Concurrent enro ment n CDX 551 requ red Prerequ s te CDX 491 or 520 and approva of nstruct Cred t 2 hours

525 Advanced Physio-Acoustic Phonetics. The phys o-acoust c aspects of the speech s gna Prerequ sites CDX 315 350 Cred t, 3 hours

527 Evaluation: Audiometric Measurement. One hour staff ng per week and two hours c ent contact per week per hour of cred t May be repeated for cred t Prerequ s te approva of nstructor Cred t 6 hours

528 Adult Aural Rehabilitation. Genera pr nc p es of rehabi tat on of the aura ly hand capped adu t nc ud ng educat ona and prosthet c approaches Prerequ s te CDX 504 or approva of nstructor Cred t, 3 hours

530 Administration of Public School Speech Therapy Services. Present pract ces n pub c school therapy programs and designs for nnovat ve change Cred t 3 hours

531 Advanced Psychology of Aurally Handicapped Children. Hear ng mpa rment and its effects on an guage nte l gence, persona ity and educat on Cred t 3 hours

532 Advanced Aural Rehabilitation for Children. Theo r es of rehab l tation of aural y hand capped ch d en Credit, 3 hours

535 Urban Noise. Prob ems of no se n an urban env ronment and approaches to the r so ut on Prerequ s te CDX 315 Cred t 3 hours

540 Differential Diagnosis Lecture d scuss on of pro cedures appropr ate for assess ng anguage spee h acqu s t on inte lectua deve opment persona ty and soc a development of persons w th commun cat on dis orders Prerequ s tes EDP 454 and approval of instructor. Cred t 3 hours.

541 Evaluation: Differential Diagnosis. Two hours su pervised cl ent contact per week per hour of cred t May be repeated for credit Prerequisite approva of nstruc tor Cred t, 1 3 hours

545 Speech Perception and Production. Current prog ress in product on and perc•ption of speech May be taken concurrent y w th CDX 525 Prerequ s te CDX 375 or approva of nstructor Cred t 3 hours

550 Therapy: Beginning Practicum. One hour staff ng per week and two hours c ent contact per week per hour of cred t May be repeated for cred t. Prerequ s te approva of nstructor Cred t 1 6 hours

551 Therapy: Advanced Practicum. Superv sed pract - cum for all therapy serv ces prov ded to persons w th commun cat on d sorders nc uding aura rehab tat on artic u ation aphas a cerebra pa sy c eft pa ate an guage stutter ng and vo ce One hour staff ng per week and a minimum of two hours c ent contact per week per hour of cred t May be repeated for cred t P erequ s te. approva of instructor Cred t 1 6 hours

564 Internship in Communication Disorders. Off-campus directed experiences in either speech pathology, language disorders or hearing disorders. Students must reserve enrollment by mid-semester of the previous semester. Special permission from the department is required. May be repeated for credit. Credit, 1-6 hours.

565 Child Language Development. Recent advances in the study of child language development. Credit, 3 hours.

566 Psycholinguistics. Language and thought in interaction. Credit, 3 hours.

567 Language and Mental Retardation. Problems of language acquisition among mentally retarded children. Credit, 3 hours.

570 Professional Issues in Communication Disorders. Professional issues facing graduating students in communication disorders as they relate to individual class members and their involvement in the profession. Credit, 3 hours.

575 Neurological Disorders of Speech — Aphasia. Communication disorders related to damage to the language sections of the central nervous system; assessment and treatment of persons manifesting such damage. Credit, 3 hours.

576 Neurological Disorders of Speech — Cerebral Palsy. Communication disorders related to cerebral palsy — assessment and treatment. Credit, 3 hours.

577 Orofacial Disorders of Communication — Cleft Palate. Communication disorders related to anomalies of the orofacial structures, including cleft lip with or without cleft palate, and dental malocclusion. Prerequisite: CDX 310 or approval of instructor. Credit, 3 hours.

578 Disorders of Voice. Communication disorders related to dysfunction of the phonatory and resonance systems of voice production, assessment and treatment. Prerequisite: CDX 310 or approval of instructor. Credit, 3 hours.

590 Reading and Conference. Credit, 3 hours.

591 Seminar. Credit, 3 hours.

592 Research. Credit, 3 hours.

Special Courses: CDX 494, 498, 500, 580, 593, 598, 599.

THEATRE

General Studies in Theatre: History, Literature, and Theory

THE 100 Introduction to Theatre. Elements and principles of the theatre. Lecture and discussion. Credit, 3 hours.

300 Film: The Creative Process. Elements of the theatrical film: cinematography, sound, editing, directing, acting, scriptwriting, producing, and criticism. Three lectures, 2 hours laboratory. Credit, 3 hours.

320, 321 History of the Theatre. First semester traces major developments in theatre production from its beginning through the 17th century; second semester continues the survey to modern times. Credit, 3 hours each semester.

325 Play Reading. Assigned independent reading programs of plays most frequently included in the modern repertory. May be repeated for credit in different sections. Credit, 1 hour. Areas of emphasis:

(a) Modern European

(b) Modern English and Irish

(c) Modern American

(d) Plays for High School Production.

420 History of the American Theatre. History of the plays, artists, and events in the development of the American theatre from colonial to modern times. Credit, 3 hours.

421 History of the English Theatre. History of the plays, artists, and events in the development of the theatre in England since the Restoration. Credit, 3 hours.

425 History of the Oriental Theatre. History and production techniques of theatre forms in India, China, and Japan. Prerequisite: six hours of theatre history or approval of instructor. Credit, 3 hours.

503 Studies in Theatre History. Resources, ideas, and trends in a major area of theatre history with application to modern theatre production. Credit, 3 hours.

504 Studies in Dramatic Theory and Literature. Major dramatic themes from the classical period to the present; related readings in dramatic literature. Credit, 3 hours.

505 Studies in the Theory and Practices of Acting and Directing. Major theories and actual practices in world theatre. Credit, 3 hours.

506 Studies in Scenic Environments. Coordinated studies in conceptualizing the scenic environment with emphasis on innovative visual statements appropriate to actual production. Credit, 3 hours.

510 Studies in Literature. Assigned individual reading programs in standard sources and masterpieces in theatre literature. May be repeated for credit in different sections. Credit, 1 hour. Topics may be selected from the following:

(a) Acting-Directing
(b) Design-Technical
(c) History
(d) Criticism

591 Seminar: Methods and Materials of Research in Child Drama. Credit, 3 hours.

Special Courses: THE 494, 498, 499, 590, 592, 594, 598, 599.

THEATRE PERFORMANCE AND PRODUCTION

THP 101 Introduction to the Art of Acting. Lectures, exercises, and projects in acting. Special sections provided for the nonmajor and theatre students who plan no additional acting courses. Credit, 3 hours.

105 Acting: Stage Movement. Exercises and techniques to achieve freedom and control; emphasis on creative movement in characterization. Prerequisite: THP 101 and/or approval of instructor. Credit, 3 hours.

106 Acting: Stage Speech. Exercises and techniques to free the voice and improve projection, resonance, and articulation. International Phonetic Alphabet and Standard Stage Speech will be covered. Prerequisite: THP 101 and/or approval of instructor. Credit, 3 hours.

113 Acting: Makeup. Techniques of theatrical make-up; laboratory projects. Credit, 3 hours.

205 Acting: Workshop. Rehearsal and public performance of assigned scenes. May not be taken concurrently with THP 315. Prerequisites: THP 101, 105, 106 and/or written approval of instructor. Two hours performance-lecture; 6 hours rehearsal laboratory. Credit, 3 hours.

206 Acting: Character Analysis. Problems, methods, and procedures of actors in preparing a role for presentation on the stage through the most frequently included plays in the world repertoire. Prerequisite: THP 205 or written approval of instructor. Credit, 3 hours.

213 Introduction to Technical Theatre. Procedures of technical theatre production. Lecture and demonstration. Topics include design and construction of scenery; lighting; and properties. Prerequisite: Theatre major, minor, or approval of instructor. Credit, 3 hours.

215 Directing: Theatre Techniques. Basic tools of the director: composition, blocking, floor plans, stage business, auditions, rehearsal techniques, etc. Prerequisites: THP 101, 213 or written approval of instructor. Credit, 3 hours.

301 Theatre Production. Participation in University Theatre productions. Prerequisite: written approval of instructor. May be repeated for credit. Credit, 1-3 hours.

305 Acting: Modern Workshop. Rehearsal and public performance of modern, realistic, avant-garde, and musical plays. May not be taken concurrently with THP 415. Prerequisites: THP 205, 206, and/or written ap-

proval of instructor. Two hours performance-lecture; 6 hours rehearsal-laboratory. Credit, 3 hours.

306 Acting: Period Workshop. Rehearsal and public performance of period plays from the Greeks to the advent of modern realism. May not be taken concurrently with THP 416. Prerequisites: THP 205, 206, and/or written approval of instructor. Two hours performance-lecture; 6 hours rehearsal-laboratory. Credit, 3 hours.

307 Acting: The Method. An advanced class for individualized work on concentration, personalization, objective memory, images, substitution, creating inner and outer character. Exercises, monologues, and scenes. Prerequisites: THP 205, 305 or 306, and written approval of instructor. Credit, 3 hours.

311 Creative Drama. Theories, procedures, and materials for creative drama in the elementary and junior high schools. Related drama activities — storytelling, choral speaking, and puppetry. Not open to freshmen. Credit, 3 hours.

315 Directing: Workshop. Rehearsals and public performance of scenes and short plays. May not be taken concurrently with THP 205. Prerequisites: THP 215 and/or written approval of instructor. Two hours performance-lecture; 6 hours rehearsal-laboratory. Credit, 3 hours.

316 Directing: Analysis and Style. Play analysis and production style for the director, including preparation of complete prompt books for a modern and a period play. Prerequisites: THP 315 and/or approval of instructor. Credit, 3 hours.

318 Theatre for Children. Dramatic literature for children. Experience in acting, directing, and production techniques for child audiences. Credit, 3 hours.

330 Introduction to Costuming. History of theatrical costume. Laboratory experience in construction of costumes. Three lectures, 2 hours laboratory. Credits, 3 hours.

331 Costume Construction. Uses of materials and techniques for stage costumes with actual construction of period apparel. Prerequisite: THP 330. Credit, 3 hours.

340 Scene Design. Studio projects in designing realistic scenery for the contemporary proscenium stage. Prerequisite: THP 213 or approval of instructor. Credit, 3 hours.

345 Lighting Design. Principles of modern stage lighting. Two lectures, 2 hours laboratory. Prerequisite: THP 213 or approval of instructor. Credit, 3 hours.

405 Acting: Stage Dialects. Major dialects for the stage based upon study of the International Phonetic Alphabet. Prerequisite: THP 205 and/or written approval of instructor. Credit, 3 hours.

406 Acting: Manners and Movement. Physical movement for period plays; movement in costume and use of properties. Prerequisite: theatre major or approval of instructor. Credit, 3 hours.

407 Acting: TV Film. Special technical aspects of acting before a camera. Four hours a week. Prerequisite THP 205 and/or written approval of instructor. Credit, 3 hours.

411 Advanced Studies in Creative Drama. Application of theories, techniques, and materials for dramatization. Regular participation with children. Prerequisite: THP 311 or approval of instructor. Credit, 3 hours.

413 Acting: Special Make-up Problems. Special problems, styles, and materials for stage make-up. Prerequisite: THP 113 and/or approval of instructor. Credit, 1-3 hours.

415 Directing: Modern Workshop. Rehearsal and performance of modern, realistic, avant-garde, and musical plays. May not be taken concurrently with THP 305. Prerequisite: THP 315 and/or approval of instructor. Two hours performance-lecture; 6 hours rehearsal-laboratory. Credit, 3 hours.

416 Directing: Period Workshop. Rehearsal and performance of plays from the Greeks to the advent of modern realism. May not be taken concurrently with THP 306. Prerequisite: THP 316 and/or approval of instructor. Two hours performance-lecture; 6 hours rehearsal-laboratory. Credit, 3 hours.

417 Stage Management. Readings in stage management and participation as a stage manager in a University Theatre production. Prerequisite: written approval of instructor. Credit, 3 hours.

418 Advanced Studies in Theatre for Children. Experimentation with the creation, direction, and production of plays for children. Prerequisite: THP 318 or approval of instructor. Credit, 3 hours.

430 Costume Design. Pr nc p es of costume des gn w th spec a projects n period and modern styles Prerequ - s te THP 330 Cred t 3 hours

431 Advanced Costume Construction. Use of mater a s and techn ques for construct on of accessories, hats and armor Prerequ s te THP 331 or approva of in- structor Cred t, 3 hours

435 Advanced Technical Theatre. Se ect on of mater a s draft ng of work ng draw ngs tool operation and construct on techn ques Two ectures 2 hours abora tory Prerequ s te THP 213 or approva of nstructor Cred t 3 hours

440 Advanced Scene Design. Advanced stud o pr jects n des gn ng nonrea st c scenery for a var ety of stage forms Prerequ s te THP 340 or approva of nstructor Cred t, 3 hours

441 Scene Painting. Stud o projects n pa nt ng stage scenery Prerequ s te THP 340 or approva of nstruc tor Cred t, 3 hours

445 Advanced Lighting Design. Spec a zed techn ques n stage ght ng Two ectures 2 hours aboratory Pre requ s te. THP 345 or approva of instructor Cred t, 3 hours.

450 Theatre Organization and Management. Pr nc p es of admin ster ng profess ona and nonprofess onal thea tre product on organ zat ons Cred t 3 hours

460 Dramatic Composition for the Stage and Screen. Fundamentals of and practice n wr t ng for the theatre the motion p cture and telev s on Prerequis te wr tten approval of nstructor Cred t 3 hours

494 Special Topics. Cred t, 1 4 hours Top cs n ay be se ected from the fo ow ng

(a) Storyte ng and Ora Read ng
(b) Curr culum and Superv s on of Ch ld Drama n School
(c) Improv sat on and Theatre Games
(d) Puppetry
e) Playwr ting for Ch ldren

498 Pro-Seminar: Children's Theatre Tour. Prerequ s te wr tten approva of instructor Cred t 1 7 hours

584 Internship in Child Drama. Pract ca app at on of creat ve drama n the c assroom or on the p ayground Superv sed regu ar creat ve drama sessions w th ch dren. Prerequ s te. approva of nstructor Cred t 1 3 hours

594 Conference and Workshop in Child Drama. Pre requ site approva of nstructor Cred t 3 hours

Special Courses. THP 498 499 580, 584 590 591 592 593 594 598 599

Humanities (Center for the Humanities)

PROFESSORS:
(KRAUSE 104 DOEBLER LAMM WENTZ

ASSOCIATE PROFESSORS:
BROWN, BUSH, FRAZ ER

ASSISTANT PROFESSORS:
DONNELL FOARD GILL L U, MARQUARDT MART N, RADER

LECTURER:
HORW TCH

Major Requirements

Bachelor of Arts Degree Curriculum

The Center for the Hun inities c ffe s tw de gree programs: A Bache or of Arts degree in Humanities through the College of F ne Arts, which may also include cert fic ti n ir Sec ondary Humanities and a Bachelor of Arts in Education degree, Secondary Education (Humanities , through the C llege f Edu a tion. For the B.A degree n Humanities, students may elect a concentr it on n nterdis ciplinary hum inities re gious st idies, or humanities education The Interdisciplin iry Hun anit es concentration cons ts of 7(se mester hours of credit consisting of the interdiscipl nary c re a d select ons frc the fields of art architecture, d ince histcry liter ature (English and foreign langu ige mu ic, ph losophy, religious st id es, theatre, nd other performing arts Two fields of study must be chosen. Semester hours w ll be accu mulated in the following pattern first sub ect, 24 hours; second subject, 15 h urs, ar inter disciplinary cor of 3 semester h irs

The Relig ous Stud es concentrat n cc sists of 70 semester hours accu nul ited in the following pattern: 24 hours of religious stud es courses, 15 hours in a second subject, and a required core of 31 semester hours comprised of courses selected from relig ous studies a d interdisciplinary humanities n consu tat on with the advisor

The Humanities Educ it on con e tr t or consists of 70 hours of cred t n Hu in ties plus profession i educ ition c urses and a for eign language

Approved courses, specif c int rdis ip inary humanities and con parative arts cou ses reli gious studies courses and suggested elect ve courses are selected in consu t iti n w tl the advisor All students re stering in a Hui iani ties major program w ll enr l thrcugl tl e Co ege of Fine Arts All Hu i anit es degree programs require a m nimum of 2 h urs for graduation In addition to the ma r requ re- ments, General Studies a d other a ademic requirements are isted or page 35 of th s cat alog. *Minimum* grade point ndex for retent n in the Humanities curr cu um 0 29 hours 2 00; 30 59 hours, 2 25, 60 89 h urs, 2.50, 90 hours, or n ore, 2 75

Minor Requirements. A 24 se i ster l c ur n nor in Humanities s c ffered Tl s pr gr u norma ly includes 8 sen ester hours f er d v sion Hui anities courses plus 12 h irs o upper division Humanit es course ; er, al 2 hours n ay be upper divisi n N n re han 12 hours may be taken outs de the cc urse offer ings of the Hum inities Center E ectives m include applied, studio, techr ca , ar d l b ra tory work in the arts and l u n an ties but a ay not include courses n the teacl ng n r

Major Teaching Field Requirements

Bachelor of Arts Degree in Humanities Curriculum. Secondary Education (Human t es)

Consists of 70 hours of cred t in H n nities plus professional educ iti n c urses and a for

eign language Individualized course of study is designed in consultation with the advisor

Bachelor of Arts in Education Degree Curriculum. Secondary Educat on (Humanit es)

Requirements are the same as for the B A in Humanities Educat on concentration with the following exceptions general psych l gy, American history, one mathem tics and one science are required, a foreign language is not required Either the n ormal educ tion program or the on site program may be selected Students transfer to the Col ege of Education at the end of the sophomore year, but retain their Humanities adv sor

Minor Teaching Field Requirements. A interdisciplinary teaching minor in Humanities Secondary Education or Humanities Elementary Educat on may also be constructed under the 15 semester hour option of academic specialization, with the addition of 9 selected hours in the related field Individual course of study constructed in consultation with the advisor

Graduate Program

Consult the *Graduate Catalog* for requirements in the Interdisciplinary Humanities program leading to the degree Master of Arts

INTERDISCIPLINARY HUMANITIES

HUM and REL courses may be elected to meet General Studies requirements in Humanities and Fine Arts

HUM 101, 102 Ideas and Values in the Humanities. Interrelation of art architecture literature music philosophy religions, theatre and other performing arts in the modern world Class projects including attendance of cultural events are required Two lectures two discussion meetings per week Credit 4 hours each semester.

150 Introduction to Asia. Introduction to further study on Asia especially in the social sciences and humanities. (Part of programs in Asian studies and Humanities) Credit 3 hours Same as L A 150

301, 302 Humanities in the Western World. Interrelation of arts architecture, literature, music, philosophy, religions, theatre and other performing arts within the context of the major stylistic periods of Western culture Cultural achievements of the past as they relate to contemporary life Class projects, including attendance of cultural events, required. Two lectures two discussion meetings per week Credit, 4 hours each semester

303, 304 Humanities in the Eastern World. Interrelation of arts architecture, literature music, philosophy religions, theatre and other performing arts in Middle and Far Eastern civilizations. Cultural achievements of the past as they relate to contemporary life Class projects including attendance of cultural events are required Open to all undergraduates Two lectures two discussions meetings per week Credit 4 hours each semester

401 Humanities in World Cultures. A humanities study program of foreign travel Fine and performing arts of the various world cultures Art galleries museums drama dance and musical events constitute a basic part of the itinerary Term paper required May be repeated for credit Prerequisite HUM 301 302 or 303 304 or approval of instructor Credit 6 hours

402 Technology, Society and Human Values. Values which motivate mankind to create technology Areas of conflict and resolution between basic human values and technological society. Reading and discussion with visiting lecturers Prerequisite. junior standing or above One lecture two discussion meetings per week Credit 3 hours. (Also listed under ASE 402)

403, 404, 405, 406, 407, 408, 409, 410 Comparative Arts Courses. Arts literature regions and the performing arts within the context of social institutions and philosophic perspectives. May be taken concurrently Prerequisites HUM 301 302 or approval of instructor Credit 3 hours each course

403 The Classical Period. Ancient Greece through the Roman Era

404 The Arts of Christianity. Christian period Ca o ng an Renaissance through the Gothic Era

405 European Renaissance. Italian and English Renaissances, beginnings of our modern world

406 The Age of Reason. Baroque, neoclassism and the rococo

407 Nineteenth Century. Romanticism realism symbolism in the arts

408 The Twentieth Century. The modern world especially American the Twenties jazz and the avant garde

409, 410 The Eastern World, I, II. Selected thought and monuments of the East and Near East

418 Perception and Judgment in the Arts. Application of perception theory to the arts Creativity art forms as icons of experientia reality and role of language in evaluation and judgment. Comparative approach and development of critical values Prerequisite junior standing Credit, 3 hours.

470 Women and the Humanities. Topics will be selected from the following woman as artist women and religion; images of women in art literature and media women in Western culture. Prerequisite junior standing Credit, 3 hours

475 Myth and Symbol. Myth and symbol as a fundamental language of the human ties and as reflective of values in human experience that transcend the boundaries of time and space The r express on in literature the visual arts and the performing arts Credit 3 hours

480 Methods of Teaching the Humanities. Methods of instruction, organization discussion and presentation of the courses in the interdisciplinary humanities Prerequisites HUM 301, 302 and approval of instructor Credit, 3 hours.

494 Special Topics in the Humanities. Open to all students. Credit 3 hours Topics may be elected from the following

(a) Western Historical or Contemporary Cultures

b Non Western Cultures

c) Cultures of Ethnic Minorities

d Fine and Performing Arts

495 Senior Seminar. Problems of comparative methodologies and principles of synthesis of disciplinary areas in the humanities Credit 3 hours

498 Pro-Seminar in the Humanities. For students with a major or minor in humanities Other students admitted with approval of instructor Credit 3 hours

520 The Esthetics of Film. Theory and criticism including film image and language film medium film as an interdisciplinary art form film and reality the film artist and the role and function of the film critic Emphasis on the experimental avant garde Credit 3 hours

525 Theory and Criticism of the Arts. Philosophical analysis of the esthetic experience and the art work to include social, moral, and the psychological functions of the arts Style, artistic truth, and definitions of art Credit, 3 hours

530 Pop Culture in America. The uses of leisure time by the great audience of American from a historical perspective which consumes and thus creates popular culture " Areas of concern will include television and radio film and stage, music, art and paperbacks Credit 3 hours

535 Artistic Styles in World Cultures. The arts as they inf uence and are inf uenced by cultural and soc o econom c factors Focus on styl st c deve opments n l terature and the f ne and perform ng arts. Cred t 3 hours.

540 Research in the Humanistic Disciplines. B bl o graph c methodo ogy, ma n reference sources and research too s necessary for scho ar y research in the interd sc pl nary Human ties Know edge of a fore gn language recommended. Cred t 3 hours

544, 545 Esthetic Principles in Eastern Humanities I, II. Pr nc p es and issues n arts and esthet cs w th n the context of nterdisc p nary human t es in the Eastern Wor d. Integrat on of trad tiona and contemporary es thet c expression n the visua verba and perform ng arts Prerequ s tes HUM 409 410 or approva of n structor Cred t 3 hours each semester

550 Technology and the Arts. The mpact of techno ogy on art mus c l terature dance and other art forms Industr a Revolut on to the present w th emphas s on the deve opments in the ast de ade Cred t 3 hours

560 The Role of the Future in Humanities. The re e- vance of past and present events and deas w th n the Human t es to the deve opment of va ue systems, where n the probab e and poss ble futures may be syn thes zed nto a preferab e future Cred t 3 hours

591 Seminar. Cred t 3 hours Prerequ s te Human t es graduate student or approva of instructor

603 Curriculum Development in Humanities Education. Issues patterns and procedures n human t es curr cu a. Prerequ s te Human t es graduate student or approva of nstructor Credit 3 hou s

610, 611 Philosophic Foundations of Humanities Education. Bas c issues in nte ectua trad t ons of the Western World wh ch are foundat ona to the ph oso ph es of human t es educat on Prerequ s te Humanities graduate student or approva of instructor Cred t 3 hours each semester

613 Ancient Greece. Thought and art stic ach evements of the anc ent precursors to our Western c v l zat on Prerequisite HUM 403 or approva of instructor Cred t 3 hours

615 Arts in the Age of Elizabeth. Arts and symbo s n the l fe of E zabethan Eng and A reconstruct on of court ife as an mage of the dea major authors con ography of the per od Prerequis te HUM 405, or approval of the instructor Credit 3 hours

616 Baroque Themes/Classical Order in the Arts Para lel themes and mages n an advanced study of the performing arts, terature and thought of 17th and 18th century Europe Prerequ s te HUM 406 or ap proval of nstructor. Credit 3 hours

618 Contemporary Issues in the Humanities. Soc a po itica and mora issues and the r express on in the perform ng, f ne and l terary arts Prerequ s tes HUM 408 or aproval of nstructor Cred t 3 hours

Additional courses may be selected from Cultural Anthropology, Architecture Art Cultural Geography, Cultural History, Dance, Foreign Languages and Engl sh (Literature), Mass Commun cat ons Mus c Ph osophy Speech and Theatre.

Special Courses: HUM 294 492, 493 497 499 584 590 592, 594 598 599 600 680, 684 690 691, 692 (See page 31.)

RELIGIOUS STUDIES

Religious Studies s a separate concentrat on w thin the Center for the Humanities Students may select re g ous studies as a f rst or second subject emphas s f e d as part of the degree programs n Human t es Courses in rel gious stud es may a so be e ected to meet General Stud es requ rements n the Human t es and F ne Arts

REL 121 Religions of the World. An ntroduct on to re gious trad t ons of the world Buddh sm Hindu sm s am and Chr st an ty Credit 3 hours.

122 Ways of Being Religious. Compar son of var ous re g ous express ons of mank nd focusing on such themes as encounter w th the Ho y, man s search for se f and for commun ty myst ca uminat on through sp r tua freedom and d sc p ine Credit 3 hours

300 Religious Themes in Western Culture. The re g ous d mens ons of Western culture exp ored n themes such as death, mean ng, sa vat on and freedom Works of f ct on poetry drama, art music phi osophy and theo ogy may be used Cred t 3 hours

305 Ritual, Symbol and Myth. Ritua symbol and myth as types of re ig ous express on with examp es selected from the re ig ons of the wor d Cred t 3 hours.

311, 312. Western Religious Traditions. Re g ous trad - tions of Ancient Persia Mesopotam a and Egypt, and the rise of Judaism, Chr stian ty and slam inc ud ng the nf uence of such movements as gnost c sm the myster es and He len sm Cred t 3 hours each semester

314 Formation of the Christian Tradition. Or g ns de ve opment and expans on of Chr st an ty major themes and tens ons from New Testament wor d to eve of the Protestant Reformat on Credit 3 hours

316 Types of Early Judaism. The post B b ica deas and forms of Juda sm, inc udes Rabb n c and He enic deve opments Cred t, 3 hours.

322 Religion in American Life and Thought. The ro e of rel g on in Amer can history. Funct ons, contr but ons tens ons, and perspect ves of re gion n Amer can cu ture Credit 3 hours

325 Biography in American Religion. Amer can re i g ous deas and nst tut ons through the ves of representat ve Americans REL 322 recommended Cred t 3 hours.

330 Native American Religious Traditions. W r d views and re g ous thought presented through the art arch tecture l terature mus c, mythology ritua and fo k ore of representat ve tribes n North Amer ca Cred t 3 hours

341 Contemporary Religious Thought. ssues n current Western rel gious thought such as theo gy and revo u tion, Juda sm and Chr st an ty, the mpact of sc ence on rel g on the death of God controversy the B b e and trad t on Credit 3 hours

351 Religious Traditions of the East. The major re gious trad t ons of the East, nc ud ng H ndu sm Buddh sm Confuc an sm and Tao sm Cred t 3 hours

371 New Testament. Orig ns and terature of the ea y Chr st an church h stor ca nvest gat ons f the type of oral and written trad t on found n the New Testament Cred t, 3 hours.

373 Introduction to the Talmud. The bas c roots of Jew sh aw, heritage and trad t ons A rev ew of aws concern ng God man revelat on fam y and fest val observances Credit, 3 hours

374 Classics of Christian Literature. The nteract on of Christ an thought and culture as seen n representat ve Chr st an terature of var ous ages ea y Chr st an to contemporary) Cred t 3 hours

381 Religion and Ethical Issues. The manner n wh ch human rel g ousness re ates to soc a concerns e g sexua ity the env ronment b o eth ca ssues and v olence Cred t 3 hours

405 Problems in the History of Religions. An n depth cons deration of selected prob ems n the h story of re g ons e g. r tua as creative process interpretat on of mytho ogy, nitiat on cr sis cu ts Cred t 3 hours

411 Religion in the Middle Ages. Rel gious aspects of medieva fe and thought var ety of forms of d ssent, heresy and reform movements 4th to 13th centruy Cred t 3 hours.

412 Reformation and Modern Christianity. Protestant Reformation to contemporary Chr stian moveme ts· n c udes factors n the d sso ut on of the Med eval Chr stian synthes s, variety of reform movements and reformat on patterns Catho c counter reform mea sures formation of ibera theo ogy ecumen cal

movement, World Council of Churches. Credit, 3 hours.

415 The Jewish Mystical Tradition. Examination of some of the esoteric lore of Judaism. Movements and literature such as Hasidism and Kabbalah will be studied. Credit, 3 hours.

422 American Puritanism and Its Early Rivals. The Puritan way in 17th and 18th century America. Relation of Puritanism to the rest of religion and culture in those centuries. Continuing influence. Prerequisite: REL 322 or approval of instructor. Credit, 3 hours.

423 Revivalism, Reform, and Americanism. The unique religious phenomena of 19th century America. The development of an American religious consensus and the dissenting movements. Prerequisite: REL 322, or approval of instructor. Credit, 3 hours.

424 Secularization and American Religion. Movement, institutions, and religious thought in the 20th century. Special attention to secularization and its effects. Prerequisite: REL 322 or approval of instructor. Credit 3 hours.

430 Native American Mystical Traditions. Consideration of Native American mystical practices such as shamanism, vision quest, dreaming, divination, and the use of medicines and drugs such as peyote. Prerequisite: REL 330 or approval of instructor. Credit, 3 hours.

435 Problems in Native American Religions. An in-depth consideration of selected problems in Native American religions. Prerequisite: REL 330, 331, 430, or approval of instructor. Credit, 3 hours.

441 Process Theology. The impact of modern process philosophies on current religious thought. Emphasis on the use of A.N. Whitehead's philosophy in the rethinking of traditional Christian concepts, Catholic and Protestant. Credit, 3 hours.

442 Existentialist Theology. The contribution of existentialist thinkers, especially Kierkegaard, to the work of theologians such as Martin Buber, Rudolf Bultmann, and Paul Tillich. Credit, 3 hours.

451 The Religious Traditions of India. The religious literature, art, history and thought of India, focusing on such traditions as Hinduism and Buddhism. Credit, 3 hours.

455 The Religious Traditions of China and Japan. The religious literature, art, history and thought of the Far East, focusing on such traditions as Confucianism, Taoism, Buddhism, Zen, and Shintoism. Credit, 3 hours.

460 The Religious Tradition of Islam. The Islamic religious tradition from the time of the Prophet down to the present day. Major religious figures, practices, institutions and movements will be examined. Credit, 3 hours.

462 The Arts and Sciences of Islam. The scientific, literary and artistic achievements of Islamic civilization. Credit, 3 hours.

464 The Sufi Way. Asceticism, mysticism, and illuminationism in Islam. Focus on representative Sufi saints, their systems and modes of expression. Credit, 3 hours.

494 Special Topics in Religious Studies. Open to all students, freshmen by approval of instructor only. Topics may be selected from various areas. Credit, 3 hours.

498 Pro-Seminar in Religious Studies. For students with a major or minor emphasis in Religious Studies. Credit 3 hours.

522 Political Religion in America. Investigation of the relationship between American religion and the political process. Such topics as civil religion, millennialism, and American destiny will be examined. Prerequisite: REL 322, and 422, 423, or 424. Credit, 3 hours.

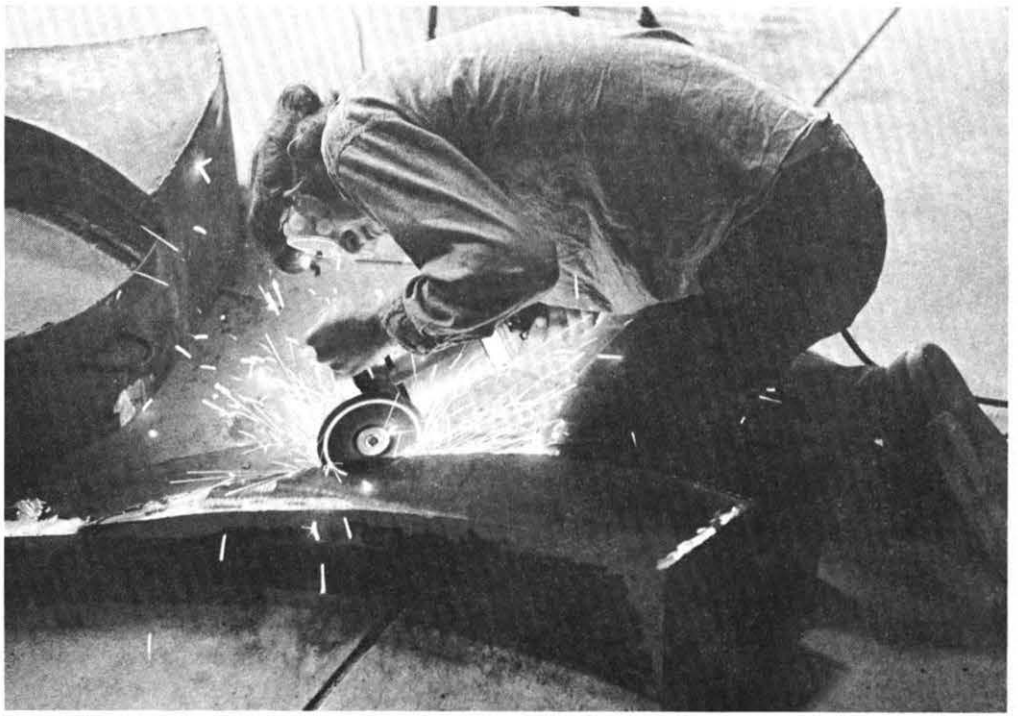
541, 542 Issues in Contemporary Theology. Detailed study of one or two prominent thinkers, (e.g., Paul Tillich, Teilhard de Chardin) or developments (e.g., theology of liberation, theology and technology) in contemporary religious thought. May be repeated for credit for different topics. Credit, 3 hours each semester.

550 Selected Religious Thinkers of the East. Life and thought of a non-Western contemporary religious thinker (i.e., Aurobindo, Radhakrishnan, Suzuki, Mishima, etc.). Credit, 3 hours.

591 Seminar. Prerequisite: Religious Studies graduate student or approval of instructor. Credit, 3 hours.

624 Problems in American Religion. Examination of topical issues such as dissent, consensus, pluralism; representative American religious thinkers; fundamentalism and modernism. Prerequisite: Religious Studies graduate student or approval of instructor. Credit, 3 hours.

Special Courses: 499, 584, 590, 592, 594, 598. (See page 31.)



Music

PROFESSORS:
(MUSIC 183), BRITTON, BULLOCK
CARROLL, DALES, DRESSKELL, ENGLISH
FLETCHER, JOHNSON, LOMBARDI, LoPRESTI
McEWEN, RICKEL, SEPP, SPINOSA
STELLHORN, STRANGE

ASSOCIATE PROFESSORS:
ANDRESS, ATSUMI, BARBOUR, BOWERS
CASTLE-TURNER, COHEN, D'ANDREA
HAERLE, HANNA, HINES, HOWERY, McLEOD,
MAGERS, PRIDONOFF, PUTNIK, RATTERREE
RAUSCH, RAVE, REYNOLDS, ROBINSON,
RUCCOLO, SMITH, STALZER

ASSISTANT PROFESSORS:
BLOEMENDAAL, FLEMING, HAEFER, HOFFER,
HOLBROOK, KLIEWER, LOCKWOOD, MILLER
NUTATIS, PORTER, SCAMMON, SWAIM
WILSON

INSTRUCTORS:
COSAND, HACKBARTH, SUNKETT
WILLIAMSON, WYTKO

The Department of Music is a member of the National Association of Schools of Music, and the requirements for entrance and graduation set forth in this catalog are in accordance with the published regulations of the Association. The following statement on Basic Musicianship is endorsed by the Department of Music.

"All musicians, whether performers, composers, scholars or teachers, share common professional needs. Every musician must to some extent be a performer, a listener, an historian, a composer, a theorist, and a teacher. For this reason, certain subject matter areas and learning processes are common to all baccalaureate degrees in music.

"Basic musicianship is developed in studies which prepare the student to function in a variety of musical roles which are supportive of his major concentration. All undergraduate curricula, therefore, provide the following:

1. A conceptual understanding of such musical properties as *sound, rhythm, melody, harmony, texture* and *form* and opportunities for developing a comprehensive grasp of their interrelationships as they form the cognitive affective basis for listening, composing and performing.
2. Repeated opportunities for enacting in a variety of ways the roles of listener (analysis), performer (interpretation), composer (creation), scholar (research), and teacher.
3. A repertory for study that embraces cultures and historical periods."

Departmental Major Requirements

For advisement purposes, all students registering in a music major program will enroll through the College of Fine Arts. All music degree programs require a minimum of 126 hours of graduation. In addition to the major requirements listed below, General Studies and other academic requirements are listed on page 33 of this catalog.

Placement Examinations. All students enrolled in an undergraduate music degree program are required to take placement tests in theory, piano and a major performing medium at the time they enter the university. This includes transfer students who have completed four semesters of theory at another institution; they are required to reach a minimum level of achievement indicated on the Theory Placement Exam. Those who fail to do so must take and pass one of the MTC ? (level theory courses. Students are urged to write the Department of Music for suggestions for auditions in applied music.

Bachelor of Arts Degree Curriculum

Music Consists of 50 credit hours. The following courses are required:

Music Theory: MTC 25 ?21, 222, 223, 320, 322, 327

Music History and Literature MHL ?4 , ?4?

Major Performing Medium Eight credit hours (MUP 111 311)

Class Piano. MUP 131 13?, ?3 ?3? (unless waived by proficiency examination)

Recital Attendance Six semesters of MUP 100

Note: The remaining hours in music will be selected by the student in consultation with his advisor. At least 18 credit hours of music must be upper division.

Bachelor of Music Degree Curriculum

Major Consists of 84 credit hours. This curriculum offers fields of specialization in choral general music, instrumental music, jazz performance, music performance (accompanying, keyboard, orchestral instrument, voice), music theatre, music therapy, theory and composition. Choral general music and instrumental music majors are provided for students wishing to meet certification requirements for teaching in the public schools. The following requirements are included in each field of specialization.

Choral-General Music

Note: This degree program may include a teaching minor in instrumental music.

Music Theory MTC 12? ?? ?? ? 3 3? 3?7, 431

Music History and Literature MHL 241 242

Conducting MUP 209, 3?9

Music Education ME ?) 313 4?)

Major Performing Medium Eight credit hours of MUP 111 and 8 credit hours of MUP

311 to obtain a proficiency level necessary to meet the graduation recital requirement MUP 495 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) Students wishing to extend their proficiency beyond this level may continue to study in MUP 321

Ensemble: Eight different semesters of participation including at least six semesters of MUP 352 and or MUP 353, or the equivalent, four of which must be at Arizona State University

Recital Attendance Six semesters of MUP 100

Instrumental Music

Note It is strongly recommended that the degree program include a minor in choral music

Music Theory: MTC 125, 221, 222, 223, 322 327

Music History and Literature MHL 241, 242

Conducting: MUP 209

Music Education MUE 110, 325, 326, 327, 328, 336, 337, 338, 451 or 462

Class Piano MUP 131 132, 231, 232 unless waived by proficiency examination

Major Performing Medium. Eight credit hours of MUP 111 and seven credit hours of MUP 311 to obtain a proficiency level necessary to meet the graduation recital requirement MUP 495 completes the requirement.

Ensemble Eight different semesters of participation, four of which must be at Arizona State University String players must have a minimum of six semesters of MUP 345 Wind and percussion players must have a minimum of six semesters of MUP 361 or the equivalent

Recital Attendance Six semesters of MUP 100

Recommended Minor Choral-General Music MUE 480, MTC 431, MUP 339, 351 or 352 353 (two semesters) and voice (4 hours

Performance (Keyboard

Music Theory. MTC 125, 221, 222, 223, 320 or 321, 322, 325 (or 428), 327

Music History and Literature MHL 241, 242, 445 446

Repertoire and Pedagogy MUP 451, 481

Conducting. MUP 209

Major Performing Medium Sixteen credit hours of MUP 127 and 16 hours of MUP 327 to attain a proficiency level necessary to meet the graduation recital requirements A half recital (MUP 495 and a full recital MUP 496) are required

Ensemble: Eight credit hours with a minimum of six different semesters, of which two semesters of accompanying and two semesters of chamber music are required

Recital Attendance Six semesters of MUP 100

Performance (Orchestral Instrument

Music Theory. MTC 125, 221, 222, 223, 320, 322, 325, 327

Music History and Literature MHL 241, 242, 445 or 446

Repertoire and Pedagogy MUP 451 481

Conducting MUP 209, 343

Major Performing Medium Sixteen credit hours of MUP 127 and 16 hours of MUP 327 to attain a proficiency level necessary to meet the graduation recital requirements A half recital (MUP 495 and a full recital (MUP 496) are required

Class Piano MUP 131, 132, 231, 232 (unless waived by proficiency examination)

Ensemble. Eight credit hours of large ensembles within a minimum of six different semesters, plus four credit hours of small ensembles within a minimum of four different semesters.

Recital Attendance. Six semesters of MUP 100

Performance Voice

Music Theory MTC 125, 221, 222, 223, 320, 322, 325, 327

Music History and Literature MHL 241, 242, 445 or 446

Repertoire and Pedagogy MUP 451, 481

Conducting MUP 209

Major Performing Medium Sixteen credit hours of MUP 127 and 16 hours of MUP 327 to attain a proficiency level necessary to meet the graduate recital requirements A half recital (MUP 495) and a full recital (MUP 496) are required

Class Piano MUP 131, 132, 231 232 (unless waived by proficiency examination)

Ensemble Four different semesters of large ensembles, plus eight credit hours of ensemble within a minimum of six different semesters to be selected from large and or small ensembles.

Recital Attendance Six semesters of MUP 100

Additional Requirements Sixteen credit hours of credit in more than one foreign language, chosen from French, German or Italian A student may elect one year of one language, and either one or two semesters of the other s), chosen in conference with his advisor

Performance Accompanying)

Music Theory MTC 125, 221, 222, 223, 320, 322, 327, 428

Music History and Literature MHL 241, 242, 445 or 446, 452, 453

Diction and Repertoire MUP 250 (2 semesters), 451

Conducting: MUP 209

Major Performing Medium Sixteen credit hours of MUP 127, 8 credit hours of MUP 311, 8 credit hours of MUP 337. In addition, student will accompany two half-recitals (MUP 495), one for a singer, one for an instrumentalist during the junior year. (A half solo recital may be substituted for either of the above.) During the senior year the student will accompany two full recitals (MUP 496), one vocal and one instrumental.

Ensemble: Two semesters of MUP 381 (chamber music), two semesters of MUP 381 (two-piano ensemble), two semesters of MUP 388; two semesters of ensemble elective (minimum of six different semesters)

Recital Attendance Six semesters of MUP 100

In addition, the student will select two semesters of one foreign language (French, Italian, German recommended)

Music Theatre Voice

Music Theory MTC 125, 221, 222, 223, 320, 327

Music History and Literature MHL 241, 242, 446 and 2 elective hours

Conducting MUP 209

Major Performing Medium Eight credit hours of MUP 111 and 8 credit hours of MUP 311 to attain a proficiency level necessary to meet the graduation requirement for a public performance of two roles, one of which must be of major proportion

Class Piano MUP 131, 132, 231, 232 unless waived by proficiency examination)

Ensemble Eight semesters of MUP 381 and eight semesters of MUP 373

Recital Attendance Six semesters of MUP 100

Additional requirements Minimum of six credit hours each in theatre and dance

Music Therapy

Music Theory MTC 125, 221, 222, 223, 320, 327

Music History and Literature MHL 241, 242

Conducting MUP 209

Music Education MUE 321, 323, 325, 327, 335, 336, 337

Music Therapy MUE 261, 261, 341, 342, 361, 461, 475, 476

Major Performing Medium Eight credit hours of MUP 111 and eight credit hours of MUP 311.

Piano: Proficiency equal to six semesters of study

Voice: Four semesters of study

Ensembles. Eight semesters of participation with at least four semesters in large groups and at least two semesters in small groups

Recital Attendance Six semesters of MUP 100

Additional requirements Four credit hours of functional dance; specified courses in Social and Behavioral Sciences

Note: Student must apply to the National Association for Music Therapy for registration as a Music Therapist on completion of the requirements for graduation

Jazz Performance

Music Theory. MTC 125, 221, 222, 223, 224, 315, 316, 321, 322, 323 and 482, 327

Music History and Literature MHL 241, 242, 352 or 353

Conducting MUP 209, 334, 434

Major Performing Medium Eight credit hours of MUP 111 and 8 credit hours of MUP 311 to obtain a proficiency level necessary to meet the graduation recital requirements. Two half recitals (MUP 495) are required, with one in the jazz idiom

Class Piano: MUP 131, 132, 231, 232, 235, 236 (unless waived by proficiency exam)

Improvisation. Two semesters of MUP 117 and two semesters of MUP 317

Ensemble Four semesters of large ensemble and four semesters of MUP 386

Recital Attendance Six semesters of MUP 100

Music Theory and Composition

Music Theory. MTC 125, 221, 222, 223, 320, 321, 322, 323 (four semesters), 325, 327, 428, 429, 430, 433, 482

Music History and Literature MHL 241, 242, 445, 446 and three elective credit hours

Conducting MUP 209, 339, 340

Applied Music Eight semesters of study (four semesters may be on instruments other than the major performing medium)

Class Piano MUP 131, 132, 231, 232 (unless waived by proficiency examination)

Ensembles: Eight semesters of participation

Recital Attendance Six semesters of MUP 100

Bachelor of Arts in Education Degree Curriculum

Music Consists of a minimum of 67 to 70 hours of music credit. This curriculum, in addition to the Bachelor of Music, offers fields of specialization in choral, general music and instrumental music for those wishing to teach music in the public schools. Each field of specialization requires the following courses

Choral General Music

Note: This degree program may include a teaching minor in instrumental music

Music Theory MTC 125, 221, 222, 223, 322, 327, 431

Music History and Literature MHL 241, 242

Conducting MUP 209, 339

Music Education. MUE 110, 313, 48

Major Performing Medium Eight credit hours of MUP 111 and 8 credit hours of MUP 311 to obtain a proficiency level necessary to meet the graduation recital requirement MUP 495 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). Students wishing to extend their proficiency beyond this level may continue to study in MUP 321

Ensemble Eight different semesters of participation including at least six semesters of MUP 352 and or MUP 353, or the equivalent, four of which must be at Arizona State University.

Recital Attendance Six semesters of MUP 100

Instrumental Music

Note: It is strongly recommended that the degree program include a minor in harpsichord music.

Music Theory MTC 25, 221, 222, 223, 322, 327

Music History and Literature MHL 241, 242

Conducting MUP 209

Music Education. MUE 110, 325, 326, 327, 328, 336, 337, 338, 481, 482

Class Piano MUP 131, 132, 231, 232 unless waived by proficiency exam)

Major Performing Medium Eight credit hours of MUP 111 and eight credit hours of MUP 311 to obtain a proficiency level necessary to meet the graduation recital requirement. MUP 495 completes the requirement.

Ensemble Eight different semesters of participation, four of which must be at Arizona State University. String players must have a minimum of six semesters of MUP 345 Wind and percussion players must have a minimum of six semesters of MUP 361, or the equivalent

Recital Attendance Six semesters of MUP 100

Recommended Minor, Choral General Music MUE 480, MTC 43 , MUP 339, 351 or 352 353 (two semesters and ice (four credit hours)

Music Minor for an Elementary Education Major

Music Theory MTC 100 101

Music History and Literature MHL 340

Music Education MUE 312

Piano. Four semesters

Electives Two credit hours

Minors for students in Secondary Education and students in Liberal Arts are available through the Department of Music Consult with the Music Department office for advisement sheets and advisors

Departmental Graduate Programs

The Department of Music offers the following graduate programs the Master of Arts degree provides advanced studies in history and literature of music; the Master of Music degree has majors in the fields of theory, composition, performance, performance pedagogy, choral music, general music, instrumental music, music theatre performance or direction and conducting The Master of Arts in Education degree Secondary Education, with a focus on choral, general or instrumental music, the Doctor of Education degree in Music Education, and the Doctor of Philosophy degree in Education Secondary Education (Music) are offered in cooperation with the College of Education Consult the *Graduate Catalog* A document on graduate degree programs in music may be obtained by writing to the Department of Music.

MUSIC EDUCATION

MUE 110 Orientation to Music Education. The larger field of music education Esthetic objectives and instructional procedures nonverbal learning teaching in-school observations. Prerequisite or corequisite for MUE 313, 480, 481. Credit, 1 hour

161 Introduction to Music Therapy. Includes requirements and qualifications of the music therapist and expectations placed upon him in the field Visits to facilities for handicapped in the community Credit 2 hours

211 Music in Recreation. Materials methods and organizational structures appropriate for recreational music. Credit, 2 hours

261 Orientation to Field Experience. Weekly experiences in an approved psychiatric hospital or other approved agency. Weekly consultation with instructor. Prerequisite: MUE 161 Credit 2 hours

310 Music in Early Childhood Education. Identifying and understanding musical needs of young children Methods and materials for program development for classroom teachers. Credit 3 hours

311 Music for the Classroom Teacher. Development of the classroom music program in the elementary school No previous music experience or course work required Not for music majors or minors Credit 3 hours

313 Music in the Elementary School. Methods of instruction organization and presentation of appropriate content in music For music majors only Credit 3 hours.

314 Music in the Elementary School. Selected problems in elementary school classroom music and choral program Observation and participation in school music classrooms Prerequisite. MUE 313. Credit 3 hours

325, 326 Educational Methods for Strings. String instrument teaching and playing skills for school music teachers Three hours a week. Credit, 1 hour

327, 328 Educational Methods for Brass. Brass instrument teaching and playing skills for school music teachers Three hours a week. Credit 1 hour.

335 Educational Methods for Guitar. Guitar teaching and playing skills for school music teachers Three hours a week Credit, 1 hour

336 Educational Methods for Percussion. Percussion instrument teaching and playing skills for school music teachers. Three hours a week Credit, 1 hour

337, 338 Educational Methods for Woodwinds. Woodwind instrument teaching and playing skills for school music teachers Three hours a week Credit 1 hour

341 Psychology of Music I. Acoustical and psychological aspects of music emphasizing problems of

percept on, experimenta esthetics mus ca funct on measurement and d agnos s of mus ca ab ity Prereq site: MUE 261 Cred t 2 hours

342 Psychology of Music II. A aboratory and research course emphasiz ng acoustica and psycho og ca as pects of mus c percept on, exper menta esthet cs mus ca funct on and measurement and d agnos s of mus ca abi ty. Prerequis te. MUE 341 Cred t, 2 hours

361 Influence of Music on Behavior. Effect of mus c on both phys ca and menta hea th. Phys o ogica psycho log ca neuro ogica soc o ogica and esthet c re at on ships Prerequ s te MUE 341 Credit 2 hours

461 Music in Therapy. Appl cat on of mus c as a ther apy to var ous types of hand caps ch dren and adu ts Prerequ s te· MUE 361 For mus c majors on y Cred t, 2 hours

475 Therapy Practicum. An act v ty c ass nvo v ng the music therapy major n the mus c an y ro es of arrang ng conducting, organ z ng and ma nta n ng sma and large music ensemb es Exper ences n d rect ng mus c learn ng activit es w th specia educat on students Emphas s on ado escent and adu t behav ors Prerequi s te. MUE 261. Cred t, 3 hours

476 Internship in Music Therapy. A s x month res dency n an approved c n a inst tution Cred t, 1 h ur.

480 Choral Music Practicum. Methods of nstruct on organ zation and presentat on of appropriate content n chora mus c c asses Cred t, 3 hours

481, 482 Instrumental Music Practicum. nstrumenta mus c as a means of deve op ng mus c sk l s under stand ngs and attitudes n e ementary and secondary schoo students Cred t 5 hours each semester

550 Studies in Music Curricula. Scope and sequence of mus ca exper ences Deve opment of cr ter a for the eva uation of mus c curr cula Cred t, 3 hours

551 Advanced Studies in Elementary School Music. For experienced teachers organ zat on and content of the general music c asses in k ndergarten and the f rst six grades of e ementary schoo Emphas s on teach ng mus c read ng and ear tra n ng to yo ng ch ldren Cred t, 3 hours

552 General Music, Music Theory and Music History Classes in the Junior and Senior High School. Organ zation and content of schoo mus c c asses wh ch are not performance or ented Credit 3 hours.

564 Instrumental Music, Advanced Rehearsal Tech niques. Formu at on of val d mus ca educat onal and esthet c rehearsal object ves Observat on and rev ew of current practices and mater a s. Deve pment of nd v dual methods of teaching n a rehearsa s tuat on Cred t 3 hours.

566 Instrumental Literature for Schools. Comprehen s ve study and analys s of al types of nstrumental mus c Credit, 3 hours

568 Choral Music, Advanced Rehearsal Techniques. Musica and voca techn ques necessary for presenta t on of chora l terature Analys s and experimentat on w th psycho og ca acoust cal and other prob ems of rehearsa and performance Cred t, 3 hours.

570 Choral Literature for Schools. Comprehe s ve study and analys s of al types of choral mus c. Cred t 3 hours

610 Music Coordination and Administration. Adm n s trat ve pr nc p es, procedures and organ zat ons for d rect ng and coord nat ng mus c programs n the schoo s and n nst tut ons of h gher earn ng Cred t 3 hours

733 Experimental Projects and Recent Trends in Music Education. Recent trends and research deve opments which cha enge trad t ona pract ces Cred t 3 hours

744 Major Problems in the Education of Music Teachers. Patterns of music teacher educat on and a projection of course out nes des gned to accommodate the most comprehens ve demands of the chang ng schoo mus c curr culum. Cred t 3 hours

755 Philosophy and Esthetics in Music Education. Ph losophy and esthet cs as they nf uence curricu um content and teach ng procedures Cred t, 3 hours

Special Courses: MUE 494 498 499, 580, 590 591, 592, 594 598 599, 680 780 784, 790, 791, 792 799. (See page 31.

MUSIC HISTORY AND LITERATURE

MHL 107 Introduction to Music. Corre at on of mus c w th iterature science and art A nontechn ca course n the humanit es for nonmus c majors Cred t 2 hours

241, 242 Music History and Literature. Western m s c from the Greeks to the present day Prerequ s te M C 221 Need not be taken n sequence. Credit 3 hours

340 Survey of Music History and Literature. Ma or per ods composers and compos t ons n the h story of mus c. A human t es cou se n the Genera Stud es program may be used to meet the mus c h st ry re qu rement for a m nor n mus c Credit 3 hours

352 The Evolution of Jazz. Or gin, deve opment and sty es of jazz mus c and ts exponents Prerequ s te MTC 223 Cred t, 3 hours

353 History of Afro-American Music. Afro-Amer can music traced from its or g ns n Afr ca to the present w th emphas s on jazz and an ana ys s of the contr bu tions of ts major contr butors Prerequ s te MTC 223. Credit 3 hours

355 Survey of American Music. Growth and deve op ment of Amer ca s mus c A human t es course n the General Studies program. Cred t 2 hours

358 Survey of the Musical Theatre. Mus c s p ace n the theatre, viewed n terms of h s h stor ca mportance and re at ve funct on A human t es course n the Genera Stud es program. Cred t, 2 hours.

357 Esthetic Perception in Music Performance. ntro duces the nonmusic major to the esthet cs f performance by stress ng the r phys ca and emotiona nvo vement in the d rect on, motion ntens ty and co or spectrum of mus c A human t es c urse n the Genera Stud es program Cred t, 3 hours

443 History of the Guitar, Lute and Vihuela. Evo ut on of these instruments and the r reperto re Study of sty e per ods and the composers assoc ated w th each Pre requis te: MHL 241 and 242 Three hours a week Credit 3 hours

438 Music in the Classic Era. Deve opment of the c as sic sty e of the 18th century major works of Haydn, Mozart, and Beethoven Prereq s te MHL 241 242 MTC 327 the atter may be taken concurrent y Credit 3 hours

439 Music in the 19th Century. European art mus c af ter Beethoven Prerequ sites· MHL 241 242 MTC 327, the latter may be taken concurrent y Cred t, 3 hours

441 Music of the Baroque Era. Works of ma or composers and sty st c tenden es of the per od Pre requ s tes· MHL 241 242 MTC 327 the atter may be taken concurrent y Cred t 3 h urs

445 20th Century European Music. nd v dua d oms and sty stic currents among ma r mposers Prereq u s tes. MHL 241, 242 MTC 327 the atter may be taken concurrent y Cred t 2 hours

446 20th Century American Music. Amer can response to European trad t ons nd vidua ity n compos t on and jazz Prerequ s tes· MHL 241, 242 MTC 327 the atter may be taken concurrently Cred t, 2 hours

452 Song Literature. Ear y ta an Eng sh German, and French art song Cred t, 2 hours

453 Song Literature. Amer can Russ an Span sh Scand nav an and contemporary song Cred t, 2 hours

510 Introduction to Graduate Study. A quaints the graduate student w th basic research mater a s in mus c B b ograph c and techn ca mater als w be incorporated into the preparat on and wr t ng of research papers. Cred t, 2 hours

532 Music Bibliography. Major h stor ca and ana yt ca wr t ngs systemat c and histor ca o ect ns of music

Reading knowledge of a fore gn anguage recom mended Credit 3 hours

535 Medieval Music. Mus c of Europe n the M dd e Ages Gregorian chant re g ous and secu ar mono phony and polyphony to 1430 Cred t, 3 hours

536 Music of the Renaissance. Mus ca thought n Eu rope with emphas s on sty ist c concepts and changes c 1430 1580 Cred t 3 hours.

541 The Art Song. Solo song from ts beg nning to the present day Credit 3 hours

542 Keyboard Literature. From the Rena ssance to the present day. Cred t, 3 hours

544 World Music I. Mus c of nonl terate cu tures fo k music of Europe and the Amer cas Credit 3 hours

545 World Music II. Folk and a t mus c of non Wester cu tures Cred t 3 hours.

575 History of Choral Music. Ma o chora works Credit 3 hours

580 Psychology of Music. The nature of mus ca ty and ts eva uation. A rev ew of recent research Cred t 3 hours

Special Courses: MHL 492 493, 494, 498 499 580 590, 591, 592, 594 598, 599 690 See page 31.

MUSIC THEORY AND COMPOSITION

MTC 100 Fundamentals of Music Notation. Prov des nonmus c majors w th suff c ent symbo teracy to beg n work n the f e d of mus ca learn ng No cred t for mus c majors Cred t, 3 hours

101 Foundations of Music Theory. A survey of mus c theory Prerequ s te MTC 100 or approva of nstructor No cred t for mus c majors This course may be used to meet the mus c theory requ rements for a m nor n mus c Credit 3 hours.

125 Basic Music Theory. For mus c majors des gned to deve op aural and notationa sk s Meets da y Cred t 3 hours

221 Music Theory-18th Century. Mus c from the 18th century w th a v ew toward deve op ng students ab t es to analyze theor ze, perform and create examp e with n the sty e. Deve opment of related aura v sua and keyboard sk s Prerequ s te MTC 125 Cred t, 3 hours

222 Music Theory-19th Century. Mus cal compo t ons chosen from the late 18th and 19th centuries. Harmon c progress ons melod c construct on and rhythm c deve - opments development of re ated aura v sua and keyboard sk s Prerequisite MTC 221 Cred t 3 hours.

223 Music Theory-20th Century. Representat ve 20th century compos tions w th part cu ar emphasis on those e ements of melodic harmonic and rhythmic treatment which break w th past conventions Development of re ated aural, v sua and keyboard sk s Prerequ s te MTC 222. Cred t 3 hours

224 Survey of Jazz Styles. Large ensemb e compos t ons and recorded improv sed so os Prerequ s te MTC 221. Cred t, 2 hours

227 Fretboard Harmony. Sca es, ntervals and chords and the r invers ons n fretboard theory. Concepts appl ed to gu tar through ana ys s of repertoire, compo s t on and harmon zat on Prerequ s te· MTC 221 Three hours a week Credit 2 hours

315 Modern Arranging. Techn ques n ar ang ng for the contemporary jazz radio, te ev s on, and studio orches tra Prerequ s te MTC 223. Cred t 2 hours

316 Modern Arranging. Cont nuat on of MTC 315 Pre requisite: MTC 315 Credit 2 hours

320, 321 Counterpoint. F rst semester strict counter point in modal sty e second semester, strict and free tona counterpoint Prerequ s te MTC 221 Need not be taken n sequence. Cred t 2 hours

322 Musical Acoustics. Propert es of sound and tone Harmon c series, nstruments the ear auditor um acoust cs, and the reproduct on of sound A thorough knowledge of mus ca notat on nterva s, sca es and harmony or two years of mus c theory w be assumed Cred t, 4 hours

323 Composition. Creat ve writ ng n the smal er forms inc ud ng the use of harmon c textures and c ntrapunta devices Prerequ site MTC 223 May be repeated for cred t Credit 2 hours

325 20th Century Theory. Ana yt ca methods and aura techn ques of 20th century music Prereq s te MTC 223 Meets da y. Cred t, 3 hours

327 Form and Analysis. Organ z ng e ements n the most important contrapunta and homophonic musica forms from the Renaissance through the 19th century. Prerequisite. MTC 223 Cred t 2 hours

428 Form and Analysis. Organ z ng pr nc p es of the arge forms of mus ca compos t on n the 19th and 20th centuries. Prerequis te. MTC 327 Cred t 2 hours

429 430 Canon and Fugue. Po yphonic stud es n form and techn que Prerequ site MTC 321 Cred t 2 hours each semester

431 Choral Arranging. Practica stud es in ed t ng and arrang ng for choral organ zat ons Preparat on of su t- ab e mater a s for young cho rs and advanced groups. Study of accompaniments Prerequisite MTC 223 Cred t, 2 hours.

433 Orchestration. Theoret ca and p act cal study of scor ng for orchestra nstruments n var ous combina- tions, rang ng from smal emsemb es to symphon c orchestra and concert band Prerequ site· MTC 223 Cred t, 3 hours

436 Electronic Studio Techniques. Pr nc ples of e ec tronic mus c systems and the r app cat ons n the composition and record ng of electronic mus c May be repeated for cred t Cred t 2 hours

482 Theory of Rhythm. Mus ca o ganizat on through phys o og ca and psycho og ca pr nc ples based upon rhythmic percept on Prerequ s tes MTC 428 MHL 445 MUP 339 or 340 Credit 2 hours

501 Theory Techniques. Two hours a week Cred t 2 hours

520 Advanced Analytical Techniques. Ana yt ca tech n ques systemat ca ly appl ed to mus c Concentrat on on structura and compositiona procedures Cred t 2 hours

523 Advanced Composition. Creat ve wr t ng n the arger forms for chorus orchestra and band Prerequ s tes MTC 323, 428, MHL 445 or equ va ent May be repeated for cred t Cred t 2 hours

525, 526 Pedagogy of Theory. Pract ces and pr nc p es of teach ng music theory Emphas zes most des rab e and practical offer ngs poss b e Comparat ve stud es of ex st ng pract ces Cred t 3 hours each semester

527, 528 Evolution of Musical Theory. Theory from Pythagoras to the present. Need not be taken n se quence Cred t 3 hours each semester

553 Advanced Choral Arranging. Chora techn ques n composition and arrang ng Voca wr t ng through ana ys s of chora works Pro ects n both arrang ng and compos tion Cred t, 2 hours

554 Advanced Scoring Problems. nstrumentat on P ayng character st cs of each instrument writing and arrang ng idiomatic music for the nstrument Pro ects in both scoring and compos t on Cred t 2 hours

Special Courses: MTC 492, 493 494, 498 499 580 590, 591 592 594 598, 599 690. (See page 31.

MUSIC PERFORMANCE

MUP 100 Concert Attendance. Requ red of a mus c majors for s x semesters in each degree program w th a m n mum of seven 7) concerts attended each semes ter No cred t

111, 311, 511 Studio Instruction. For majors in mus c degree program. P acement audition requ red Piano organ harps chord, vo ce, f ute, oboe c arinet saxo phone, bassoon trumpet, cornet horn euphon um guitar trombone, tuba percussion harp v ol n v o a, ce o contrabass. May be repeated for cred t M nimum

contact of one hour plus studio c ass week y May not be taken for audit Credit, 2 hours each semester

117, 317 Improvisation Workshop. Ensemble work shops n improvisationa techn ques re ated to the f e d of jazz. Emphas s on chord symbol read ng patterns ear train ng, analys s of recorded mprovised so os and me odic concept Prerequisite MTC 125 Two hours per week May be repeated for credit May not be taken for aud t. Cred t, 1 hour each semester

121, 321, 521 Studio Instruction. For secondary or m nor instrument nstruct on and nonmajors n the univers ty P acement examinat on and aud tion requ red P ano, organ harpsichord, vo ce f ute, oboe, gu tar, clarinet, saxophone, bassoon trumpet cornet horn euphonium, trombone tuba percussion, harp v o n viola ce lo, contrabass May be repeated for credit M nimum contact of one-ha f hour per week May not be taken for aud t Credit, 1 hour each semester

127, 327, 527 Studio Instruction. For performance majors in Bachelor of and Master of Mus c degree pro grams on y P acement examinat on and aud t on requ red P ano organ harps chord voice f ute, oboe, c arinet, guitar, saxophone bassoon, trumpet cornet horn, euphon um, trombone, tuba, percuss on harp v ol n v o a, cel o contrabass May be repeated for cred t. M nimum contact of one hour pl s stud o c ass week y. May not be taken for aud t Cred t 4 hours 2 or 4 hours each semester for MUP 527

131, 132, 231, 232 Class Piano. A four semester se quence of courses des gned for those ack ng p ano experience and those who need p ano as a classroom too Emphas s on keyboard techn que, s ght reading s mp e accompan ments and mprov sation Two hours a week May not be taken for aud t Cred t 1 hour each semester.

133, 134, 233, 234 Class Voice. Open to a students nterested n the development of bas c s ng ng techniques. Two hours a week May not be taken for aud t Cred t 1 hour each semester

137, 138 Classical Guitar Class. Fundamentals of c assical gu tar Prerequ s te approva of nstructor Pr mar y for music majors May not be taken for aud t Two hours a week. Cred t, 1 hour each semester

209 Elements of Conducting. Essent a s of conduct ng techniques used by both chora and nstrumenta con ductors Two hours a week Cred t 1 hour

235, 236 Jazz Piano. Jazz keyboard exper ence Em phas s wi l be on chord symbo read ng s mp e mprov sat on and vo cing Prerequis te· MUP 232 Two hours per week May not be taken for aud t Cred t 1 hour each semester

250 Diction for Singers. Use of phonet cs n the study of song and opera literature. Language emphas s differs each semester. May be repeated for cred t Credit 1 hour.

301 Studio Instruction. For choral general and therapy majors on y. P ano organ Emphas s on mprovisat on accompan ments and harmon zations Prerequ s te MUP 232 or profic ency Placement exam nat on required. One ha f hour lesson a week. May be repeated for credit May not be taken for audit Cred t, 1 hour

337 Studio Instruction Accompanying. Lessons for accompany ng majors only. Reperto re to be se ected from voca and instrumental iterature P acement ex am nat on required. One hour esson a week May be repeated for cred t Cred t 2 hours

339 Choral Conducting. E ements of chora conduct ng technique and interpretat on Prerequ s te MUP 209 Three hours a week. Cred t 2 hours

340 Instrumental Conducting. Fundamentals of score reading and nterpretation of nstrumenta mus c. Pre requ s te. MUP 209. Three hours a week Cred t, 2 hours

341 Jazz Conducting and Field Experience. Tra n ng and superv sed practice in conduct ng azz ensemb es w th emphasis on l terature programm ng and rehearsa techn ques Prerequisite· MUP 340 Two c ass hours and two field exper ence hours each week Cred t, 3 hours

345 Symphony Orchestra. Open to a students who can qual fy on the bas s of aud t ons w th the d rector Over a four year per od, the student s ntroduced to the masterp eces of symphony orchestra terature F ve hours a week May be repeated for cred t Cred t, 1 hour.

350 Choral Union. Open to a students n the Un vers ty and to nterested s ngers n the commun ty Time de voted to preparation and performance of the arger choral works. May be repeated for cred t Credit 1 hour

352 Concert Choir. Membership chosen by aud t on May be repeated for cred t Four hours a week. Cred t, 1 hour.

353 University Choir. Membersh p chosen by aud tion. May be repeated for credit Four hours a week Cred t 1 hour

355 Men's Glee Club. Open to al ma e students n the Univers ty who can qua fy on the bas s of aud t ons w th the d rector Rehearsal and performance of mus c for ma e vo ces Three hours a week May be repeated for credit Cred t, 1 hour

357 Women's Chorus. Membership chosen by aud t o Three hours a week. May be repeated for credit Credit 1 hour

361 Marching and Concert Bands. Open to al students who can qua ify on the basis of aud t ons with the direc tor Stag ng of formations and dr ls for footba games and other events (Fa); masterp eces of symphon c band l terature (Spr ng). Meets da ly May be repeated for credit Cred t, 1 hour.

362 Concert Bands. Membersh p chosen by aud t on (Fall). May be repeated for cred t Credit 1 hour

371 Music Theatre Workshop. Open to a students who can qualify on the basis of aud t ons w th the nstructor May be repeated for credit *Section 1* nterpretat on . Exerc ses, improv sat ons and mus cal-dramat c nter pretat on for the s ng ng actor *Section 2* Opera Scenes). Rehearsal and product on of opera scenes *Section 3* (Music Comedy) Mus cal dramat c nterpreta tion of mus ca mater a s Each section· One lecture demonstrat on, 1 laboratory per week Cred t 1 hour

372 Music Theatre Orchestra. Open to a l students who can qua fy on the bas s of aud t ons w th the instructor Part c pat on n Lyr c Opera Theatre product ons. May be repeated for credit. *Section 1* Opera Orchestra 2 2 hours per week, *Section 2* (Chamber Opera Orchestra 4 hours per week Cred t, 1 hour

373 Music Theatre Production. Open to a students who can qual fy on the bas s of aud t ons with the nstructor Part cipat on n Lyr c Opera product on *Section 1* (Voca Performance)· *Sect on 2* Techn ca Mus Theatre) *Section 3* (Prob ems n Product on , to be taken concurrent y w th MUP 373, Sect on 2 May be repeated for credit Cred t 1 hour

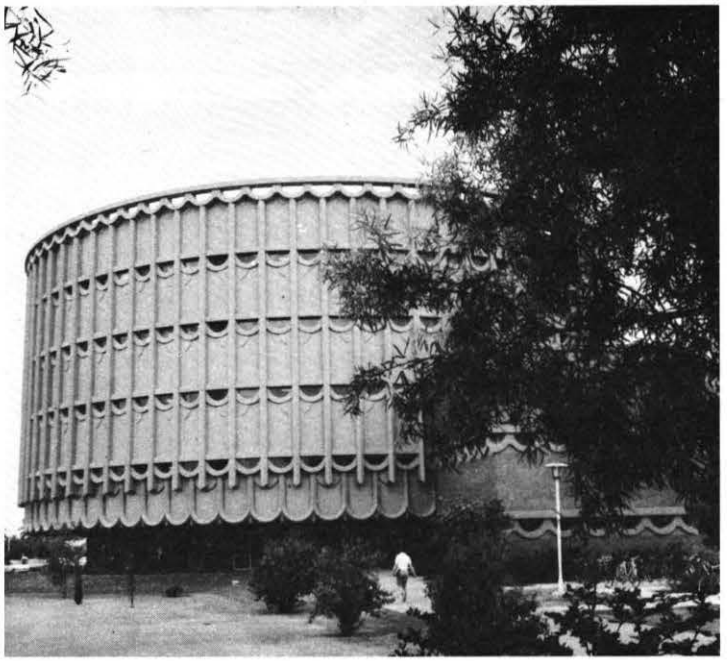
379 Chamber Music Ensembles Str ng brass woodwind, percussion keyboard, voca and m xed ensemb es Prerequ s te· approva f nstructor Two hours a week May be repeated for cred t. Cred t 1 hour

382 Collegium Musicum. Singers and instrumenta ts specia iz ng in the performance of ear y and unusual mus c. Prerequ site. approva of nstructor Two hours a week May be repeated for cred t Cred t, 1 hour

383 University Singers. Sma chora ensemb e chosen by audit on Two hours a week May be repeated for cred t Credit 1 hour

384 Brass Choir. Specia iz ng n publ c performance of music wr tten for brass nstruments Prerequ s te approva of nstructor Two hours a week May be re peated for cred t Cred t 1 hour

385 Percussion Ensemble. Rehearsal and performance of standard and orig nal reperto re for the percuss on ensemble and re ated nstruments Membersh p by



approval of the instructor. Two hours a week. May be repeated for credit. Credit, 1 hour.

386 Stage Band. Rehearsal and performance of literature for the stage band. Membership by approval of the instructor. Four hours a week. May be repeated for credit. Credit, 1 hour.

387 Accompanying. Keyboard majors. Piano accompaniments found in vocal and instrumental literature; discussion of styles and performance practices; experience in public performance. May be repeated for credit. Two hours a week. Credit, 1 hour.

388 Accompanying. Accompanying majors (others at the discretion of instructor). Piano accompaniments found in vocal and instrumental literature; discussion of styles and performance practices; experience in public performance. May be repeated for credit. Two hours a week. Credit, 1 hour.

451 Repertoire. Literature available for performance in all performing media. Prerequisite: junior standing in major performance field. May be repeated for credit. Credit, 2 hours.

481 Performance Pedagogy and Materials. Principles and methods of performance techniques for each performance field. Prerequisite: senior standing or approval of instructor. May be repeated for credit. Credit, 2 hours.

495 Solo Performance. For Bachelor of Music and Bachelor of Arts in Education degree candidates where one-half recital is a graduation requirement. No credit.

496 Solo Performance. For Bachelor of Music in Performance degree candidates where a full recital is a graduation requirement. Prerequisite: MUP 495. No credit.

539 Advanced Conducting. Advanced baton technique for band and orchestra. Score reading, mechanics of conducting, individual criticism of style. Prerequisite: MUP 339, 340 or equivalent. Credit, 2 hours.

545 Symphony Orchestra. Open on the basis of audition with the director. Masterpieces of symphony orchestra literature. Five hours a week. May be repeated for credit. Credit, 1 hour.

550 Choral Union. Preparation and performance of the larger choral works. May be repeated for credit. Credit, 1 hour.

551 Repertoire. Literature available for performance in all performing media. May be repeated for credit. Credit, 2 hours.

552 Concert Choir. Membership chosen by audition. May be repeated for credit. Four hours a week. Credit, 1 hour.

553 University Choir. Membership chosen by audition. May be repeated for credit. Four hours a week. Credit, 1 hour.

555 Men's Glee Club. Open by audition only. Rehearsal and performance of music for male voices. Three hours a week. May be repeated for credit. Credit, 1 hour.

557 Women's Chorus. Membership chosen by audition. Three hours a week. May be repeated for credit. Credit, 1 hour.

561 Marching and Concert Bands. Open by audition only. Staging of formations and drills for football games and other events (Fall); masterpieces of symphonic band literature (Spring). Meets daily. May be repeated for credit. Credit, 1 hour.

562 Concert Bands. Membership chosen by audition (Fall). May be repeated for credit. Credit, 1 hour.

571 Music Theatre Workshop. Open on the basis of audition with the instructor. May be repeated for credit. *Section 1* (Interpretation): Exercises, improvisations and musical-dramatic interpretation for the singing actor. *Section 2* (Opera Scenes): Rehearsal and production of opera scenes. *Section 3* (Musical Comedy): Musical-dramatic interpretation of musical materials. Each section: One lecture-demonstration, 1 laboratory per week. Credit, 1 hour.

572 Music Theatre Orchestra. Open on the basis of audition with the instructor. Participation in Lyric Opera Theatre productions. May be repeated for credit. *Section 1* (Opera Orchestra): 2½ hours per week; *Section 2* (Chamber Opera Orchestra): 4 hours per week. Credit, 1 hour.

573 Music Theatre Production. Open on the basis of audition with the instructor. Participation in Lyric Opera production. *Section 1* (Vocal Performance); *Section 2* (Technical Music Theatre); *Section 3* (Problems in Production), to be taken concurrently with MUP 573, Section 2. May be repeated for credit. Credit, 1 hour.

579 Chamber Music Ensembles. String, brass, woodwind, percussion, keyboard, vocal and mixed ensembles. Prerequisite: approval of instructor. Two hours a week. May be repeated for credit. Credit, 1 hour.

581 Performance Pedagogy and Materials. Principles and methods of performance techniques for each performance field. May be repeated for credit. Credit, 2 hours.

582 Collegium Musicum. Singers and instrumentalists specializing in the performance of early and unusual music. Prerequisite; approval of instructor. Two hours a week. May be repeated for credit. Credit, 1 hour.

583 University Singers. Small choral ensemble chosen by audition. Two hours a week. May be repeated for credit. Credit, 1 hour.

584 Brass Choir. Public performance of music written for brass instruments. Prerequisite: approval of instructor. Two hours a week. May be repeated for credit. Credit, 1 hour.

585 Percussion Ensemble. Rehearsal and performance of standard and original repertoire for the percussion ensemble and related instruments. Membership by approval of the instructor. Two hours a week. May be repeated for credit. Credit, 1 hour.

586 Stage Band. Rehearsal and performance of literature for the stage band. Membership by approval of the instructor. Four hours a week. May be repeated for credit. Credit, 1 hour.

595, 596 Solo Performance. For Master of Music candidates in applied music only. May be full recital, major operatic role, solo performance with orchestra, or an ensemble or lecture recital. Credit, 1 hour each semester.

Special Courses: MUP 494, 498, 499, 580, 591, 594, 598, 690. (See page 31.)

Center of Criminal Justice

Victor G. Strecher, Ph.D.
Director

Purpose and Philosophy

The primary purpose of the Center of Crim inal Justice is to provide the foundations for professional development to pre service and in-service personnel 'n the field of criminal jus tice.

Criminal justice is a mu ti d scip inary, problem oriented field of scholarship, re search, and teaching, embracing those aspects of social, behavioral, natural, and forens c sci-ences relevant to understanding crime and social deviance, and ent ailing a crit cal exami nation of the systems which have evolved for handling attendant problems

Degrees

Bachelor of Science in Criminal Justice. The curriculum for the degree of Bachelor of Science in Criminal Justice s designed to pro vide the student with a broad, libera education. The curriculum maintains a strong multi-disciplinary foundation, is social science oriented, academic in content, and has as its objective the preparat on of students as gener alists for entry level positions n the criminal justice system.

Master of Science in Criminal Justice. The Master of Science in Crim nal Just ce curriculum is des gned tc prepare students fcr professional positions n functional criminal justice agencies, for teaching pos t ons in community and four year colleges, or for fur ther study ind research in the field of crim n al justice. Information on the Master of Science in Criminal Just ce is detailed in the *Graduate Catalog.*

Degree Requirements

The Center of Criminal Justice wards a Bachelor of Sc ence degree n crim na justice upon the successful completion of a curricu lum of 126 semester hours consisti g of

	Semester Hour
General Studies Requirements	49
Criminal Justice Major	45
Electives	32
Total	126

In addition, the student must fulfill the fol lowing requirements:

1 Have accumulated a m nimum of 50 se mester hours of upper division courses
2. Have completed a minimum of 30 semester hours, including 24 in criminal justice courses at this University.
3 Have obtained a cumulative grade point index of 2 00 or better for all criminal us tice courses taken at th s University.
4. Have met the University's residency and scho arship requirements
5 Have demonstrated a reasonable profi ciency in written Engl sh by receiving a grade of "C" or better n b th ENG 101 and ENG 102, or in ENG 104 or its equiv alent.

General Studies Program. T n eet the University's General Stud es requirements, and to assure breadth and depth of the stu dent s education, al crim nal ustice students must complete a tot l of 49 semester hours of General Studies courses, exc ud ng all criminal ustice courses and the rel ted courses counted toward the major, w th the designated mini mum semester hours in each of the follow ing f e ds

Humanities and Fine Art . 9 sem h s
Arch tecture APH courses *nl* , art history ARH courses *onl*), Eng sl ex *cpt* ENG 01, 102, 104), foreign angu ges, ur nities, us c (MUS c urses *onl*), philosophy

Social and Behavi ra Scie s . . 15 sem h s.
Anthropology ASB courses *on* , economics, history, p lit ca science psych gy PGS c urses

nly, sociology Must include at least one course in each of the following Sociology psych logy, and a polit cal science c urse n Ar er can g vern n ent

Sc ences and Mathe nat cs 1 sen I
Must nclude a scienc c ur e with a ab rat ry section, and at least one r athen at s course above the MAT evel Anth op l gy ASM courses *nly*, t ny and bi l gy a BIO BOT and MIC c irses, ch en istry, geograph y physica (PHG urses *nly*, mathemat , p y ics (PHY, AST and PHS cou es *nl* psychology PSY ourses *n y*, z gy ll BIO, ENT and ZOL cc u s

Other Gener il C ou se 5 se h s
Al crim ina ustice student n ust n p et t c urse n C nnu it r, an ENC 4 r b t ENG 0 and 102, s p rt t th e h urs Ad ditional c u ses may be taken r n the ab ve fields as limited y the e c pti ns ndicated r ther fields as appr v d by the student adv r

Criminal Justice Program. A major n crim inal justice cons sts of 45 semester hours of credit, of which 9 may be taken in related fields approved by the Center of Crimin il Jus tice CRJ 100, 200, and 301 are required r all degree candidates Add t onally, a grou I criminal ustice courses n ay be required to ensure a comprehens ve exposure to a spects of criminal ustice

Electives. Students are encouraged to uti ze the unique opportunit es afforded by the Uni versity to pursue personal educat onal inter ests, whether in the forn of a broad s mpling of other disciplines, r the deeper probing of a single field

Transfer of Community College Credits. Credits transferred fron accredited commu nity colleges will be accepted as ower division credits up to a maxin um of 64 semester hours The acceptar ce of credits will be deter n ined by the Director o Admissions, and the applicability of cred ts toward degree require ments w ll be determined by the Center of Crim nal Justice

Criminal Justice

PROFESSORS:
STRECHER (ASB 304), KENNEDY

ASSOCIATE PROFESSORS:
BROWN BRUNS, HAYNES, HERNANDEZ, SCHADE, SHUMAN

ASSISTANT PROFESSOR:
MELICHAR

CRJ 100 The Criminal Justice System. Overv ew of the cr m na just ce system Ro es of aw enforcement per sonnel the courts, and correct ona agenc es Ph osophica and theoret ca v ews n h stor ca perspect ve Credit 3 hours

200 Concepts and Issues of Criminal Justice. s ues re at ng to cr m na justice po ic es perspect ves tech niques ro es nst tutiona arrangements management uses of research nnovat ve patterns Prerequ s te. CRJ 100 or approva of nstructor Cred t 3 hours

301 Research and Statistics in Criminal Justice. ntro ductory exposure to methods of stat st ca analys s. App cat on of socia sc ence research methods to cr m nal just ce prob ems Prob em formu at on, study and analys s of data n the context of contemporary agency needs Prerequ s tes CRJ 100 and one mathemat cs course more advanced than MAT 105 or approva of nstructor Credit 3 hours

306 The Police Function. A ternat ve ob ect ves strate gies programs inst tut ona arrangements ro es perspect ves and nteragency re at onsh ps of the po- ce Prerequ s tes. CRJ 100, 200 or approva of nstructor Cred t, 3 hours.

308 The Adjudication Function. Object ves processes sett ngs ro es, and perspect ves of the courts prosecu- t on and defense. Prerequ s tes CRJ 100 200 or approva of nstructor Credit 3 hours

310 The Correctional Function. A ternat ve correct ona objectives strateg es programs inst tut ona arrange- ments, roles, perspect ves and nteragency re at onships. Prerequisites CRJ 100, 200 or approva of instructor. Cred t, 3 hours.

311 Prevention of Delinquent and Criminal Behavior. Theories of prevention, nd vidua group and commu n ty approaches intervention at appropr ate stages contemporary aw enforcement and corrections prac t ces Prerequ s tes CRJ 100 200 or approva of instructor Credit 3 hours

320 Criminal Justice and Community Relations. Re a tionship between cr m na just ce and commun ty served Focus on soc a stratif cat on nterest groups and racia ethn c minorit es Prerequ s tes· CRJ 100 200 or approva of nstructor Credit 3 hours

360 Law and Social Control. Reso ut on of soc a ssues through the app icat on of aw as an agent of soc al con tro Nature, sanct ons, a d m ts of aw. Categor es of aw and schools of jur sprudence Prerequ s tes CRJ 100 200 or approva of nstructor Cred t 3 hours

402 Criminal Justice Theory. A conceptua exam nat on of the cr m na just ce system ntegrat on of contempo rary thought nto an operat ona frame of reference Prerequ s tes CRJ 100, 200 and one upper d v s on cr m na justice course or approva of nstructor Cred t 3 hours

404 Imperatives of Proof in Criminal Justice. Prob em and means of estab ish ng dent ty and fact n re at o to arrest detent on adjud cat on, senten ng, and correct ona case management Prerequ s tes CRJ 100 200 and one upper d v s on cr m na just ce course or approva of nstructor. Cred t, 3 hours

440 Organization and Administration of the Criminal Justice System. System-w de a a ys s of organ zat ona structures. Management and admin strat ve po cies of cr m nal justice agencies aw enforcement courts and corrections Prerequisites CRJ 100 200 and one upper d v s on cr minal justice course or approva of nstructor Cred t 3 hours

461 Substantive Criminal Law. Cr m nal ab ty Crimes aga nst persons property and society Govern mental sanct ons of 'ndiv dua conduct as formu ated by eg s atures and the courts Prerequ s te. CRJ 360 or approva of nstructor Cred t, 3 hours

462 Procedural Criminal Law. The cr m na process Const tut ona and ega prob ems assoc ated w th cr m- na procedures Due process of law Prerequis te CRJ 360 or approva of nstructor. Credit 3 hours

463 Discretionary Justice. Use of discret onary author- ity throughout a phases of the cr m na just ce system Cross-purpose effect of d scretionary just ce. Const tu tiona m tat ons on and jud c a rev ew of d scret onary author ty Prerequisite· CRJ 360 or approva of nstruc tor. Cred t 3 hours

480 Internship in Criminal Justice. Assignments n a cr m na just ce agency des gned to further the student s

integration of theory with practice. Placements are arranged through consultation with students and agencies. Prerequisite: Junior standing and completion of criminal justice required courses (CRJ 100, 200 and 301) or approval of instructor. Credit, 3 or 6 hours.

494 Special Topics in Criminal Justice. Topics chosen from various fields of criminal justice. Prerequisites: CRJ 100, 200, and one upper division criminal justice course or approval of instructor. Credit, 1 to 3 hours.

498 Pro-Seminar. Small group study and research for advanced students. Prerequisites: CRJ 100, 200 and one upper division criminal justice course or approval of instructor. Credit, 3 hours.

499 Independent Study. Original study or investigation in the advanced student's field of interest. Prerequisites: CRJ 100, 200, and one upper division criminal justice course or approval of instructor. Credit, 1 to 3 hours.

500 Criminal Justice Research Methods. Theories and methods of research with emphasis on development of designs most relevant to criminal justice data and problems. Credit, 3 hours.

501 Criminal Justice System, Theory and Issues. Analysis of the criminal justice structure and process within various theoretical frameworks. Issues such as discretion, diversion and plea negotiations. Credit, 3 hours.

502 Primary Management in Criminal Justice. Concepts of modern management and their application to criminal justice agency supervision and management. Credit, 3 hours.

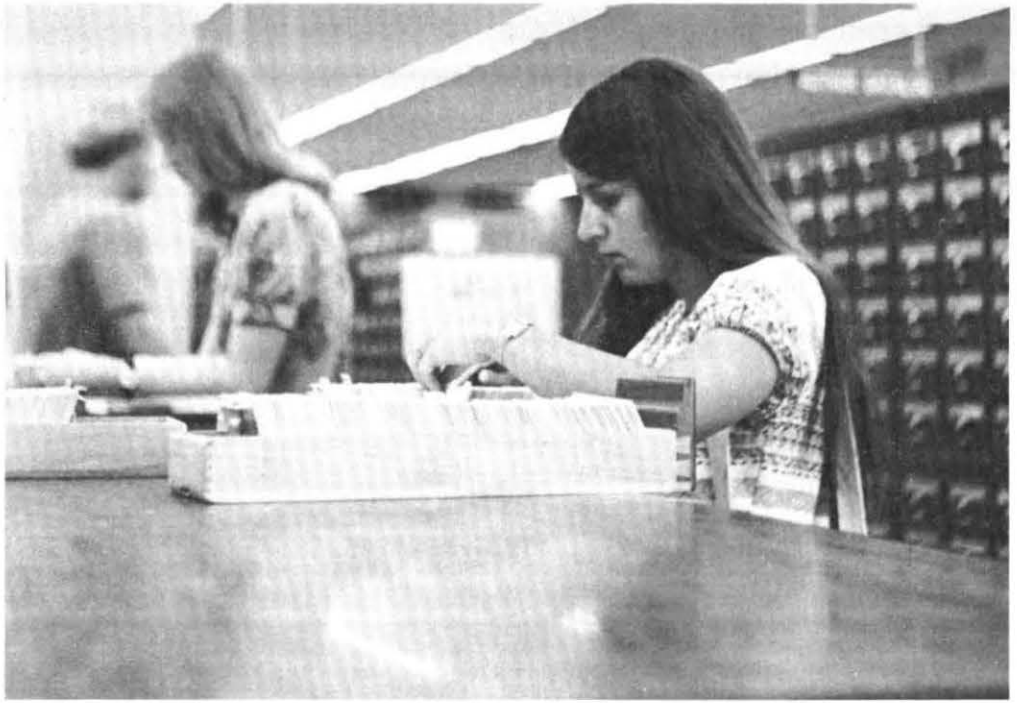
503 Crime and Social Causation. Theories of deviance and crime as they relate to social policies and specific response of the criminal justice complex. Credit, 3 hours.

509 Statistical Problems in Criminal Justice Research. Methodological problems of research design and statistical methods specific to criminal justice. Prerequisite: CRJ 500 or approval of instructor. Credit, 3 hours.

510 Understanding the Offender. Survey of learning, personality, and biological theories of causation and their relevance to understanding criminal and delinquent behavior. Credit, 3 hours.

511 Criminal Behavior: Programs and Techniques for Change. Current intervention techniques and programs for juvenile and adult offenders, including diversion, community-based and institutional programs, and current research. Prerequisite: CRJ 503, 510 or approval of instructor. Credit, 3 hours.

512 Treatment Delivery Systems. Treatment delivery systems utilized in the prevention and rehabilitation of criminal and delinquent behavior. Social, school, and government agency networks as resources in planning for individuals. Prerequisite: approval of instructor. Credit, 3 hours.



530 Criminal Justice Education. Development and philosophy of criminal justice education and training. Problems of curriculum development and evaluation. Examination and evaluation of teaching methodologies and instructional aids. Prerequisite: approval of instructor. Credit, 3 hours.

540 Criminal Justice Administration. Administrative policies and practices used in criminal justice agencies, and their application to the various facets of the criminal justice administrative process. Prerequisite: approval of instructor. Credit, 3 hours.

541 Criminal Justice Planning: Innovation and Change. Normative factors in planning for standards and goals in the criminal justice system. Application of innovation and change techniques in an interdependent system. Prerequisite: approval of instructor. Credit, 3 hours.

591 Seminar. Topics may be selected from the following: a. Police Policy Analysis. b. Adjudication Policy Analysis. c. Corrections Policy Analysis. d. Criminal Justice Philosophy and Ethics. e. Crime and Social Institutions. f. Judicial Education. g. Continuing Professional Development in Criminal Justice. Credit, 3 hours.

598 Special Topics. Topics may be selected from the following: a. Police Systems Development and Management. b. Adjudication Systems Development and Management. c. Corrections Systems Development and Management. d. Comparative Criminal Justice. e. Research, Planning, and Evaluation in Criminal Justice. f. Support Services in Criminal Justice Administration. Credit, 3 hours.

Special Courses. CRJ 584, 590, 592, 593, 594, 599.

College of Law

Ernest Gellhorn, LL.B.
Dean

Purpose

The prime function of the College of Law is to train young 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.

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 and entry into the many branches of the legal profession and careers in government, business, finance, industry and education.

To fulfill the requirements for a J.D. degree, a student must satisfy all of the following. (1) Admittance to the College as a candidate for the degree and satisfaction of any conditions imposed at the time of admission or prior to graduation during the law course. (2) Satisfaction of residency requirements for the College of Law. (3) Successful completion of a minimum of 87 hours of academic credit with a cumulative weighted average of 70 or better. (4) Completion of all required College courses. (5) Completion of first year writing research program. (6) Completion of the degree requirements within five years of entry into law school.

Except in the case of a transfer student, a student must be in residence at the College as a full-time student for a minimum of six semesters or their equivalent. A semester in residence is earned where a student has been enrolled in a minimum of ten hours of course work. A transfer student must complete the work of at least three semesters in the College immediately preceding the granting of a degree.

Admissions

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 (B.S., B.A., or equivalent). (2) A score on the Law School Admission Test (administered by the Educational Testing Service, Box 944, Princeton, N.J., in centers throughout the country). Both are to be at a level of achievement giving the applicant reasonable prospect for success in law study.

The deadline for completed applications, with college transcripts on all completed course work, the Law School Data Assembly Service Report and the Law School Admission Test score, in the Admissions Office of the College of Law, is April 1.

Each year many more students apply than can possibly be accommodated within the educational program of the College. Accordingly, the admission process is selective. Basic factors for evaluation are the undergraduate academic record and the score on the Law School Admissions Test, which are given roughly equivalent weight. The higher the GPA and LSAT scores the better. These are not the only factors considered, however. The admission requirements are flexible and other evidences of ability and an applicant's prospect for significant contribution to the educational program of the law school and to public service will be carefully considered by the Admissions Committee with the object of selecting those who are likely to succeed in law study. As a state institution, the College weighs residency as a factor in admission.

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 the student by the "case method," by the "problem method," by "moot court" and through other techniques an intensive exposure to the basic legal processes. The second year includes both prescribed and elective courses; a student is required to take at least 10 of 18 designated courses. The third year offers distinctive educational experiences featuring practice-oriented professional subjects; small group seminars; and participation in the actual rendition of legal services under licensed practitioners through internships with a law clinic and other public law offices.

Grading

First- and Second-Year Courses

Performance in first- and second-year law courses is graded under the following numerical scale:

95-88 A, Distinction
87-80 B, Excellent
79-70 C, Good
69-60 D, Deficient
59-50 F, Failure

A grade of 60 or above is required to receive credit for any course.

Third-Year Courses. Third-year courses are graded either "Credit" or "Non-Credit."

Retention Standards. To be eligible to continue in the law school, a student must maintain a cumulative weighted average of 70 or better at the end of each semester, summer session or quadrant.

Any student whose average for the first semester of the first year falls below 70 is automatically placed on probation, except that an average below 65 disqualifies a student from further attendance.

Continuation of enrollment shall be upon such terms and conditions as the College may impose. A student whose cumulative average

thereafter falls below the 70 level will be dismissed but may petition the faculty through the Office of the Dean for readmission. Where the academic average 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 average.

Special Honors at Graduation. At the time of graduation, students with academic distinction in the study of law may be awarded the respective designations *cum laude, magna cum laude* and *summa cum laude*. Recipients of these awards are selected by the Law Faculty on the basis of graded performance in courses for the first two years and evidence of academic achievement in the third year.

Law Building and Law Library

The John S. Armstrong Law Building is in the central campus near other graduate schools of the University and the Hayden Library. The Law Building provides every modern facility for legal education and has been described by experts on planning law buildings as setting a new standard in functional design.

With an "open stack" policy of accessibility to all law students and a rated seating capacity of three-fourths of the total student body, the Law Library contains a substantial collection of law and law-related books. The modern facility has shelf capacity for approximately 200,000 volumes. The goal is to make the Arizona State University Law Library one of the most outstanding in the country.

Accreditation

The College is fully accredited by the American Bar Association and by the Association of American Law Schools.

Information

Further detailed information concerning the course of study, admission practices, expense and financial assistance will be found in the Bulletin of the College of Law. Requests for the Bulletin and for application forms should be addressed to the Admissions Office, College of Law, Arizona State University, Tempe, Arizona 85281

Law

PROFESSORS:

GELLHORN (AH 102D), ALTMAN, BERCH, CANBY, DAHL, EFFLAND, FURNISH, LEE, LESLIE, MATHESON, MORRIS, MOULTON, PEDRICK, ROSE, SCHROEDER

ASSOCIATE PROFESSORS:

BRUFF, KAYE, LOWENTHAL, MINER, STRONG, ZILLMAN

DIRECTORS:

CIVIL CLINIC, ARONOW

PUBLIC DEFENDER CLINIC, MONTES DE OCA

LAW 501 Contracts I. Contract doctrines and their role in the judicial process. Judicial doctrines and where applicable the Uniform Commercial Code are studied in the context of contracts covering employment, personal and family arrangements, building and construction, the sale of goods, loans, assignment of wages and accounts receivable. Credit 3 hours.

502 Contracts II. Continuation of 501. Credit, 3 hours

503 Torts I. Protection through the judicial process of personality, property and relational interests against physical appropriations and defamatory harms. Doctrines of trespass, nuisance, negligence, conversion, deceit, privacy, slander, libel, seduction, alienation of affections, malicious prosecution, inducement of breach of contract and unfair competition. Credit 3 hours

504 Torts II. Continuation of 503. Credit, 2 hours

505 Procedure I. The nature of judicial power, viewed in the context of historical development and constitutional grants and limitations. Credit 3 hours

507 Property I. Law of real and personal property, various legal and equitable estates in land, fee estates, remainders, concurrent interests, executory interests, limitations on creation of future interests. Modern concepts of property. Credit 3 hours

508 Property II. Continuation of 507. Credit, 3 hours

510 Constitutional Law. Role of courts in the federal system, distribution of powers between state and federal governments, role of procedure in litigation of constitutional questions, fundamental protection for person, property, political and social rights. Credit 4 hours.

511 Criminal Law and Procedure I. Legislative and judicial formulations designed to deal with anti-social activity, the substantive elements of particular crimes, problems in the administration of criminal law and the penal system. The role and responsibilities of the legal profession in the administration and improvement of our system of criminal justice. Credit 3 hours

512 Criminal Law and Procedure II. Continuation of 511. Credit, 3 hours

513 Legal Research and Writing I. Techniques of research, use of the law library; preparation of legal memoranda. Credit, 1 hour

514 Legal Research and Writing II. Continuation of 513. Credit, 1 hour

600 Administrative Law. Administrative process, emphasizing nature of powers exercised by administrative agencies of government, problems of procedure and scope of judicial review. Credit, 3 hours

601 Antitrust Law. Legislation and its implementation to prevent monopoly and business practices in restraint of trade, including restrictive agreements involving price-fixing, trade association activities and resale price maintenance. Credit 3 hours

602 Commercial Law. Law of negotiable instruments, sale and secured transactions with emphasis on the Uniform Commercial Code. Legal problems arising in the distribution of goods. Credit 4 hours

603 Conflict of Laws. Problems arising when the operative facts of a case are connected with more than one state or nation. Choice of law, bases of jurisdiction, effect of foreign judgments, under lying federal and constitutional issues. Credit 3 hours

604 Corporations. The corporation as a legal tool for organizing the business enterprise in comparison with sole proprietorship and partnership. Relations of stockholders and management, varieties of stock ownership. Credit, 4 hours.

605 Evidence. Principles and practice governing the competency of witnesses and presentation of evidence, including the rules of exclusion and roles of lawyer, judge and jury under the adversary system. Credit 3 hours.

606 Federal Income Taxation. Federal income tax in relation to concepts of income, property arrangements, business activity and current tax problems, with focus on the process of tax legislation and administration. Credit 3 hours

607 Procedure II. Obtaining and exchanging information in advance of trial, solutions to the area of controversy, disposing of cases or issues without trial, defining the scope of litigation in terms of parties and subject matter, and the relationship between successive litigations. Credit, 2 hours

608 Procedure III. Litigation through appeal, including jurisdiction, right to jury, selection of jury, withdrawing case from jury, instructing jury, verdicts, judgments, appellate review. Credit 2 hours

609 Trusts and Estates. Substantive concepts involved in transmitting wealth, including intestate succession, wills and will substitutes, the modern trust as a family protective device, creation of future interests in a planned estate, social restrictions of a nontaxable nature and methods of devoting property to charitable purposes. Credit, 4 hours

610 Administration of Criminal Justice. Administration of the adult criminal justice system, including issues arising in the initial police stage of the system, the trial process and the sentencing and correctional stages. Credit 3 hours.

611 Estate Planning I. Tax laws relating to transfer of wealth both at death and during lifetime, including federal estate tax, gift tax and income taxation of estates and trusts. Credit 3 hours

612 Family Law. Legal and nonlegal problems which an individual may encounter because of a situation as a family member. Credit 3 hours

613 Federal Courts. Federal judicial system, relationship of federal and state law, jurisdiction of federal courts and their relation to state courts. Credit 3 hours

614 Labor Relations. Collective bargaining, including the right of employees to organize and to engage in concerted activities, resolution of questions concerning the representation of employees, duty of employers and unions to bargain; administration and enforcement of collective bargaining agreement. Credit 3 hours

615 Public International Law. Role of law in international disputes. Drafting and interpretation of treaties and multilateral conventions will be considered. Credit 3 hours

616 Jurisprudence. Philosophical problems raised by application of laws to society: major schools or legal

philosophy as they re ate to traditional and contemporary problems Cred t, 3 hours

617 The Legal Process. Inst tutions and processes of the American lega system and the r interrelat onsh ps. Credit 3 hours

701 Legal History. Lawyers contribution to soc ety, emphasizing the lives of eminent lawyers, judges, ega scholars and aw trained statesmen and awmakers. Cred t, 2-3 hours

702 Judicial Remedies. njunctions and other equ table relief; compensatory restitut onary and exemplary damages for breach of contract or for injury to persona and property nterests Cred t, 2 3 hours

704 Corporate Finance. Applicat on of lega mater a s tra ning and judgment to prob ems of sma l and large scale corporate enterpr ses. Prob ems nclude se ect on of the capita structure pub ic offer ngs of corporate secur t es, reorganizat ons of solvent corporate enter prises and corporate disso ut on Cred t, 2 3 hours

705 Corporate Taxation. Prob ems n taxab l ty of the corporation, corporate d str butions and corporate reor ganizat ons. Credit 2 3 hours

706 Indian Law. nquiry into ega problems spec a to American Ind ans and tribes Credit 2-3 hours

708 Law in a Technological Society. mpact of technol ogy on aw and soc ety. Such developments as computer sc ence, nuclear energy and h gh-speed transportation w ll be considered Credit 2-3 hours

709 Law and Medicine. Prob ems raised by the nterac t on of law and medic ne. Credit 2-3 hours

710 Natural Resources Development. Legal prob ems re ating to the acqu s t on, d str but on development and conservation of natura resources federal state and nterstate problems, environmenta contro , publ c ands Cred t, 2 3 hours

711 Insurance. Current trends n the bus ness of nsur ance ro e of government n the nsurance fie d Cred t 2 3 hours.

712 Creditor-Debtor Relations. Creditors remedies in satisfaction of cla ms and debtors protect on and rel ef under bankruptcy other aws Cred t 2-3 hours.

715 Professional Sports. Un que egal problems relat ng to profess ona sports, inc ud ng the r relat onsh p to ant trust laws, the nature of the p ayer contracts and assoc ated tax problems Credit 2 3 hours

716 Securities Regulation. Se ected prob ems ar s ng under the major statutes concerned w th regu at ng the securities market Cred t, 2 3 hours

719 Consumer Protection. Prob ems of the ndiv dual purchaser n mass markets. Fraud breach of warranty, holder in due course, usury and unconscionabi ity doctrines for voiding contracts, new protective eg s ation. Credit, 2-3 hours.

720 Legal Problems of the Poor. Legal prob ems of the poor n such areas as welfare, housing and consumer aw. Techniques for attacking these prob ems through constitut onal prov s ons and court processes. Credit 2-3 hours

721 Education and the Law. Current egal problems affecting institut ons of h gher educat on· relationships with governmenta agenc es facu ty and students scope of author ty publ c l ab lity; f nanc a contro Credit, 2-3 hours.

722 Water Law. Acqu s tion of water r ghts water use controls, interstate conf icts. Cred t 2 3 hours

723 Environmental Law. Lit gation, adm nistrative aw and egislation relating to prob ems of env ronmenta qua ity such as air and water pollution pest cides and radiation. Credit 2-3 hours.

724 Selected Problems in Tort Law. Credit 2-3 hours

725 Government Information. Access to and protection of data n governmental f les, the nterface between the Freedom of Information Act and the Federa Privacy Act Credit, 2 3 hours.

726 Legal Profession. Organized bar d str but on of lega services in modern soc ety, economics of the profession profess onal canons of eth cs for the bar and jud ciary and prob ems in po cing the profession. Cred't 2 3 hours.

728 Selected Problems: Legal Profession. Cred t, 1 to 3 hours.

731 Professional Skills: Interviewing and Counseling. Sk l s and techn ques nvolved in nterv ew ng and coun sel ng, ncluding nterd sc p nary mater a s from other fields such as psycho ogy and psychiatry Cred t, 2 3 hours.

732 Professional Skills: Problems in the Practice of Law. Ski ls of negotiat on n icens ng a var ety of situa t ons and draft ng of typ ca lega instruments Cred t 2 3 hours

735 Estate Planning II. Preparat on of actua estate plans, and imp ementing lega documents for a variety of typical pr vate cl ents Both tax and nontax elements in preparation of the p ans w l be considered. Prerequi site: LAW 611. Cred t, 2 3 hours

736 Planning for the Business Client. P ann ng trans act ons nvolving bus ness organ zat ons w th specia emphas s on ncome tax and corporate cons derat ons Credit, 2 3 hours.

737 Planning Private Real Estate Developments. Lega aspects of real estate deve opment ncluding negot a tion, legal devices for financing, promot on of sales leasing problems and compliance with ega controls as well as creation of private contro s over land use. Cred t 2-3 hours.

738 Practice Court. Students act as lawyers in conduct ing a case through al stages of tria from commencement of the action to final judgment. Credit, 2-3 hours

739 Techniques of Advocacy. Des gned to fami iarize students with the skills of the advocate by observat on, instruction and participation Cred t 2 3 hours.

740 Problems of Litigation. Current deve opments n the f elds of pract ce procedure, and ev dence Credit 2-3 hours.

741 Freedom of Speech. Freedom of speech and its assoc ation n compet tion with a number of governmenta and individual interests nc ud ng those of preserv ng order moral ty fa r tr a and privacy Credit 2-3 hours.

742 Equality in Modern Society. Discrim nation ts so c a and egal effects and remed es Focus on const tut onal, statutory and pr vate organizat onal at tacks upon d scriminat on on the bas s of race, re ig on sex or other classif cations Cred t, 2-3 hours

744 Protections From Bureaucracy. Proposed and ex sting mechanisms for protect on of nd v duals from governmental act on or inact on Case studies of the operation of the ombudsman, po ce civ ian review boards and other such nstitutions Cred t 2 3 hours

745 The Supreme Court. ntens ve exam nation of se lected current decis ons of the U S Supreme Court Credit 2 3 hours

746 Community Property. Property r ghts of husband and wife the Ar zona commun ty property system· homestead. Credit, 1 3 hours

748 State and Local Government. Lega problems n volved in the organ zation and adm n strat on of governmenta un ts nc ud ng the city, county, town v - lage, school district and specia distr ct Credit 2 3 hours.

749 Land Use Regulation. Legal prob ems n the regu a t on and control of land development by state and oca governments. Adm n strat on of zon ng subd v s on, and other planning controls; issues of fairness and procedure n the ut l zation of such contro s Cred t, 2 3 hours

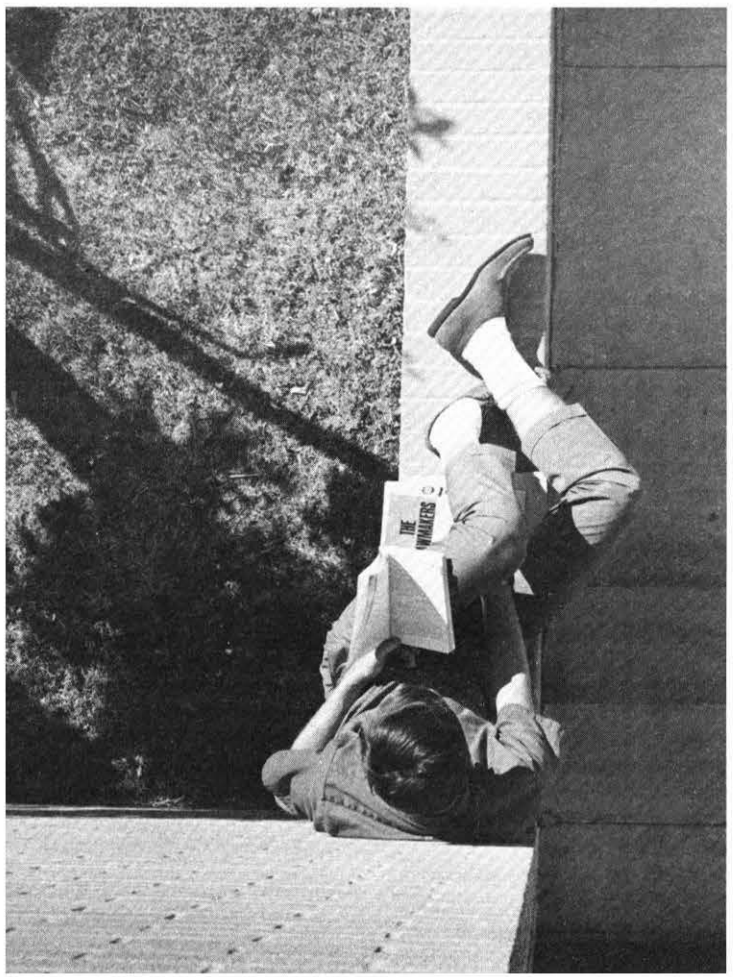
750 Labor Arbitration and Mediation. Ro e of the arbitrator and mediator in the settlement of abor management disputes Enforceab ty of awards proce dure and the operation of arb tration associations Credit, 2 3 hours

751 Selected Problems in Labor Law. Advanced ques-

tions in the collective bargaining area. Credit, 2-3 hours.

753 Criminal Behavior and Criminal Law. Legal problems raised by the various systems of social control. Objectives of the criminal justice system; theories as to the dynamics of criminal behavior and specific questions raised by the behavior of classes of offenders. Credit 2-3 hours.

754 Juvenile Justice System. Special problems in the juvenile system. Credit, 2-3 hours.



757 The Legal Monopolies: Patent, Copyright and Labor. Legally created and sanctioned monopolies will be examined and compared on the basis of their justifications, objectives and limitations. Credit, 2-3 hours.

758 The Competitive Economy. Legal and economic characteristics of selected problems of the industrial organization in the modern economy. Prerequisite: LAW 601. Credit, 2-3 hours.

759 Regulated Industries. Nature and extent of regulation imposed on selected industries and of the techniques adopted by administrative agencies in seeking to achieve the varied objectives of public control. Credit, 2-3 hours.

761 Selected Problems in Antitrust. Analysis of the private enforcement techniques in antitrust. Review and analysis of the various defenses, procedural problems and damage issues. Credit, 2-3 hours.

763 Selected Problems in International Law. Advanced consideration of selected problems. Credit, 2-3 hours.

764 Comparative Law. Comparison of laws and legal institutions of major world legal systems. Credit, 2-3 hours.

767 Selected Problems in Developing Nations. The effect of law in social change and development through agrarian reform, industrial development, economic integration. Emphasis on Latin America. Credit, 2-3 hours.

768 International Business Transactions. Problems and policy considerations involved in international trade; tariffs, international monetary controls, development loans, etc. Credit, 2-3 hours.

770 Law Journal. Academic credit for successful completion of work by a member of the staff of *Arizona State Law Journal;* 5 credit hour maximum. Credit, 1-2 hours.

771-779 Internships in Law. Supervised, practical experience with such agencies as Legal Aid, Public Defender Office, District Attorney's Office and other state and local governmental departments. Credit, 3 or 6 hours.

780 Moot Court. Academic credit for successful completion of work as a member of the Moot Court Board of Directors; 3 credit hour maximum. Credit, 1 hour.

781-782-783 Individual Study. With the approval of a faculty member, a student may research a legal subject of special interest and prepare a paper suitable for publication. Credit, 1-3 hours.

790 Field Work. Specialized study outside the law school in a particular area where law has an impact. The work must be approved and supervised by a member of the faculty. Credit, 1 to 6 hours.

791 Seminar in Law. Credit 1-3 hours.

School of Social Work

Ismael Dieppa, D.S.W.
Dean

The School of Social Work offers two programs: The undergraduate curriculum, leading to the degree Bachelor of Social Work (B.S.W.), is for the beginning level of social work practice. The graduate program leading to the degree Master of Social Work (M.S.W.) provides a curriculum to educate social workers in advanced and different levels of specialization and professional leadership.

Degrees

Bachelor of Social Work

The School of Social Work offers a curriculum leading to a Bachelor's Degree in Social Work (B.S.W.). During the freshman and sophomore years, students concentrate on obtaining a strong background in General Studies and are classified as pre-majors until they are officially admitted to the major. Entrance into the social work major from the pre-major is *not* automatic (see section on Admissions).

Junior and senior social work majors focus on social work courses in Social Policy, Human Behavior and Social Environment, Social Work Methods, Social Intervention, Social Work Research, and Field Instruction in Community Agencies. In addition, majors take additional courses in related areas and elective

Objectives

The undergraduate curriculum is designed to prepare students for beginning level social work practice, and to provide preparation for graduate training in social work. It also offers social welfare content in General Studies courses for Liberal Arts students from other curricula.

In consideration of the varied cultural and ethnic composition of Arizona and the Southwest, the program prepares students for transethnic social work and actively recruits from ethnic minority groups.

Degree Requirements

All candidates for graduation in the Bachelor of Social Work curriculum are required to present at least 126 hours of credit, of which at least 50 hours must consist of upper division courses. A cumulative grade point index of 2.00 is required for graduation.

Requirements for the Bachelor of Social Work degree:

		Semester Hours
I.	Communications Requirement	6
II.	General Studies Requirement	55
III.	Social Work Core Requirement	36
IV.	Related Social Work Requirement	9
V.	Electives	20
	Total	126

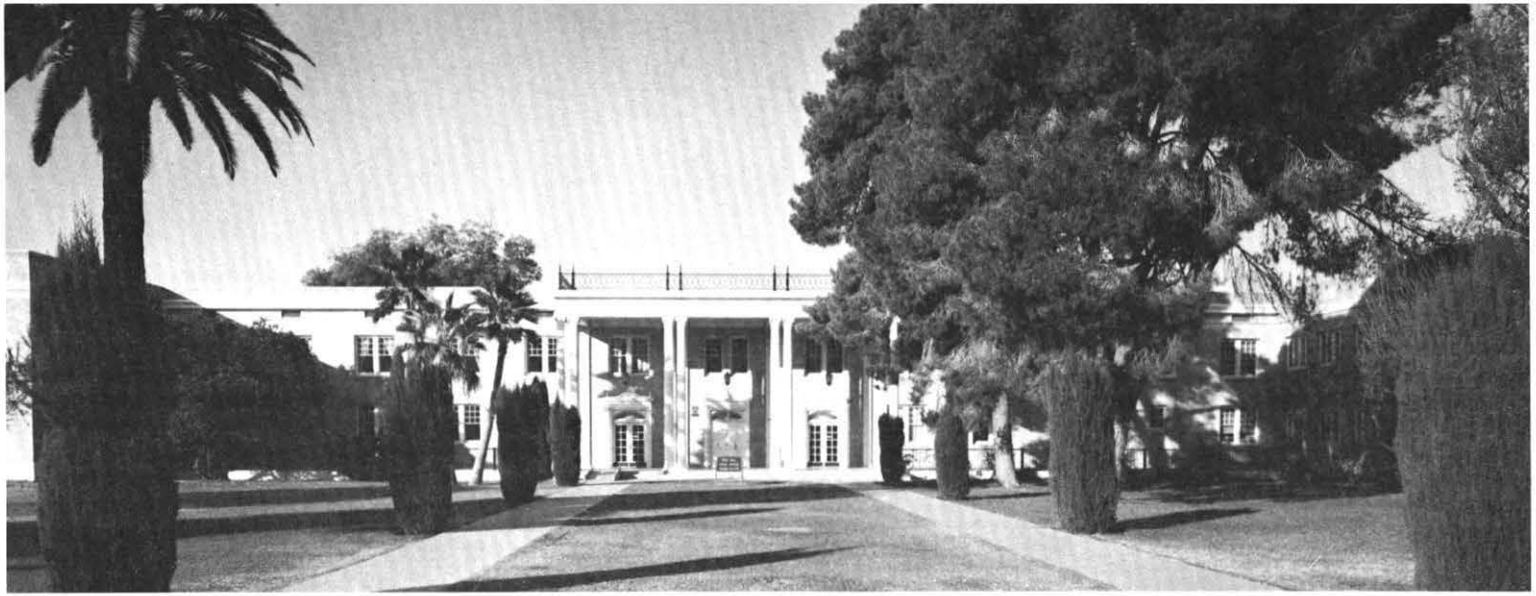
I. Communication Requirement.

ENG 101 3 credit hours
ENG 102 3 credit hours
or
ENG 104* 3 credit hours see page 36 "University English Proficiency Requirement"

*Those students taking ENG 104 must complete 3 additional hours in any subject to total 126 semester hours for graduation.

II. General Studies Requirement. To meet University General Studies requirements and to assure breadth and depth to the student's education, all social work students must complete a total of 55 semester hours of General Studies courses with the designated minimum semester hours in each of the following fields. Students may choose the requirements for the catalog under which they entered the University or the following.

Humanities and Fine Arts . . 12 semester hrs.
Architecture (APH courses only), art history (ARH courses only), English (except ENG 101, 102, 104), foreign language, humanities, music (MUS courses only), philosophy



Social and Behavioral Sciences ..... 18 sem. hrs.*
Anthropology (ASB courses only), economics, geography-cultural (CUG courses only), history, political science, psychology (PGS courses only), sociology.
*Included in these 18 hours, students must take SOC 101 or 301 and one additional sociology course. The psychology, economic and political science courses required for the major may be used to meet the requirement of social and behavioral sciences or for related areas.

Science and Mathematics ..... 10 sem. hrs.*
Anthropology (ASM courses only), botany and microbiology (all BIO, BOT and MIC courses), chemistry, geography-physical (PHG courses only), geology, mathematics, physics (PHY, AST and PHS courses only), psychology (PSY courses only), zoology (all BIO, ENT and ZOL courses).
*At least one course must include a scheduled laboratory and at least two courses must be taken in the same department.

Additional Courses ..... 15 sem. hrs.
To complete the 55 hours, additional courses may be taken from the list of approved courses preceding or from the following:
Aerospace Studies (maximum 6 hours ROTC credit), art, criminal justice, health, physical education and recreation (HES 100, 481; DAN 130, 230, 330 and PED 120, 220, 320, 473; REC 160; a maximum of 4 hours in all activities courses), home economics (CDE 232; DEA 171, 271, 272, 472, 474; FON 141; FAS 330, 331, 354, 357, 435; TXC 122), interdisciplinary (LIA courses in Liberal Arts, see page 97 in the catalog), mass communications, military science (maximum of 6 hours ROTC credit), music, speech.

III. Social Work Core Requirements

SWU 271	Introduction to Social Work
SWU 371	Social Policy and Services I
SWU 372	Social Policy and Services II
SWU 374	The Social Environment and Human Behavior
SWU 375	Social Intervention I (major only)
SWU 376	Social Intervention II (major only)
SWU 471	Use of Research in Social Work (major only)
or	
	SOC 390 - Social Statistics *and* SOC 391 - Social Research
*SWU 477	Field Work I (major only)
SWU 498	Pro Seminar Field Work I (major only)
*SWU 478	Field Work II (major only)
SWU 498	Pro Seminar Field Work II (major only)

*SWU 477 and 478 each require 16 hours in the field and must be taken concurrently with the appropriate SWU 498 Pro Seminar for 2 credit hours. Students planning to take SWU 477 or 478 must file an application for field work before they register for the courses.

Additional Requirements for Major. In addition to the social work requirements, students must complete 3 credit hours in ethnic minority background or problems and 3 credit hours from each of the following: economics, political sciences and psychology. These hours may also be used for General Studies, related areas or electives.

No credit will be granted toward fulfilling major core requirements in any upper division course in the student's major unless the grade in that course is at least a "C".

IV. Related Areas. (9 hours) Although the practice model of the program is a social work generalist, related areas and electives offer students opportunities to pursue their interests in special areas of service. Students are urged to consult their advisors for specific course suggestions.

V. Electives. (20 hours) In order to fulfill the University requirement of 126 credit hours for graduation, the student has the option of taking 20 credit hours in any college or department within the University. Students are encouraged, in consultation with their ad-

visor, to use these elective courses to supplement their particular area of concentra tion suggested under related areas Economics, education, management, political science, psy chology, quantitative systems and sociology are only a few of the academic units offering a specialized knowledge of value to the profes sional social work practitioner.

Admissions

The Bachelor of Social Work degree program at Arizona State University is divided into the pre-social work major and the social work major.

Pre-social work major consists of freshman and sophomore students who have been admit ted to the University and have declared social work as their major, as well as students trans ferring to the School of Social Work from other colleges within the University and other universities or junior colleges who have not successfully completed the admission process to the major. Students transferring from other universities or junior colleges as pre majors should follow the procedure outlined on page 17 of the University catalog. Students trans ferring from another college within the Uni versity must obtain a "Change of College" form from the Undergraduate Social Work office.

Admission Procedure for Social Work Majors. (Students having 45 credit hours or more) In order to meet accreditation stan dards, the Undergraduate Program of the School of Social Work has had to place a limi tation on the number of social work majors enrolled. Students wishing to enter the social work major are required to apply for adm s sion to the program in addition to obtaining an official certificate of admission to the Univer sity. A student is eligible to apply for admis sion as a social work ma or during the spring semester of his her sophomore year, provided the applicant has successfully completed 45 hours at the end of the previous fall semester. Students are admitted to the major ordinarily at the beginning of the fall term following the spring semester in which they applied.

Students who have been pre-majors will au tomatically be sent social work major application packets at the end of the fall se mester, provided they have successfully completed 45 hours at the end of that semes ter. Upon notification of formal acceptance to ASU, the Undergraduate Social Work office will mail the social work major application packet to the address listed on the official cer tificate of admission to transfer students having completed 45 hours during the previous semester or before. For this reason, students are urged to notify the Undergraduate Social Work office of any change in address. Stu dents may also pick up social work major application packets at the Undergraduate So cial Work office in West Hall 269 or request that they be mailed to their home address by calling 965 4907.

All students who are applying for fall admis sion must have an official certificate of admission to the University in their files by February 15. Students should allow at least four additional weeks to process their ASU application to receive their acceptance. All other application material (*i.e*, application form, additional statement and two letters of reference) must be returned to the Admissions Committee Chair, School of Social Work, Undergraduate Program, Arizona State Uni versity, Tempe, AZ 85281 by March 1 of the semester in which the student is applying. Failure to meet these deadlines may result in the applicant having to wait for the next year's admission process. Applicants will be notified by mail of the commitee's decision within four weeks following the March 1 deadline Those applicants who have been denied admission may request a conference to discuss the deci sion and obtain counseling in the development of alternative plans.

Criteria for Admission. The admissions committee, composed of faculty and student members, will evaluate all applicants on the basis of the following criteria: (1) GPA (Grade Point Average) Generally, a 2.5 cu mulative grade point average is required, but consideration is given to applicants whose grades reflect a recent or constant trend of improvement. (2) Motivation. Although moti vation is more difficult to assess than grade point average, the committee uses the applica tion form, letters of reference and in particular, the additional statement to judge the applicant's commitment toward working with people in a helping relationship. For this reason, it is recommended that applicants use the additional statement as a means to elab orate about how motivation is demonstrated in their life and work experience by using spe cific examples. (3) Experience. Volunteer and/or work experience are the usual indica tors of interest and potential for the helping professions, but students are encouraged to include any life experience which further qual ifies them as helping professionals. (4) References. Two references are required for each applicant. These references should be from two persons who have known the appli cant in a professional capacity, *e.g.* former teacher, employer or social worker, and have knowledge of the person's potential as a social work professional. It is also helpful that the references have some knowledge of the type of qualifications necessary for social workers. Students may submit more reference forms if they wish

Students who have graduated with a degree from an accredited B.S.W. program may be considered for advanced standing in the M S.W. program.

School of Social Work

PROFESSORS:
DIEPPA (WEST HALL), CRANMER
MECH

ASSOCIATE PROFESSORS:
BRAND, COUDROGLOU, ENGELHARDT, FAUSEL, HILL, LEYBA, MEANS, MONTIEL, NICHOLS, NOWAK, POLENZ, TEAGUE, WOODMAN

ASSISTANT PROFESSORS:
BANKHEAD, BAUR, BOYD, BROWN, CARTSONIS, GARNER, GLICKEN, HARRIS, LENNA, MANN, MARTINEZ, NEAL, PRIETO, SPOONHUNTER

SOCIAL WORK (SWU)

SWU 271 Introduction to Social Work and Social Welfare. Analysis and observation of social welfare services and the field of social work. Two lectures, 3 hour field trips and volunteer experience. Not open to students who have credit for SWU 470. Credit, 3 hours; 1 hour credit for laboratory.

272, 273 Current Social Welfare Problems and Communications. Development of written and oral communication skills needed in social work. Credit, 3 hours each semester.

371 Social Policy and Services I. Development of social welfare as a societal institution. Philosophical, historical, and comparative analysis of the welfare functions, issues and problems in meeting changing human needs in a changing social structure. Credit, 3 hours.

372 Social Policy and Services II. Evaluation of existing and projected social welfare programs or services in selected areas: prerequisite SWU 371. Credit, 3 hours.

374 The Social Environment and Human Behavior. Relationships among social units which affect human behavior stressing the relevance of this content to social work. Prerequisite: PGS 341 or approval of instructor. Credit, 3 hours.

375 Social Intervention I. Introduction to social work methods. Examines the value base of the social work profession and develops knowledge and skills in communications, data collection and data analysis for working with individuals, small groups and community groups. Prerequisites: social work major, SWU 374 or approval of instructor. Credit, 3 hours.

376 Social Intervention II. Develops intervention techniques for working with individuals, small groups and community groups. Prerequisites: social work major, SWU 375 or approval of instructor. Credit, 3 hours.

470 Community Resources. Purpose, structure and delivery of community welfare services. Especially designed for teachers, nurses, police and related professions. Not open to students who have credit for SWU 271. Credit, 3 hours.

471 Use of Research in Social Work. Statistical and research principles and methods, emphasizing their application to social work. Prerequisites: social work major, SWU 375 and approval of instructor. Credit, 3 hours.

474 Ethnic/Cultural Variables in Social Work. A basic conceptual approach to understanding ethnic/cultural variables of Southwestern ethnic minorities and how these factors intervene in social work practice. Credit, 3 hours.

477, 478 Field Work I and II. Sixteen hours a week field instruction in a social agency. A 2 credit hour pro-seminar, SWU 498, must be taken concurrently. Prerequisite: social work major and SWU 375 or approval of instructor. Each field work course may be repeated for a total of 10 credits. Credit 5 hours each semester.

498 Pro-Seminar Field Work I and II. To be taken concurrently with field work. Seminars integrate practice and theory. Prerequisite: social work major. Credit, 2 hours each semester.

Master of Social Work

The curriculum of the Master of Social Work program is currently under revision. For information pertaining to admission, degree requirements, and design of the new program which recognizes differential entry levels and course listings, please refer to the School's *Bulletin*. Inquiries should be addressed to Director of Admissions, School of Social Work.

Graduate College

Charles M. Woolf, Ph.D.
Dean

The development and interpretation of new knowledge and creative work are important functions of the University and matters of specific concern to those involved in the programs available in the Graduate College. For students who have demonstrated a high level of ability and promise at the undergraduate level, graduate work offers an opportunity for further intellectual challenge in advanced and more specialized areas.

The primary purposes of the Graduate College are to provide the student with opportunities for advanced study, and to foster the spirit of scholarship and research. The critical analysis of information and the ability to arrive at a level of understanding beyond that already existing plays an integral role in graduate education.

Under the supervision of the Graduate Council and the Dean of the Graduate College, programs for graduate study are offered by the various departments, schools, centers and colleges. The Graduate Council is responsible for the development and formulation of general policies and the approval of procedures essential to the organization and administration of graduate programs. The Appeals Board of the Graduate Council acts as the appeals body for graduate students seeking redress on academic decisions regarding their graduate programs. The Dean of the Graduate College is directly responsible for the administration of policies and graduate programs.

Graduate Degree Programs Offered

Master of Arts
Master of Science
Master of Architecture
Master of Arts in Education
Master of Business Administration
Master of Counseling
Master of Fine Arts
Master of Health Services Administration
Master of Music
Master of Natural Sciences
Master of Public Administration
Master of Science in Engineering
Education Specialist
Doctor of Business Administration
Doctor of Education
Doctor of Philosophy

Master of Arts and Master of Science. The master's degree is offered in Accounting, Agriculture, Anthropology, Art, Biological Sciences, Botany, Chemistry, Communication, Communication Disorders, Criminal Justice, Economics, Engineering, English, French, Geography, Geology, German, History, Home Economics, Humanities, Mathematics, Microbiology, Music, Nursing, Philosophy, Physical Education, Physics, Political Science, Psychology, Recreation, Sociology, Spanish, Speech, Technology, Theatre and Zoology.

Doctor of Philosophy. The Ph.D. degree is offered in the following fields: Anthropology, Botany, Chemistry, Economics, Education, Engineering, English, Geography, Geology, History, Mathematics, Physics, Political Science, Psychology, Sociology, Spanish and Zoology.

Admission to Graduate College

A student who has earned a bachelor's degree or a graduate degree from an accredited college or university is eligible to apply for admission to the Graduate College of Arizona State University. All decisions on admissions are made without regard to sex, creed or ethnic origin. Application forms may be obtained by writing to the Admissions Office, Graduate College.

At least two months before the first enroll

ment, the Graduate College should have received the application for admission and two transcripts of all undergraduate and graduate work. In addition, all applicants are required to submit a score received on an academic aptitude test. The student should contact the department involved to determine which test is required.

The application for admission, the applicable test scores, and the transcripts are to be sent directly to the Admissions Office, Graduate College. The transcripts are to be sent to the Admissions Office by the registrar of each college or university which the applicant previously attended. The applicant should write to the registrars concerned and then allow them time to process and mail the transcripts. A qualified applicant, whose application has been filed later than the deadline may be permitted to enroll in graduate classes as a nondegree student. That status will be maintained until all required forms and transcripts have been received and a decision regarding admission to a program has been reached by the college or department concerned and by the Graduate College.

Students' official status for a semester is determined by their status at the end of that semester.

All documents received by the University in connection with such applications for admission become the property of Arizona State University. Under no circumstances will they be duplicated, returned to the applicant, or forwarded to any agency or other college or university. Admission documents of applicants who do not enroll in the University may be destroyed after one year.

Departmental Requirements. Many departments have earlier application deadlines than the Graduate College and additional admission requirements. Applicants are advised to check with individual departments regarding application deadlines and admission requirements. Letters of recommendation should be sent directly to the department. In all instances, the college or department in which the student wishes to study must indicate its willingness to admit the student. All applications for admission must be approved by the Dean of the Graduate College. When faculty or facilities are limited, a department may set standards higher than those established by the Graduate College and may recommend denial of a student whose academic record is superior to the minimum requirements described below.

Applicants may be admitted to a graduate program under two classifications:

Regular Admission. Applicants must be acceptable to both the Graduate College and the academic unit in which the applicant plans to study. Among other considerations for acceptance by the Graduate College, the applicant must have a grade point average of 3.0 (4 point scale) in the last two years of work leading to the bachelor's degree. The applicant's score on an aptitude examination such as the Graduate Record Examination, Miller Analogies Test, or the Graduate Management Admission Test will also be considered in making decisions regarding admissions. Applicants should check with the academic unit of their intended study to determine specific requirements. Applicants should be aware that a particular department may hold standards substantially above the Graduate College minimums. Inquiries should be directed to the department concerning its standards and whether letters of recommendation aptitude or other materials are required.

Provisional Admission. An applicant may be granted provisional admission to the Graduate College if the Graduate College or academic unit in which he plans to study requires additional evidence of his qualification for admission with regular status. No student may maintain provisional status indefinitely. Normally, final determination of status will be made by the time the student has completed 12 hours of approved graduate study. If applicants have extensive deficiencies requiring an additional year or more of preparatory study, they may be advised to enroll in an undergraduate program.

Nondegree Status. An applicant with an undergraduate degree who is not pursuing a graduate degree program may be registered in the Graduate College in a nondegree status.

Foreign Student Admission. Applicants from foreign countries should write to the Admissions Office, Graduate College at least one year prior to the date they plan to begin study. They will receive the necessary instructions and application blanks which are to be completed and returned to that office. Applicants should make sure that other documents are sent at about the same time, especially transcripts from colleges and universities attended, letters of recommendation, results of the Test of English as a Foreign Language (TOEFL), and a statement of financial responsibility.

Prospective foreign students should not make plans to leave their country until they have received notification of admission. Ordinarily such a statement regarding admission is required before the student can be issued a passport or visa.

Re-entry to the Graduate College. Any former graduate student who has not been in attendance at Arizona State University for one or more regular semesters must obtain an application for re-entry from the Admissions Office, Graduate College. This application should be submitted at least one month prior to the beginning of the semester in which the student plans to re-enter. Official transcripts

of any additiona work taken elsewhere must be sent directly to the Admissions Office, Graduate College at Arizona State Un versity from the Office of the Registrar at the nstitu tion where such credit was earned

Student Responsibility. It is the respon- sibility of the graduate student to become con versant with and observe all procedures and requirements of the Graduate College as de fined in the *Graduate Catalog* and to be familiar with the University's po icy regard ng student conduct as described n the section, "Student Membership in the Un versity, ' of the *General Catal og* The student should be particularly informed about the genera regu- lations concerning the degree desired and iny special requ rements within the department or academic unit.

Transient Graduate Students. A graduate student in good standing at another university who wishes to earn cred ts for transfer to that inst tution may register for a lim ted number of cred t hours either during i sui imer session or during a regular semester. The student w be admitted as a "transient gradu ite student," and wi l not be required to subm t an aca demic transcr pt A letter from the student's graduate dean, stating that the appl cant is n good standing and s author zed to register for specified courses, must be received by the Dean of the Graduate Col ege it least three months prior to registrat on.

Graduate Study by Arizona State Univer- sity Faculty Members. Men bers of the University faculty holding the rank of assis tant professor or higher n ay not earn a graduate degree at Arizona State U niversity They may, however, be perm tted t enr ll in graduate courses on a n ndegree b is s or t take courses for tr insfer to an ther nstitution

Graduate Course Enrollment by Under- graduates. Undergraduate students at Arizona State University may enroll in gradu ate courses with the approval of their advisor, the course instructor, the chair of the depart ment, and the Dean of the College offering the course. If the course s not used to meet an undergraduate graduation requ rement, it may be eligible for use in a future graduate pro gram on the same basis as work taken by a nondegree graduate student

Course Load. The course load is determined by the supervisory committee but is not to exceed 15 semester hours of graduate credit. At the graduate evel, course work, whether cr not formal in nature, serves m inly is a guide for independent study. Students are expected to exceed minimum requirements and to mas ter subjects rather than simply to pass courses All graduate students doing research or work ing on theses or dissertations, or who are using university fac ities or faculty time, must be registered for a minimum of one hou of appropriate graduate evel credit n the de partment in which they ire pursu ng their degree program.

Scholarship. Academic excellence s ex pected of students doing gradu ite work A student who is not doing s atisf actory work may be withdrawn from the degree progr im by the Dean of the Gr aduate College upon the recommendation of the department or ac dem c unit concerned

The grading system applicable to graduate courses is as follows

A Excellent (4.0)	CR Cred t
B Good (3)	Y Satisfact ory
C Passing (2 0	NC No Credit
D No Graduate Credit (1 0 *	W Withdr w il Inc mplete
E Failure	X Audit

*Cannot be applied t owa d i gradu te de · b it s inc uded n calcu tion f grade p r t ave age

To be eligible for a degree in the Graduate College, a student must achieve a grade point average of "B" (3.0) or better in all work taken for graduate credit, exclusive of defi- ciencies, and in all work specific y included in his program of study. Grades below "C" cannot be used to meet the requ rements for a graduate degree. Grades on transfer work wil not be included in computing grade point aver ages. Graduate course work, other than research or thesis, reported "Incomplete" must be completed within one year of the official ending of the course If a grade of "Incom plete" ("I") is not removed w thin one year, it becomes part of the student's permanent record.

Students receiving a grade o "D" or 'E" must repeat the course in regu ar class if they wish to include it in their program of study.

The mark of "W" is given in a course when ever a student (1) off cia ly drops from a course during the first six weeks of the semes- ter, (2) officially w thdraws from the University during the first six weeks of the semester, (3) officially dr ps a course after the first six weeks only if passing at the time of withdrawl, (4) off cia ly withdraws from the University after the first s x weeks only if passing at the time of w thdr wal

Graduate Credit Courses. Courses carry ng graduate cred t are numbered 500, 600, 700 However, only those courses appearing on the approved program of study may be applied toward a graduate degree Courses at the 400 level will apply to degree requirements when appearing on an approved progr im of study

Foreign Language Requirement. Language requirements for graduate degrees are deter mined by the departments concerned If a foreign language is required, students must demonstrate at least a reading knowledge of the language which is recomm ended by th eir committee and approved by their department

chair. Normally these will be selected from French, German, Russian or Spanish, although other languages may be recommended when there is adequate justification.

Language competency is certified by the Graduate College. Foreign Language examinations (ETS examinations) are administered by the University Testing Service. Examinations in languages other than those available through ETS are administered by the Department of Foreign Languages. Students planning to take the ETS Foreign Language examination must register at the University Testing Service at least one month prior to the examination date. Only three attempts will be permitted. Satisfactory ETS scores achieved as an undergraduate will be accepted within a six-year time limit. Students who maintained at least a "B" average in the second full year of language taken at an accredited university and completed within the last six years may petition to be exempt from the test.

The language requirement may be fulfilled by special reading knowledge courses for graduate students given by the Department of Foreign Languages. Students are certified as having a reading knowledge in a particular language upon completion of the two-semester course, providing a grade of "A" or "B" has been achieved in the second semester of the course.

Graduation. Students should apply for graduation no later than the date specified in the *Graduate Catalog* calendar. All fees are payable at that time. At the end of the semester in which they apply for graduation, students will be officially notified of any requirements for their degree which they have not yet completed.

Master's Degree

Admission to the Master's Degree Program. Students wishing to enroll in a master's degree program at Arizona State University are admitted according to the procedure described on pages 274-275. Since graduate work presupposes adequate preparation in a selected field at the undergraduate level, deficiencies will be specified at the time of admission by the department or academic unit involved.

Credit Requirements. A minimum of 30 semester hours of graduate work approved by a student's supervisory committee and the Graduate College is required. More than 30 semester hours may be required in certain programs.

Supervisory Committee. Upon admission of the applicant with regular or provisional status, a supervisory committee, consisting of a chair and other members, will be appointed by the Dean of the Graduate College. This committee establishes a program of study with the student, directs the thesis or graduate project, and administers the final examination(s). Appointments are made by the Dean of the Graduate College on the recommendation of the head of the student's department or academic unit.

Whenever a minor field is involved, one of the members of the committee shall be from the minor field. In the Master of Arts in Education degree programs involving an academic field, the chair of the supervisory committee shall be from the College of Education and a co-chair shall be from the academic field. Other members may be from either field.

It is in the student's best interest to have an official program of study filed with the Graduate College at the earliest possible date. Changes in the planned program may be made by the student's supervisory committee, with the approval of the department chair, and the

Dean of the Graduate Col ege. Forms for the submission of the program of study are provided at the time of regular admission and are also available in the graduation section of the Office of the Registrar, 134 Moeur Administration Building.

Program Requirements. A minimum of 18 semester hours of approved graduate work in courses taken for resident credit at Arizona State University is required

A maximum of 6 semester hours of resident graduate credit taken at other institutions may be transferred for credit toward a master's degree, provided the courses are included in the approved program of study Such courses must be acceptable toward graduate degrees at the institution where the courses were completed.

Only courses with an "A" or "B" grade may be transferred Grades on transferred credit cannot be included in the grade point average.

Up to 12 semester hours toward a master's degree program may be earned in courses taken for extension credit The total of all transfer and nonresident extension courses is limited to 12 semester hours Extension courses completed through the University of Arizona or Northern Arizona University after January, 1973 are eligible for transfer on the same basis as resident courses provided the extension courses were taught by resident faculty of one of the two universities Extension courses offered by other universities cannot be transferred

A maximum of 10 semester hours of course work completed while in nondegree status may be included in a program of study

Foreign Language Requirement. Language requirements are determined by the department concerned For certification of proficiency, see page 30

Thesis Requirements. The requirement of a thesis is determined by the department or academic unit concerned Each student writing a thesis must register for a minimum of six semester hours credit for thesis, or a combination of research and thesis totaling six hours which are directed toward a common research problem. These hours must appear in the program of study The final copy of the thesis must be reviewed by the student's supervisory committee and submitted to the Dean of the Graduate College at least three weeks before the degree conferral date. Copies of *Guide to Thesis Preparation* are available in the Graduate College office

Final Examinations. A final examination, written, oral or both administered by the department or academic unit, is required The dates of the written examinations are set by the Graduate College once each semester as listed in the *Graduate Catalog* calendar Students are not eligible to apply for the comprehensive or any final examination until they have filed a program of study, fulfilled any language requirement and applied for graduation.

Failure in the comprehensive or any final examination will be considered final unless the supervisory committee recommends, and the Dean of the Graduate College approves, a re examination. Only one re examination is permitted. A re examination may be administered no sooner than three months and no later than one year from the date of the original examination.

The final oral examination in defense of the thesis must be conducted at least one week before the degree conferral date The examination will be conducted by the supervisory committee and others appointed by the Dean of the Graduate College Applications for the final examinations are available in the Graduate College office.

Maximum Time Limit. All work offered towards a master's degree program must be completed within six consecutive years

Education Specialist Degree

The Education Specialist degree program is designed to provide opportunity for professional persons in the field of education to develop skills as highly competent practitioners in the various areas of education

Programs of study for the Education Specialist degree are offered in Adult Education, Counseling and Student Personnel Curriculum and Instruction, Educational Administration and Supervision, Elementary Education, School Psychology, Secondary Education, Social and Philosophical Foundations of Education Teaching Specialist Secondary Education Subject Matter Fields (See list in the *Graduate Catalog* under Secondary Education Subject Matter Fields

Admission to the Education Specialist Degree Program. To be eligible to apply for admission, the student must have a bachelor's degree from an accredited institution At least one year of successful teaching experiences is required in all programs Normally the student will have a master's degree when entering. Admission is determined by a variety of criteria in addition to grade point averages These criteria are specific to particular programs Information is available from departments offering the particular programs

Supervisory Committee. The Dean of the Graduate College, upon recommendation of the department chair appoints the supervisory committee Each area of study included in the degree program will be represented on the committee The supervisory committee shall approve the program of study, prepare and administer qualifying and comprehensive

examinations, approve the applied project and serve on the final oral examining committee.

Program of Study. A minimum of 60 semester hours are required beyond the bachelor's degree. This may include no more than 30 semester hours in a master's degree program. At least 48 hours of course work in the program must be earned in courses at the 500 level or above.

Credits may be transferred from other accredited institutions. The number of credits accepted for transfer will depend upon the objectives approved by the supervisory committee. Grades on transferred credit cannot be included in the grade point average. A minimum of 24 semester hours in the approved program of study shall be taken at Arizona State University, following admission to the program.

Residence. Normally the candidate must expect to spend the equivalent of two full academic years in graduate study, which may include one year spent in attaining the master's degree. One academic semester or a ten week summer session must be spent in full time residence at the University before admission to candidacy for the Education Specialist degree. Additional residence may be required by certain departments in order to meet special needs. A graduate student is considered to be a "full time student" in a semester if enrolled in 10 or more semester hours. Full time graduate students shall not be employed more than a maximum of one half time as either a graduate assistant, a graduate associate or in other employment. Individual departments may, with the approval of the Dean of the College of Education and the Dean of the Graduate College, modify this definition in particular cases. At least 30 semester hours of approved graduate work must be completed at Arizona State University.

Comprehensive Examinations. When students have essentially completed the program of study, they will apply to the Graduate College through their supervisory committee for permission to take the oral and written comprehensive examinations. Failure in the comprehensive examinations will be considered final unless the supervisory committee recommends, and the Dean of the Graduate College approves, a re examination. Only one re examination is permitted. A re examination may be administered not sooner than three months and no later than one year from the date of the original examination.

Admission to Candidacy. Students should apply for admission to candidacy and graduation promptly after they have completed 45 hours of course work, passed the written and oral comprehensive examinations, and have had the problem and title of the applied project approved by the supervisory committee.

Applied Project. Upon recommendation of the supervisory committee, students may enroll for the applied project after completion of 12 hours of approved course work in the degree program.

Final Examination. The final oral examination for the Education Specialist degree program in defense of the applied project report is administered by the supervisory committee and others appointed by the department. This examination is scheduled through the chair of the supervisory committee and department chair and must be held at least one week before the degree conferral date as listed on the *Graduate Catalog* calendar.

Graduation. After the final oral examination has been passed the student is eligible for graduation.

Maximum Time Limit. The Education Specialist degree requirements must be completed within three years after the comprehensive examinations have been passed.

Doctor of Philosophy Degree

The Doctor of Philosophy degree is granted upon evidence of high attainment in a special field and demonstration of independent scholarship. Such attainment must be demonstrated by original research or creative work presented in a dissertation. The degree is never conferred solely on the basis of courses completed or formal study extending over a prescribed period of time.

Admission to the Ph.D. Degree Program. The general requirements for admission to the Graduate College are given on pages 274-275. Graduate students may apply for admission to the Ph.D. degree program by filing a written application with the Admissions Office, Graduate College.

Supervisory Committee. Upon recommendation of the department chair or head of the academic unit, the Dean of the Graduate College appoints the student's supervisory committee, consisting of a chair and at least four other members.

Program of Study. The program of study should be submitted as early as possible and must have the approval of the student's supervisory committee, the department chair, and the Dean of the Graduate College. The courses may be taken entirely within one department or they may be taken in a combination of departments. Credits from other recognized institutions may be transferred provided the courses meet the objectives of the program as defined by the supervisory committee and are approved by the Dean of the Graduate College. Only courses with an "A" or "B" grade may be transferred.

Residence. In general, Ph.D. degree students should expect to devote to their program of

study the equivalent of at east three academic years (84 semester hours) beyond the bache lor's degree At least two semesters subsequent to the first year (30 semester hours) of gradu ate study must be spent in continuous ful time residence at Arizona State University, and at least 30 hours of approved graduate credit must be completed at this inst tution.

It is expected that during the period spent in residence, students w devote full time to graduate studies This period is des gned to provide an opportunity for students to avail themselves of university resources and to inter act fully with faculty and fellow graduate students. Ideally, this time is one of total in volvement in the academic program being pursued by the student

Foreign Language Requirements for the Ph.D. Degree. l anguage requirements are determined by the department concerned I or certification of proficiency see page 3)

Comprehensive Examinations. When stu dents have essentially completed the course work in an approved program of study and have satisfied any departmental foreign an guage requirement, they should request permission from the Graduate College to take their comprehensive examinations These wr t ten and oral examinations are designed to test the students' mastery of the r field of specialization. Failure in the comprehensive examinations will be considered final unless the supervisory committee recommends, and the Dean of the Graduate College approves, a re examination A re-examination may be administered no sooner than three months and no later than one year from the date of the original examination Only one re-examination is permitted

Admission to Candidacy. Students should apply promptly for admission to candidacy and for graduation after they have passed the comprehensive examinations and have had the subject and title of their dissertation approved by the supervisory committee

Research and Dissertation. Each candidate must register for a minimum of 24 semester hours credit for research and dissertation The final copy of the dissertation must be reviewed by the supervisory committee and the Dean of the Graduate College at least three weeks be fore the degree conferral date. Copies of *Guide to Preparation of the Doctoral Dissertation* are available in the Graduate College Office.

Final Examination. The final oral examination in defense of the dissertation will be scheduled by the Dean of the Graduate College. This examination may not be scheduled earlier than two weeks after the completed dissertation has been reviewed by the supervi sory committee and the Dean of the Graduate College The examination will be conducted by the supervisory committee and others ap pointed by the Dean of the Graduate College All final oral examinations must be conducted at least one week before the degree conferral date

Graduation. After the final oral examination has been passed and the dissertation has been accepted and filed in the Graduate College the student is eligible for graduation.

Maximum Time Limit. The candidate must take the final oral exam nation in defense of the dissertation w thin five years after passing the comprehensive examinations. Any excep tion must be approved by the supervisory committee and the Dean of the Graduate College and ordinarily will involve repetition of the comprehensive examinations

Doctor of Education Degree

The basic purpose of the Doctor of Education degree program is to provide opportunity for those interested in the field of education to do advanced scholarly study and research in prep aration for professional practice A dissertation based upon this research is required. The degree is never conferred solely as a result of study extending over any prescribed period of time or the completion of a given number of courses. The program for the Doc tor of Education degree requires at least the equivalent of three academic years of full time study beyond the bachelor's degree or two academic years of full time study beyond the master's degree

The Doctor of Education degree is offered in the following areas: Adult Education, Art Education, Business Education, Counseling Psychology, Curriculum and Instruction, Edu cational Administration and Supervision, Educational Technology, Elementary Educa tion, Health and Physical Education, Industrial Education, Mathematics Education, Music Education, Physics Education, Sc ence Education, Secondary Education, Social and Philosophical Foundations of Education.

Admission to the Doctor of Education Degree Program. A student who seeks ad mission is expected to have acquired a minimum of one ye ar post bacca aureate teaching or equally relevant experience An applicant may be required to take speci l qualifying examinat ons prep red and evalu ated by the graduate committee of the department to which he applies The general requirements for admission to the Gradu ate College are given on pages 274 275. In addi tion, a variety of criteria are employed t) determine admission Specific information may be received by consulting the appropriate department chair

Supervisory Committee. The Dean of the Graduate College upon recommendation of the department chair appoints the supervisory committee. Each area of study included in the

degree program will be represented on the committee.

Program of Study. A minimum of 90 semes ter hours of work taken beyond the bachelor's degree is required. At least 28 semester hours of course work must be taken in Education, exclusive of the dissertation The student is expected to complete three semester hours in statistics and design, 12 semester hours of psychological/social foundations, and 15 se mester hours of practicum internship At least 59 semester hours of the learning experiences should be at the 500-level or higher.

Upon approval of the supervisory commit tee, the student may start research activity in connection with the dissertation after complet- ing 15 hours of work in the program beyond the master's level.

Credit may be granted for courses taken at other recognized institutions. The number of credits accepted on transfer depends upon the recommendation of the supervisory committee and approval of the Dean of the Graduate College. Only courses with "A" or "B" grades may be transferred

Reading knowledge of a foreign language is not required for the Ed.D degree.

Residence. The candidate should expect to spend the equivalent of three full academic years in graduate study, which may include one year spent in attaining the master's de gree. The amount of time that a student must spend in official residence on the campus de- pends to some extent on the individual program of study

The minimum residence requirement for the Ed.D. degree is 30 semester hours completed within a period of 18 consecutive months. Additional residence may be required by cer tain departments There is much benefit to the student if at least one academic year of the residence period is spent in full time graduate study without employment outside the univer- sity. This provides an opportunity for students to avail themselves of university resources and to interact fully with faculty and fellow gradu ate students.

During the Ed.D. residency period, a stu- dent enrolled for 10 or more credit hours in a given semester may not be employed for more than 20 hours per week. Not more than 10 semester hours of dissertation credit may be included in the course work used to meet the 30-hour residence requirement

General Regulations. In all matters not specified above, the standard procedures es- tablished by the Graduate College for the Ph.D. degree will apply.

Doctor of Business Administration Degree

The objectives of the Doctor of Business Ad ministration (D.B.A.) program are to prepare individuals for faculty positions in university or collegiate schools of business, and to pre pare individuals for positions in business or government where the required educational background is doctoral-level study. The D.B.A. degree program is designed to provide a broad study of the inter related areas of business administration and a high degree of professional competence in three fields of spe cialization.

The degree is granted upon the completion of an approved program of graduate study, successful completion of comprehensive writ ten and oral examinations, and submission of an acceptable original research project pre- sented in a dissertation.

Admission to the D.B.A. Degree Program. Students apply for admission to the D.B.A. degree program by filing a written application with the Admissions Office, Graduate College The application is considered by the Graduate Committee of the College of Business Admin- istration in consultation with the academic department of the applicant's major field and a recommendation is then made to the Dean of the Graduate College. Admission is based on the applicant's entire record. The Graduate Management Admission Test (GMAT) is re quired, as well as three letters of recommendation.

Students normally complete a master's de gree or equivalent before entering the D.B A. degree program. In an exceptional case, candi dates with a bachelor's degree may be admitted, in which case they shall complete the requirements of the master's degree pro gram before pursuing the doctoral core and specialized fields.

A student who applies for admission to the program without all the business core courses required by the American Assembly of Colle giate Schools of Business for admission to graduate study in business may be admitted provisionally until all business core courses are satisfactorily completed. Currently, core courses include basic work in each of the fol lowing seven areas: accounting, economics, finance, management, marketing, statistics and business law. A student with no previous course work in basic calculus is to take a course incorporating such coverage after ad- mission to the D.B.A program.

Supervisory Committee. The Dean of the Graduate College, upon recommendation of the Dean of the College of Business Adminis tration, appoints a supervisory committee of five faculty members. The chair is selected from the student's field of concentration, two members are selected from the student's sup plementary fields, and two members are selected at large from the faculty of the Col- lege of Business Administration The supervisory committee approves the program of study, guides the student through his entire period of study, and serves on the examining committee for the general oral examination. A

dissertation committee will be appointed after completion of the general oral examination.

Program of Study. The program is planned to fit the student's background and objectives. The degree is granted upon evidence of demonstrated competency and scholarly achievement, rather than upon the accumulation of hours in a series of prescribed courses. A minimum of 30 semester hours of credit beyond the master's degree is required of all doctoral students, exclusive of the dissertation and the prerequisite business courses generally required by the American Assembly of Collegiate Schools of Business for admission to graduate study in business. For most students, the program will consist of 36 to 54 semester hours of course work beyond the master's degree, depending on the student's academic background.

Reading knowledge of a foreign language is not required for the D.B.A. degree.

Residence. The entire program, including course work and dissertation, normally requires at least the equivalent of two academic years of work beyond a master's degree. Students must spend at least one academic year of the last two years (summer sessions excluded) in full-time course work in residence. The dissertation may be completed in absentia with permission of the student's dissertation committee and the Dean of the College of Business Administration.

Comprehensive Examinations. During the final semester of course work, students must apply to the Graduate College through the supervisory committee and the Dean of the College of Business Administration for permission to take the comprehensive written examinations. Examinations are required in the field of concentration and each supplementary field and are designed to test the student's comprehensive knowledge of the fields rather than the subject matter of the specific courses taken. Comprehensive written examinations must be taken in two consecutive sittings. If students do not pass a written comprehensive examination, they must file a revised program of study which normally reflects prescribed additional formal course work. They must also complete the course work before permission for a second examination will be granted by the Dean of the Graduate College. Upon satisfactory completion of all course work and comprehensive written examinations, students must complete a general oral examination which covers the entire doctoral program, except the dissertation. For either written or oral examinations, only one re-examination is permitted. A re-examination may be administered no sooner than three months and no later than one year from the date of the original examination.

Admission to Candidacy. Students apply for candidacy when they have completed the general oral examination and have a dissertation subject submitted to and approved by their dissertation committee. If candidates fail to complete the dissertation oral examination within five years after completing the comprehensive examinations, it will be necessary for them to be re-admitted to candidacy.

Dissertation. The dissertation requires major research of an original and creative nature. After a subject has been selected for the dissertation, each candidate is expected to present the dissertation topic in a special seminar open to all faculty and doctoral students in the College of Business Administration.

The final copy of the dissertation must be reviewed by the committee appointed to direct the dissertation research and also by the Dean of the Graduate College at least three weeks before the degree conferral date. General rules of the Graduate College for dissertation procedures, format, and microfilming will be followed. Copies of *Guide to Preparation of the Doctoral Dissertation* are available in the Graduate College office.

Dissertation Oral Examination. The final oral examination in defense of the dissertation will be scheduled by the Dean of the Graduate College. All final oral examinations must be conducted at least one week before the degree conferral date. Candidates will present and defend their dissertation before members of their dissertation committee and others appointed by the Dean of the Graduate College at a meeting open to all faculty members.

Graduation. After the final oral examination has been passed and the dissertation has been accepted and filed in the Graduate College, the student is eligible for graduation.

General Regulations. In all matters not specified above, the standard procedures established by the Graduate College for the Ph.D. degree will apply.

University Extension and Summer Sessions

Denis J. Kigin, Ed.D.
Dean and Director

University Extension

The office of University Extension serves as the academic service arm of the University in providing the opportunity for off campus continuing education. The following services are available. off-campus courses for academic credit, correspondence study, community services, non credit courses, instructional television, international education, special programs and assistance in the development and administration of conferences

Off-Campus Courses. Off-campus courses are organized to provide continuing education for individuals unable to take full time or regular evening classes on campus These courses are of two types (1) resident credit courses and (2) extension credit courses. *Off campus resident credit courses* are those courses appearing in this catalog *Extension credit courses* are usually general interest courses taught by part-time specialist regular faculty Up to but not more than 12 semester hours may be applied toward undergraduate degree programs (See page 38)

The fee for off-campus resident and extension courses is $26 00 per semester hour. Full time students (students registered for 7 or more hours through on-campus registration) may register for *off campus resident credit* courses without the payment of additional fees Any combination of *on campus and off campus resident credit courses* resulting in a combined registration of 7 or more semester hours requires that the student pay full time, in state registration fees or full-time, out of state registration fees and the appropriate tuition see pages 23 27 Full time students who have paid registration fees and tuition 7 or more semester hours *must also pay extension fees* if they enroll in extension credit courses

Correspondence Study. College credit correspondence courses offered by Arizona State University are specifically designed for the student who cannot attend classes They are offered for those who are seeking to fulfill degree objectives as well as for those who wish to increase their occupational, professional or intellectual skills

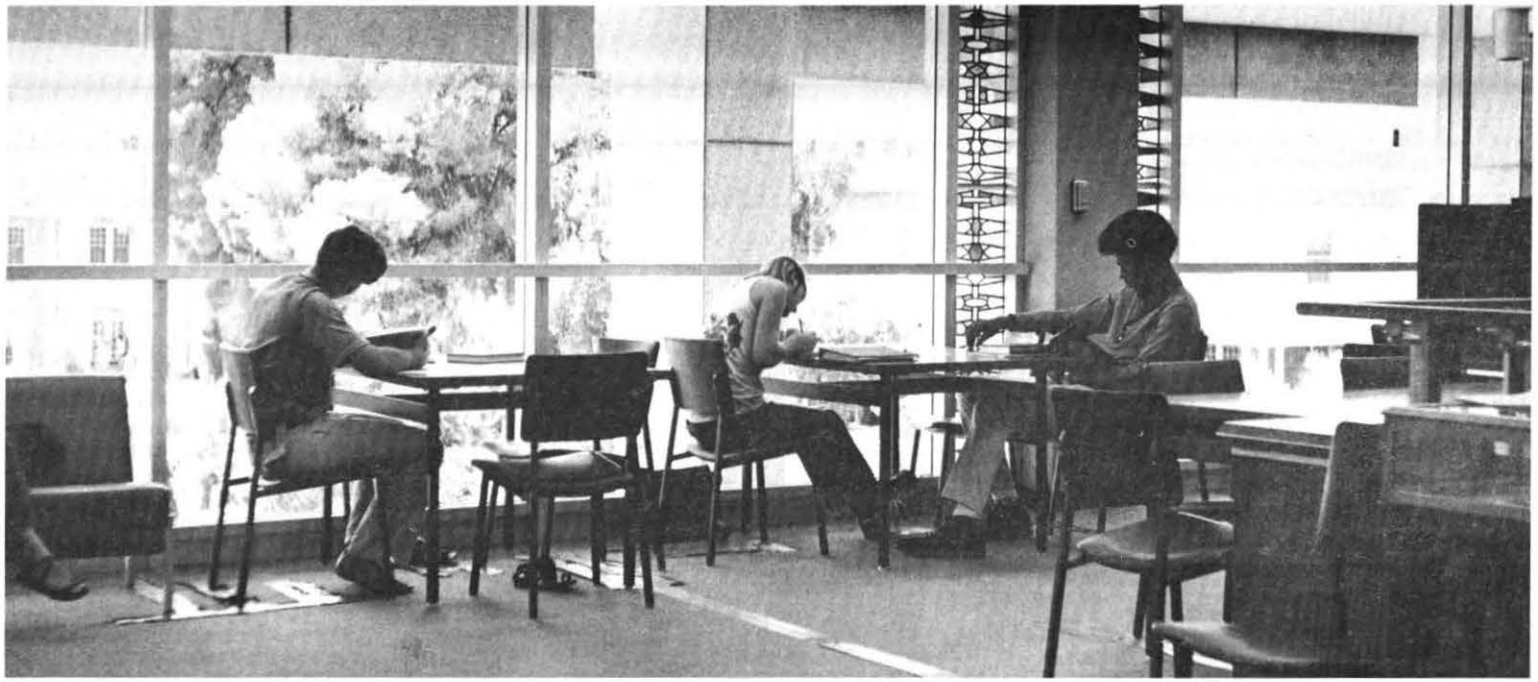
A correspondence course generally consists of eight lesson assignments for each semester hour of credit and usually requires the same amount of work as a class course Eight to ten hours are normally required in preparing each assignment.

Students who receive a failing grade in a resident or extension course *may not use correspondence study* to make up the deficiency Students taking six hours or more in residence may not register for a correspondence course without first obtaining approval of the Standards Committee of the college in which they are enrolled

Initial enrollment is limited to one correspondence study course However, when one half the lessons are completed, enrollment in a second course is possible Students are limited to a maximum of two courses at any one time Students are expected to complete a course within a calendar year

A maximum of 30 semester hours of credit earned in correspondence and or by comprehensive examination may be applied toward the baccalaureat degree at Arizona State University (See page 38 *Correspondence courses are not applicable as graduate credit toward advanced degrees*

The fee for correspondence courses is $18.00 per semester hour of credit and is payable at the time of registration. Persons desiring to enroll in correspondence study should write to the Correspondence Study Office, University Extension, for an enrollment form and a brochure listing the courses available.



Admission to Extension and Correspondence Courses Programs. A student may enroll in an extension or correspondence course without making formal application for admittance to the University or to degree candidacy. High school seniors may enroll in extension or correspondence courses under the provisions as stated for Conditional Admission Prior to Graduation from High School. (See page 16.)

Community Services. The Community Services Program is designed to bring the resources of the University—its faculty, staff, students, and facilities—to bear on the problems of the disadvantaged and the community. Administered through University Extension, the program is designed to assist other community agencies and individuals in developing and coordinating programs.

Instructional Television Services. Television is a convenient, effective and available educational delivery system. Through television, it is possible to deliver educational opportunities to all the adult population of Arizona in the places where they live, work, and play. Instructional Television Services uses television as an educational delivery system capable of turning homes, businesses and schools in rural and urban communities into learning environments.

Non-Credit Continuing Education. Arizona State University recognizes the responsibility of providing effective continuing education activities. These activities, coordinated through the Office of University Extension, are educational in nature and in conformance with established University regulations and policies. All non-credit continuing education activities are sponsored by an academic department, college, or other approved agency of the University. Activities may be co-sponsored or conducted in cooperation with outside agencies or groups when there is internal University involvement and control and the purpose of the activity is educational.

The Office of University Extension provides operating assistance, encourages program development, and coordinates all continuing

education activities sponsored by University administrative units and departments.

Special Programs. University Extension offers professional services to departments and colleges, individuals, agencies, organizations, institutions, and target groups by designing and coordinating special programs for immediate and long-range educational goals. This outreach attempts to meet the varied needs of all the citizens of Arizona.

English Skills. The English Skills Program is co sponsored by the Department of English in the College of Liberal Arts and University Extension. Enrollment is open to international students who seek to improve their language proficiency. Applicants for admission must be at least 18 years of age and have a high school diploma or the equivalent Admission to the program does not constitute regular admission to Arizona State University Courses completed in the program do not carry university credits but certificates of attendance or proficiency are awarded at the completion of study. Applicants must meet all conditions of immigration as stipulated in the immigration laws of the United States

Instruction in the English Skills Program concentrates on the development of techniques of listening, reading, speaking and writing in English. The program is structured on three levels; elementary, intermed ate and advanced The TOEFL (The Test of Eng ish as a Foreign Language) is given at the completion of study (see pages 18 19

University Conference Services. The Office of University Extension, through its University Conference Services, coordinates on-and-off campus conferences, seminars and workshops sponsored by any administrative unit or academic department.

Working closely with each of the University's colleges, complete conference services and assistance to any campus group desirous of conducting an educational program or professional meeting are offered Services include general conference planning, budgeting, site selection, promotion and publicity, hotel mote liaison, and overall logistical support for any and all phases of the conference The office also aids in the development of guidelines, checklists, and general operating procedures which serve to ensure coordination and smooth operation of continuing education activities sponsored by the various campus departments

Summer Sessions

The Summer Sessions provide an opportunity for students to pursue academic work during the summer. Course offerings are much the same as those of the academic year. Degree candidates, both graduate and undergraduate, as well as those seeking to enhance or to refresh their subject matter interests, will find a broad selection of courses available All campus classes are held in air conditioned classrooms and laboratories.

The opportunity for international travel and study is available during the summer through selected study tours. These programs are directed by regular faculty members and allow students to earn graduate or undergraduate credit. The international study programs carry University credit with the approval of the academic department and college involved.

All summer programs are available to n state residents as well as those from out of state. Professional conferences, institutes, workshops and seminars are also offered on campus during the summer

Terms: There are three Summer Sessions; one of eight weeks and two of five weeks The eight-week session and the first five week session run concurrently.

Credit and Residence Requirements. Students are permitted to earn a maximum of 6 semester hours of credit each five week session and 9 semester hours of credit each eight week session. With prior approval of the college, it is possible for a student to satisfy the University residence requirement by attending Summer Sessions Students entering the University as freshmen are invited to begin their university work in the summer They should, however, seek academic advisement before registering (see page 29)

Undergraduate Enrollment. In general, applicants for admission are expected to present evidence of graduation from an approved four-year high school, or evidence of good standing in an accredited college. Students, 19 years of age or over, may be admitted as unclassified students without the above qualifications, but with the understanding that all University admission requirements must be satisfied before they can be admitted for a degree program (see page 17

Graduate Study. Summer Sessions offer an excellent opportunity for baccalaureate degree holders to continue their professional development Candidates for graduate degrees should pay particular attention to the requirements for graduate admission and study (see page 274 and the *Graduate Catalog*.

Fees and Expenses. The Summer Sessions fee is $26.00 per credit hour, which includes the student activity fee. Textbooks and supplies are available for purchase at the University Bookstore in the Memorial Union on campus. Room and board for the summer are available on campus at the prevailing rates.

Information. Requests for the Summer Sessions *Schedule of Courses* or for other information should be addressed to the Office of Summer Sessions at Arizona State University, Tempe, Arizona 85281

Faculty, University Offices and Services

The faculty listed are involved in both graduate and undergraduate instruction.

Arizona Board of Regents

Ex Officio

Raul H. Castro, B.A., J.D., LL.D. ..... *Governor of Arizona*
Carolyn Warner ..... *Superintendent of Public Instruction*

Appointed

James Elliott Dunseath, B.A., J.D.
Sidney S. Woods, B.S.
Dwight Patterson, B.A.
Ralph M. Bilby
Rudy E. Campbell
Thomas Chandler, B.A., LL.B.
William G. Payne, B.A., M.A., M.D.
Ellen F. Mollov, J.D.

Blair D. Benamon, B.A., LL.B. ..... *Advisor to the Board*
Lawrence E. Woodall, B.S. ..... *Executive Coordinator*

General Administration

John W. Schwada ..... *President of the University*
B.S., Northeast Missouri State College ..... *Professor of Political Science*
M.A., University of Missouri, Ph.D., University of Texas

Karl H. Dannenfeldt ..... *Academic Vice President, Professor of History*
A.B., Valparaiso University, M.A., Indiana University, Ph.D., University of Chicago

George F. Hamm ..... *Vice President, Student Affairs, Professor of Education*
B.S., South Dakota State College, M.A., Ph.D., University of Wyoming

Charles M. Woolf ..... *Vice President, Graduate Studies and Research*
B.S., M.S., University of Utah ..... *Dean, Graduate College, Professor of Zoology*
Ph.D., University of California, Berkeley

Jack G. Penick ..... *Vice President, Business Affairs*
B.S., University of Maryland, M.B.A., University of Alabama

V. Alonzo Metcalf ..... *Vice President for Administration, Professor of Economics*
B.S., M.S., University of Arkansas,
Ph.D., University of Missouri

Troy F. Crowder ..... *Assistant to the President, Director, University Relations*
B.A., University of South Dakota ..... *Associate Professor of Mass Communications*
M.A., University of Iowa

Guido G. Weigend ..... *Dean, College of Liberal Arts, Professor of Geography*
B.S., M.S., Ph.D., University of Chicago

Hugh Burgess ..... *Dean, College of Architecture, Professor of Architecture*
B.S., University of Idaho, M.S., Columbia University

Glenn D. Overman ..... *Dean, College of Business Administration*
B.S., Central State College ..... *Professor of Marketing*
M.S., Oklahoma State University, D.B.A., Indiana University

Delbert D Weber . . . *Dean, College of Education Professor of Education*
B A Midland College, M Ed, Ed D University of Nebraska

Lee P Thompson . *Dean, College of Engineering and Applied Sciences Director, School of Engineering Director Engineering Research Center Professor of Engineering*
B A Indiana University, M S Ph D, Texas A & M University

Jules Heller . *Dean College of Fine Arts, Professor of Art*
B A, Arizona State University M A Columbia University Ph D, University of Southern California

Juanita F Murphy . *Dean College of Nursing Professor of Nursing*
A B Oklahoma Baptist University M S Ph D Case Western Reserve University

Ernest Gellhorn .. . . *Dean College of Law Professor of Law*
B A, LL B University of Minnesota

Ismael Dieppa *Dean School of Social Work Professor of Social Work*
B A Sul Ross State College M S S W Boston University, D.S.W, University of Southern California

Denis J Kigin . . *Dean University Extension Director Summer Sessions, Professor of Industrial Technology*
B S Mankato State Teachers College, M S The Stout Institute, Ed D University of Missouri

Koepp, Donald W. (1973 . . . *University Librarian*
A B, Wisconsin State College M S, University of Wisconsin D L S, University of California Berkeley

Resident Faculty

Aannestad, Per (197 *Assistant Professor of Physics*
B S, University of Oslo P D, University of California Berkeley

Abbott, Nancy C (1971) *Assistant Professor of Nursing*
B S N Arizona State University M S University of California San Francisco

Abdow Mirian J 1965 *Instructor of French*
Licence es Lettres University of Paris France, M A French) Spanish Arizona State University

Abraham, Willard 1953 *Professor of Education*
B S, Illinois Institute of Technology M Ed, Chicago Teachers College Ph.D Northwestern University

Abramson, Martin L 1973) . *Assistant Professor of Communication and Theatre*
B S, M F A Temple University

Acevedo, Roberto M 1964 . . *Assistant Professor of Spanish*
B A University of California, B . . M A P D University of Arizona

Acharya, Raghunath 1976 *Assistant Professor of Physics*
M Sc, University of Delhi Ph D University of Rochester

Acker, William J 970) . *Associate Professor of Geography*
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B A , De Pauw University, B F A , Denison Un versity; M.F A , Ohio State

Overman, Glenn D. (1956) ..... *Professor of Marketing; Dean*
B S., Central State College, *College of Business Administration*
M.S , Oklahoma State University D B.A , Ind ana University

Owen, John E (1964) ..... *Professor of Sociology*
B A , Duke University A M , Ph D University of Southern Ca fornia

Packer, Merle A. (1959) ..... *Associate Professor of Health, Physical*
B.A., M A , Arizona State Univers ty *Education, Recreation and Dance*

Page, John B. (1969) ..... *Associate Professor of Physics*
B S , Ph D , University of Utah

Palais, Joseph C. (1964) ..... *Professor of Engineering*
B S E E , University of Ar zona, M S.E , Ph.D , University of M chigan

Pangrazi, Robert P (1973) ..... *Associate Professor of Health Physical*
B A M S , Ph D , Washington State Un versity *Education Recreation and Dance*

Pardini, Louis J (1967) ..... *Associate Professor of Technology*
B A A.M , Idaho State Un versity, Ed D , Un vers ty of Northern Colorado

Parker, L Mayland (1955) ..... *Professor of Geography*
B S , Brigham Young Un versity M.S , Un versity of Utah, Ph D., Cornell University

Parkinson, Stanley R (1971) ..... *Associate Professor of Psychology*
A B , University of Ca forn a, Berkeley, M A , Ph D University of California, Dav s

Parrish, H. Wayne (1967) ..... *Assistant Professor of Education*
A B , San Diego State College, M Ed , Ed D U n versity of Oregon

Parsons, Jean L (1974) ..... *Assistant Professor of Education*
B A , Washingt n State Un versity M A , Ph D , Ohio State Un vers ty

Parsons, Michael L (1967) ..... *Associate Professor of Chemistry*
B A , M S , Kansas State Co lege, Ph D , Un versity of Florida

Patten, Duncan T. (1965) ..... *Professor of Botany Chair Department*
B A , Amherst College, *of Botany and Microbiology*
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Patterson, John D (1967 ..... *Professor of Engineering*
B S E.E , M S., Ph.D , University of Californ a Berkeley

Patterson, Robert A (1957) ..... *Professor of Zoology*
B S , University of M chigan, Ph D Ohio State University

Patti, Charles H. (1974) ..... *Assistant Professor of Advertising*
A B , M.S , Ph.D , Univers ty of I nois

Paulsen, George E (1959) ..... *Professor of History*
B A , Hobart College, M A , Rutgers, The State Univers ty,
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Peck, George B (1957) . . . . . *Assistant Professor of Mathematics*
B.S., Arizona State University, M S., University of Illinois

Pedrick, Willard H (1966) . . . . . *Professor of Law*
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Peek, George A. Jr (1964) . . . . . *Professor of Political Science*
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Perreault, Richard G. (1976) . . . . . *Assistant Professor of Military Science*
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Perrell, Richard C (1976) . . . . . *Assistant Professor of Architecture*
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Perril, Lester S. (1957) . . . . . *Professor Emeritus of Education*
B A , Ohio Wesleyan University, M A , Ohio State University,
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Perrill, Norman K. (1966) . . . *Professor of Communication and Theatre*
B S , M A Northwestern University, Ph D , Un versity of Southern California

Peterman, Gordon G (1966) . . . . . *Associate Professor of Construction*
B S C E , University of Iowa

Peters, Kathleen A (1967) . . . . . *Assistant Professor of Home Economics*
B.S , M.S , Kansas State University

Peterson, Clifford J. (1974) . . . . . *Assistant Professor of Engl'sh*
B.A., University of Montana M A Arizona State University,
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Peterson, John R (1963) . . . . . *Associate Professor of Arch tecture*
B A , St Olaf College, B Arch Un versity of Minnesota,
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Peterson, Ralph (1976) . . . . . *Assistant Professor of Education*
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Pettit, George R. (1964) . . . . . *Professor of Chemistry*
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Péwé, Troy L. (1965) . . . . . *Professor of Geology*
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Pfuhl, Erdwin H Jr. (1968) . . . . . *Associate Professor of Sociology*
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Pheanis, David C. (1975) . . . . *Assistant Professor of Engineering*
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Philippakis, Andreas S (1967) . . . . *Professor of Quantitative Systems,*
B S., Gannon College, *Chair Department of Quantitative Systems*
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Phillips, William W (1958) . . . . . *Associate Professor of History*
Ph B , M A., University of North Dakota, Ph D , University of Missour , Co umbia

Pian, Richard H J (1959) . . . . . *Professor of Engineering*
B S C E , Kung Shang Un versity Ch na), M S E , Ph D Corne l University

Piercey, Dorothy J (1968) . . . . . *Associate Professor of Education*
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Pike, Kenneth V. (1962) . . . . . *Professor of Zoology*
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Pike, Norma J. (1964) . . . . . *Assistant Professor of Health Physical*
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Pile, James (1971) . . . . . *Assistant Professor of Art*
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Pimentel, David (1973) . . . . . *Assistant Professor of Art*
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Pinkava, Donald J (1964) . . . . . *Associate Professor of Botany*
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Pitt, H. Ronald (1975) . . . . . *Assistant Professor of Accounting*
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Pittman, Anne M. (1952) . . . . *Professor of Health, Physical Education,*
B S., University of Texas, *Recreation and Dance*
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Plantz, Don V (1960) . . . . . *Professor of Economi s*
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Plog, Frederick T (1975) . . . . . *Associate Professor of Anthropology*
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Plummer, Ramona F (1957) . *Associate Professor of Health, Physical*
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Podlich, William F (1949) . . . . . *Professor of Education*
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Poe, Jerry B (1974) *Professor of Finance; Chair Department of Finance*
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Polenz, G. Donald (1967) . . . . . *Associate Professor of Social Work*
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Porter, John Stone (1973) . . . . . *Assistant Professor of Music*
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Porter, Karen K. (1971) . . . . . *Assistant Professor of Nursing*
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Portnoff, Collice H (1945) . . . *Professor Emeritus of English*
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Pridonoff, Eugene (1971) ... *Associate Professor of Music*
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Putnik, Edwin V (1962) ... *Associate Professor of Music*
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Quesada, Eugene R 1973) ... *Assistant Professor of Technology*
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Quirk, Daniel (1959) ... *Assistant Professor Emer tus of English*
B.A., B S Arizona State Univers ty, M A New Y rk Univers ty

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B A , Oberlin College, B D , Ya e D v nity Scho l M A , Ph D , Un vers ty of Ch cago

Radke, Judith J (1960 ... *Associate Professor of French*
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Ragan, Donal M (1967) ... *Professor of Geology*
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Ralston, Mack A. 1956 ... *Professor of Educat on*
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Randall, Virginia R. 1962 ... *Assistant Professor of English*
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Rankin, Robert L (1971 ... *Assistant Professor of Eng neering*
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Rannells, Jessie M 1939) ... *Professor Emeritu of Home E conomics*
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Rapp, James R (1962 ... *Assoc ate Professor of Arch te ture*
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Rasmussen, David I (1963) ... *Professor of Zoology*
B.S , M.S , University of Utah Ph D , University of Michigan

Rasmussen, Robert D. (1949) ... *Associate Professor of Agriculture*
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Ratterree, Jack L (1964) ... *Associate Professor of Music*
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Rausch, Jack D (1965) ... *Associate Professor of Music*
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Rave, Wallace J (1967) ... *Associate Professor of Music*
B S , Illin is State Un versity M M Ph D , Un ve sity of Illino s

Rawls, William S. (1949) ... *Professor of Phy sics*
B S , Murray State C llege, M S , Tu ane University, Ph D , Iowa State University

Ray, William J (1968) ... *Professor of Education*
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Razzaq, Zia (1974) ... *Assistant Professor of Engineering*
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Reader, Mark (1967) ... *Associate Professor of Political Science*
A B , A M Ph.D , University of Michigan

Reck, Ross R. (1975) ... *Assistant Professor of Management*
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Reeves, Henry C (1969) ... *Professor of Microbiology*
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Reich, John W (1965) ... *Associate Professor of Psych logy*
B.A., M S , University of Ok ahoma, Ph.D , University f C orado

Reid, Diane E (1976) ... *Assistant Professor of Nursing*
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Reif, William E 1970) ... *Profess r of Management*
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Reinard, John C (1975) ... *Assistant Professor of Communi ation and Theatre*
B A , M A , Cal forma State Un versity, Fu lerton,
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Rein'l, Robert L (1961 ... *Professor Emer tus of Philosophy*
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Reiser, Castle O (1958) ... *Professor of Engineering*
B S Col rado State Univers ty, *Chair Chemical Engineering Faculty*
Pet. E , Colorado Sch f Mines, Ph D., U n versity of W sc ns n, Mad s n

Re ss, Peter W (1976 ... *Assistant Professor of Adm nistrat ve Services*
B S , J D., Marquette Un versity, M A , Ariz na State Univers ty

Reneau, J Hal (1975 ... *Assistant Professor of Accounting*
B B A., M S , Texas Tech Univers ty Ph D Un versity of M ss ur C umb a

Reuter, Vincent G. (1961) . . . . . *Associate Professor of Management*
B S C , M A , Ph D , Un versity of Iowa

Revelle, Barbara (1976) . . . . . *Assistant Professor of Art*
B A , M F.A , University of Col rado

Reynolds, Robert D. (1970) . . . . . *Associate Professor of Musi*
B M., Texas Christian Un versity, M M U iversity of Texas;
Ph D., Ohio State University

Reznikoff, Shirley (1973) . . . . . *Associate Professor of Art*
B A., University of Southwestern Louisiana,
Certificate, New York School of Interior Design, M A , Louis ana State Un vers ty

Ricci, Marilyn (1972) . . . . . *Assistant Professor of Nursing*
B S , State University of New Y rk; M S , Texas Woman s University

Rice, Margaret J. 1968) . . . . . *Assistant Professor Emeritus*
A B., A M , University of Kansas *of Communication and Theatre*

Rice, Ross R. (1950) . . . . . *Professor of Political Sc ence*
M A Ph D , University of Chicago

Rice, Roy C. (1946) . . . . . *Professor Emeritus of Education*
B S , University of New Mexico. M S , Un versity of Mass achusetts,
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Rice, Warren (1958) . . . . . *Professor of Engineer ng*
B S., M S , Ph D , Texas A & M niversity

Richards, Gale L (1965) . . . . *Professor of Communication and Theatre*
B A , Univers ty of Akron, M A , Ph D , Un versity of Iowa

Richardson, Deane E (1970 *Professor of Health, Physical Education,*
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M.A., Ed D , Stanford University

Richardson, Grant L (1953) . . . . . *Professor of Agriculture*
B S , M S University of Arizona Ph.D., Oregon State Un vers ty

Richardson, H.D. (1940) . . . . *Professor Emeritus of Counselor Education*
Ph B , Ph M , Univers ty of Wiscons n, Ph D , Northwestern Univers ty;
LL D , Ar zna State Un vers ty

Richardson, Richard C. Jr (1977) *Professor of Education, Director*
B S , Castleton State Co lege, *Center for Higher and Adult Education*
M S., Michigan State Un ve sity,
Ph D , University of Texas

Rider, Wendell J (1953) . . . . . *Professor Emeritus of Music*
B S Iowa State Teachers College, M M , Eastman School of Mus c,
Ph D., University of Iowa

Rieke, Eula E. (1968 . . . . . *Assistant Professor of Nursing*
B S , University of Colorado M S B ston Un versity

Rickel, Harry P. (1948) . . . . . *Professor of Musi*
B M M M , University of Ariz na

Ripley, Robert E (1967) . . . . . *Associate Professor of Education*
B A , M.A , Ph.D. University of Minnesota

Rippke, Mary J (1973) . . . . . *Assistant Professor of Nursing*
B S , Augustana College. M S., Arizona State University

Ritchie, Kathleen E 1972) . . . . . *Instru tor in Psychology*
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Robbins, Earl R. (1961) . . . . . *Associate Professor of Eng neering*
B.S E E , Texas Technolog cal Col ege, M S E Ph D Arizona State Un vers ty

Roberts, Russell C Jr , Colone (1974) . . . . . *Professor of Aerospace Studies*
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Roberts, Thomas G. (1970) . . . . . *Associate Professor of Education*
B A., Wake Forest Univers ty M A , Ph D , University of North Caro ina

Robinson, Daniel O (1950) . . . . . *Professor of Agri ulture*
A B , Brigham Young Un vers ty, M S Un vers ty of Ar zona
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Robinson, Don R (1968) . . . . . *Instructor in Health Physical Education,*
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Robinson, Helene M 1967) . . . . . *Associate Professor Emeritus of Musi*
B A , Un versity of Oregon, M M Northwestern University

Robison, Ray C 1967) . . . . . *Instru tor in Health Physical Education*
B S., Morningside College, *Recreation and Dance, Head Trainer*
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Rockoff, Sheila G. (1977) . . . . . *Instructor of Nursing*
B S N , California State Univers ty, San Francisc ,
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Rod, Bruce (1974) . . . . . *Assistant Professor of Art*
B.A., Moorhead State Co lege, M F A Univers ty of Wisconsin Madis n

Rodd, Laurel R (1975) . . . . . *Assistant Professor of Japanese*
B A , DePauw University, M A T East Tennessee State University,
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Rollier, Dwayne A (1971) . . . . . *Associate Professor of Engineering*
B S , M S., Oklahoma State Un vers ty Ph D , Flor da State U n vers ty

Roman, Roger V (1973) . . . . . *Assistant Professor of Mathemat cs*
B.A., Washington and Jefferson Col ege M S , Florida State University,
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Rook, Fern H (1969 . . . . . *Assistant Professor of Technology*
B A., University of C lorado M A , Ariz na State University

Roper, Devon J. (1966) . . . . . *Assistant Profess r of Te hnology*
B S., Utah State Un versity, M S , Ar zona State Un versity

Rose, Jonathan (1968) . . . . . *Professor of Law*
B A , University of Pennsylvania LL B , Un vers ty of Minnesota

Rose, Seth D (1976) ... *Assistant Professor of Chemistry*
B S., University of Californ a, Berkeley,
Ph D., University of California, San Diego

Rosenzweig, Kenneth (1974) ... *Assistant Professor of Accounting*
B A., University of Texas; M.B A , University of Houston,
Ph D., Michigan State University

Rossi, Patrick J. (1967) ... *Associate Professor of Psychology*
B.S , St Mary's College, M.A , San Fernando Valley State Col ege;
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Rossman, Mark H. (1974) ... *Associate Professor of Education*
B.A , New York University M S University of Bridgeport,
Ed.D , University of Massachusetts

Rothschild, Mary A. (1975) ... *Assistant Professor of History*
B.A , M A , Ph D., University of Washington

Rover, R. Craig (1952) ... *Professor of Education*
B.A., Upsala Col ege, M A , St Lawrence Univers ty,
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Rowe, Kenneth L (1962) ... *Professor of Marketing*
B A , M A Northern Iowa University; Ph D., Michigan State University

Rowley, C Stevenson (1970) ... *Associate Professor of Accounting*
B.A , Trinity College; M B A University of Chicago,
Ph D , University of Wiscons n, Madison, C P A Arizona Il nois

Roy, Radha R (1963) ... *Professor of Phy sics*
B Sc , M.Sc Presidency College, University of Calcutta, Ph.D , University of London

Ruccolo, James S (1974) ... *Associate Professor of Music*
B M Eastman School of Mus c, M M , Ariz na State University,
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Ruch, William A (1968) ... *Associate Professor of Management*
B S , M B A D B A Ind an i U n versity

Rue, Joseph (1972) ... *Assistant Professor of Quantitative Systems*
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Ruff, Paul F. (1958) ... *Professor of Engineering*
B.S C E , M S C F Case Western Reserve University

Ruppé, Reynold J (1960) ... *Professor of Anthropology*
B A., University of New Mexico; Ph D , Harvard University

Russell, Paul E. (1967 ... *Professor of Engineering*
B S.E E , B.S M E , New Mexico A&M University
M S.E E Ph D , University of W sconsin Madison, P E

Russell, Stanley J (1969) ... *Associate Professor of Engineering*
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Rutherford, Robert B Jr 976 ... *Associate Professor of Education*
B S , M.Ed , University of Virg nia, Ed S , Ph D , George Peabody Co lege

Rutowski, Ronald L. (1976) ... *Assistant Professor of Zoology*
B.A , Crown College, University of California, Santa Cruz, Ph D , Cornell University

Sacks, Benjamin (1963) ... *Professor Emeritus of History*
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Sackton, Frank J (1976) ... *Instructor of Public Affairs*
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Sadalla, Edward K. (1974) ... *Assistant Professor of Psychology*
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Sadler, William E (1975) ... *Assistant Professor in Technology*
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Salerno, Nicholas A (1961) ... *Professor of English*
B.A in Ed , M A Arizona State Un versity; Ph D , Stanford Un versity

Samuchin, Michael G. (1976) ... *Associate Professor of Architecture*
B Arch., University of Il nois, Chicago M.S Ph D , Northwestern University

Sanders, Bevie T (1957) ... *Associate Professor of Accounting*
B B A , North Texas State University· M S Texas A & M University,
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Sanderson, R Thomas (1963) ... *Professor of Chemistry*
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Sandler, Irwin (1975) ... *Assistant Professor of Psychology*
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Sandling, Rosemarie (1971) ... *Assistant Professor of Nursing*
B S N., Arizona State University, M N., University of Cal fornia, Los Angeles

Sansone, Fred J (1965) ... *Associate Professor of Mathematics*
B.S E , M S.E , University of Michigan M S , Ph.D , Rutgers, The State Un versity

Sargent, Charles S Jr 1971) ... *Associate Professor of Geography*
B A , University of Wyoming, M A Ph D University of Californ a, Berke ey

Sater, Vernon E (1962) ... *Professor of Engineering*
B S Ch E , M S Ch E Ph D , Il inois Institute of Technology

Satterthwaite, Lester L Jr (1968) ... *Professor of Education*
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Sattler, Howard E (1967) ... *Professor of Education*
B S , M S , Ph D , Ar zona State University

Savage, Nevin W (1959) ... *Professor of Mathematics*
B S , M A , Pennsy van a State University, *Chair Department of Mathematics*
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Scalise, James W (975) ... *Assistant Professor of Architecture*
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Scammon, John A (1975) ... *Assistant Professor of Music*
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Schabacker, Joseph C. (1963) . . . . . *Professor of Management*
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Schade, Thomas V. (1974) . . . . . *Associate Professor of Criminal Justice*
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Schall, Merri H (1960-66, 1967) . . . . . *Associate Professor of Education*
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Schaumburg, Donald R (1953) . . . . . *Professor of Art*
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Schilling, Dorothy C (1932 . . . *Professor Emeritus of Eng sh*
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Schlacter, John L (1969) . . . . . *Associate Professor of Marketing*
B B A , Western Reserve Un versity, M B A , Ph D , Oh o State Univers ty

Schlagenhauf, Don E. (1976 . . . . . *Assistant Professor of Economics*
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Schmidt, Alfred H (1960) . . . . . *Professor of Marketing*
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Schmidt, Jean M (1966) . . . . . *Associate Professor of Microbiology*
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Schmidt, Randall B. (1968) . . . . . *Associate Profess or of Art*
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Schneider, Mary J (1976) . *Instructor of Health Physical Education*
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Schoen, Robert A (1966) . . . . . *Assistant Professor of Technology*
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Schoenwetter, James (1967) . . . . . *Associate Professor of Anthr pology*
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Schon, Isabel (1974) . . *Assistant Professor of Education*
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Schroeder, Milton R 1969 . . . . . *Professor of Law*
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Schuback, Gertrud B (1966) . . . . . *Instructor of German*
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Schwada, John W. (1971) . . . . . *President of the University*
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Scott, Walter T (1961) . . . . . *Professor of Mathematics*
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Seale-Vásquez, Mary (1975) . . . *Assistant Professor of Spanish*
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Sealey, Calvin W (1976) . . . . . *Assistant Professor of Finance*
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Searfoss, Lyndon W (1973) . . . . . *Assistant Professor of Education*
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Sebald, Hans (1963) . . . . . *Professor of Sociology*
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Selleck, Herbert H. (1973 . . . . . *Associate Professor of Construction*
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Senner, Wayne M (1973) . . . . . *Associate Professor of German*
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Seperich, George J (1976 . *Assistant Professor of Agriculture*
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Strawn, Roland S. (1975 .. .. . . *Associate Professor of Technology*
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Strojnik, Ales (1969) . ... *Professor of Phvsics*
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Svoboda, Wil iam S 1969 . . . *Profess r of Educat' n*
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Swafford, James R (197) . . . . *Assistant Professor of Mi robiolog*
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Swagert, S La rd (1971) . . . *Profe ssor of P litical Science*
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Swimmer, Alvin (1963) . . . . . *Associate Professor of Mathematics*
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Swinyard, William R (1976) . . . . *Assistant Professor of Marketing*
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Tallman, Nancy N 1975) . . *Assistant Professor of Communicati n*
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Tyler, Karen B 1975) ... *Instructor in L brary Science*
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Zimmer, Carl R (1959) . . *Associate Pr fessor of Engineering*
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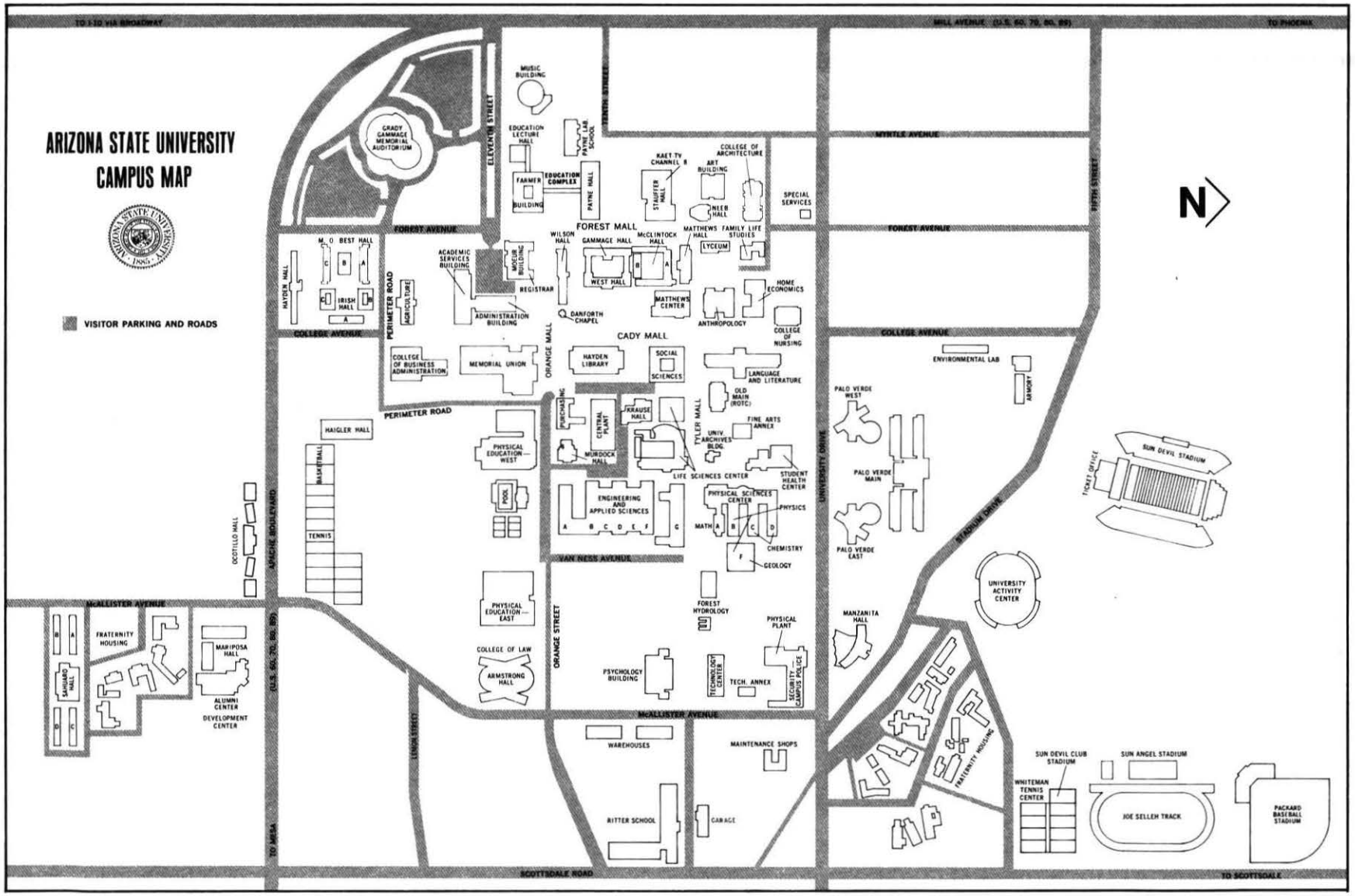
CAMPUS MAP



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