MAJOR

Adult Education

DEGREE

M.S.

Professors:


Associate Professor:

K. O. McCullough, Ph.D. Florida State.

Assistant Professor:


The Master of Science degree in Adult Education is offered for teachers, administrators, counselors, and community specialists. The degree program has two options. A thesis option requires a minimum of 45 hours and an additional 15 hours of electives, 15 hours of educational research, and 9 hours of thesis preparation. The thesis option requires a minimum of 51 hours, 24 hours of electives, and 3 hours of research methods. For each option, 9 hours must be completed in the behavioral sciences. A minor may be developed from the hours allotted to electives. The thesis option requires satisfactory completion of a final oral examination. The non-thesis option requires satisfactory completion of a final written comprehensive examination.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5060 Adult Education: A General Survey (3) Historical development, philosophies of adult education, agencies, programs, current issues, and literature of adult education. F, Sp

5110 Seminar in College Teaching (3) Effective college teaching; testing and measurement; recent research in college instruction; major problems and solutions. Required of candidates for the MACT degree. S/NC only. Sp

5360-70-80 Problems in Continuing and Higher Education (1-3, 1-3, 1-3) Independent study of problems and special institutes. S/NC only. E

5410 College and University Law—The Legal Environment (3) Legal precedent concerning liability exposure of public institutions of higher education. Personal and institutional liability. Basic principles of risk management and liability insurance. Prereq: 5410 and 5420, or consent of instructor. E

5440 American Higher Education (3) Purposes, functions, organizations, and programs. F, Sp

5450 Instruction in Higher Education (3) Problems, procedures, and techniques. W

5460 Adult Development (3) Changes in characteristics of the adult over the life span and implications for adult education. F

5470 The Curriculum of Undergraduate Higher Education (3) Curricular organization, and organization of instructional programs, trends, and evaluation procedures, including accreditation activities. F

5510 Governance of Colleges and Universities (3) Development, change, trends, processes, and structures of collegiate governance. F

5550 Fiscal Problems in Higher Education (3) Revenue sources and fiscal management in public and private colleges and universities. Sp

5600 Program Planning in Continuing and Higher Education (3) Theory and method for planning adult education programs. W

5860 The Community-Junior College (3) History and role of two-year college, major functions, organization and administration, problems, and issues. E

5995-65-75 Practicum in Continuing and Higher Education (1-3, 1-3, 1-3) Supervised practice in selected areas of instruction or administration of continuing or higher education programs. S/NC only. E

5990-70-80 Seminar in Continuing and Higher Education (1-3, 1-3, 1-3) Problems and issues confronting professionals in fields of adult or higher education. E

6450 Advanced Seminar in Program Planning (3) Concepts and theories related to program planning and higher education. Prereq: 5660 or equivalent.

See also course listings under the Departments of Curriculum and Instruction, Educational Administration and Supervision, and Educational Psychology and Guidance.
quarter hours of graduate study. If the student has earned the Master's degree, a maximum of 45 hours of the Master's work may be credited toward the Master of Education degree (45 hours of 5000-level courses are required.) The program must also include the following:

1. A minimum of 12 hours taken in one of the eight areas listed below.
2. A minimum of 12 hours taken within the College of Education in areas other than the student's major area.
3. A minimum of 12 hours taken outside the College of Education.
4. A minimum of 12 hours earned through the writing of a thesis. (Students who have written a thesis for the Master's degree may be exempted from a thesis in the Ed.S. program provided, in the judgment of the student's committee, the thesis meets the standards of research appropriate for the Ed.S. degree.)
5. A minimum of 45 elective hours taken according to a plan jointly developed by the student and the major professor in terms of the student's professional goals.

THE DOCTORAL PROGRAM

The doctoral major in Curriculum and Instruction may include emphasis upon the following fields: curriculum, social foundations, educational research, elementary education, English education, foreign language education, mathematics education, science education, social science education.

For further information, write the Department of Curriculum and Instruction.

4010 International Education: Europe and the Americas (3) Historical, philosophical, and sociological foundations; special reference to England, USSR, France and Germany.

4110 Education in Cultural Perspective (3) Contribution of anthropological concepts (primarily concepts of culture) to understanding of education processes, problems, and thought in our society and others. (Same as Anthropology 4110.)

4111 Non-Western Education: Anthropological Approaches (3) (Same as Anthropology 4111.)

4150 School Library Administration (3) (Same as Library and Information Science 4150.)

4210 Curriculum in Elementary School Social Studies (3) Survey of current curricular approaches and trends in elementary school social studies. Prereq: Teaching experience or student teaching. Sr, Su.

4215 Teaching Elementary School Science (3) Methods and materials used in teaching science in elementary school. Developmental and diagnostic/corrective programs. Not open to students with recent courses or background in teaching elementary school science.

4216 Teaching Elementary School Mathematics (3) Methods and materials used in teaching mathematics in elementary school. Developmental and diagnostic/corrective programs. Not open to students with recent courses or background in teaching elementary school mathematics. W, Su.

4217 Teaching Elementary School Language Arts (3) Methods and materials used in teaching elements of language arts, development of functional relationships with other curriculum areas, diagnostic procedures, and corrective work. Not open to students with recent courses or background in teaching elementary language arts.

4240 Classroom Instructional Organization (3) Developing understandings and skills relating to group management, development of curricular organization, grading, integration, and achieving an effective social environment. For elementary classroom teachers. Prereq: Senior standing.

4250 Initiating the Activities Program (3) Prereq: Educational Psychology 2430, 6 hrs of methods of teaching in elementary school.

4260 Philosophy of Education (3) Truth, knowledge, and evaluation in education, the schools, and society. Prereq: 3010, Educational Psychology 2430 or 3810. E

4261 Educational Classics (3) Discussion of selected writings on education. Prereq: History of Education 52.

4262 Diagnosis and Correction of Classroom Reading Problems (3) Prereq: 3380 or equivalent. E

4300 Developmental Reading in Secondary School and Community College (3) Approaches and materials for teaching basic reading skills and organizing classroom and/or laboratories at middle school, secondary school, and community college level. Prereq: Consent of instructor.

4301 Teaching Developmental Reading (3) Methods and materials used in teaching reading in the elementary school. Includes development of functional relationships with other curriculum areas, diagnostic procedures and remedial work. Not open to students with recent course work or background in the teaching of reading. E

4303 Language Development of Children: Birth-Preadolescence (3) In-depth view of language development from birth through preadolescence; application of process of language development to instructional programs for early and middle childhood. E

4304 Developing Reading Skills in Content Fields (3) Approaches and techniques for teaching reading skills in content areas of school program. Emphasis on middle school and secondary school programs. Prereq: Consent of instructor.

4340 The Junior High School and Middle School (3) To identify and analyze distinguishing characteristics of the Junior High and Middle School curriculums.

4350-60-70 Problems in Teaching English (3, 3, 3)

4351-61-71 Problems in Teaching Mathematics (3, 3, 3)

4352-62-72 Problems in Teaching Social Studies (3, 3, 3)

4353-63-73 Problems in Teaching Science (3, 3, 3)

4354-64-74 Problems in Teaching Language Arts (3, 3, 3)

4355-65-75 Problems in General Curriculum (3, 3, 3)

4356-66-76 Problems in Instructional Materials (3, 3, 3)

4357-67-77 Problems in Teaching Foreign Languages (3, 3, 3)

4359-69-79 Problems in Teaching Conservation (3, 3, 3)

4381 Problems in Early Childhood Education (3) May be repeated. Maximum 9 hrs. 6 hrs can be taken concurrently.

4400 Problems in Improvement of Instruction (1-3) Special conferences, workshops, or in-service programs designed for improvement of instruction. May be repeated. Maximum 9 hrs. S/NC only.

4410 Educational Sociology (3) (Same as Sociology 4410.)

4420 Teaching in Kindergarten: Overview (3) Relationship of kindergarten to total elementary program; goals, historical settings and current developments.

4451 Teaching in Kindergarten: Program Development (3) Curriculum planning and organization; classroom management. Prereq: Consent of instructor.

4630 Current Educational Problems (3)

4654 Programs, Methods and Materials in Environmental and Science Education (3) Instructional materials, teaching methods, curricular programs and issues in environmental and science education.

4750 Utilization of Instructional Media (3) Introduces the basic communications process, need for instructional media, instructional development, selection and utilization of media, and basic software production techniques. (Same as Library and Information Science 4750 and Vocational-Technical Education 4750. E

4840 Introduction to Data Processing in Education (3) Analysis of current activities in field of educational data processing. Emphasis on practical applications, administrative, and research opportunities in education, using modern electronic data processing machines and methods. (Same as Library and Information Science 4750 and Vocational-Technical Education 4750.) E

4860 Programmed Learning (3) Theories of learning as related to technology of programmed instruction; techniques and applications of programming. Prereq: Psychology 3210, Educational Psychology 3730, or consent of instructor. (Same as Psychology 4860.) 2 hrs and 1 lab.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5040 Seminar in Elementary School Language Arts (3) Analysis of current issues related to elementary school language arts education. Emphasis on individual student presentations, projects, and investigations. Prereq: At least 1 yr teaching experience (K-6), or consent of instructor.

5070 Seminar in Intercultural Education (3) Analysis of selected problems: political factors in creation of educational policy; social stratification and its impact on education in elite and mass societies; relation of education to manpower planning and technological change; and others.

5100 History of European Education (3) Ancient Greece to development of national school systems.

5110 History of Education (3) Foundations for American education. E


5140 Comparative Philosophies of Education (3) Educational theory and policy proposals of the major philosophic schools of thought. Prereq: 4260 or equivalent.

5141 Pragmatism in Education (3) Effects of American pragmatist tradition on educational policy and practice. Prereq: At least one course in history or philosophy of education.

5142 The Existential Student (3) Literature of existentialism as source for harmonizing student's educational ideals and curricula.

5143 Supervised Readings in Philosophy of Education (3) Prereq: At least 9 hrs history or philosophy of education.

5150-60-70 Seminar (1-3, 1-3, 1-3) Curriculum, elementary education, secondary education, or social foundations as they relate to goals of students' programs. Maximum 9 hrs. S/NC only.

5180-90-200 Seminar Educational Specialist Research and Thesis (3, 3, 3)

5210 Seminar in International Education: Asia and Africa (3) Historical, philosophical, and sociological foundations; special reference to Japan, China, India, and Nigeria.

5211 Instructional Strategies in Elementary School Social Studies (3) Special emphasis on teaching strategies and instructional procedures for organizing social studies learnings. Prereq: Undergraduate social studies course or equivalent.

5220 Supervised Readings in International Education (3) Supervised readings and research in any area of international education, with emphasis on historical, philosophical and sociological foundations. Prereq: Consent of instructor.

5230 Diagnosis and Remediation of Arithmetic Difficulties (3) Problems in learning arithmetic concepts, techniques and strategies for diagnostic teaching of arithmetic. Prereq: 5290 or 5525, or consent of instructor. F, Su.

5240 Creative Thinking and Expression in the Elementary School (3) Gives students opportunity
to examine development of creative potential across academic curriculum of elementary school. Prereq. Consent of instructor.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<td>Secondary School Instruction (3)</td>
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<td>5270</td>
<td>Elementary School Curriculum (3)</td>
<td></td>
<td>Theoretical background and experimental approaches.</td>
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<tr>
<td>5280</td>
<td>Teaching of Language Arts in the Elementary School (3)</td>
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<td>Related curricular issues.</td>
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<tr>
<td>5292</td>
<td>Teaching of Mathematics in the Elementary School (3)</td>
<td></td>
<td>Trends, issues, and research in content and method for the elementary school mathematics program.</td>
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<tr>
<td>5293</td>
<td>Programs and Materials in Teaching Elementary Science (3)</td>
<td></td>
<td>Analysis of new and innovative science program materials. Instructional strategies inherent in teaching of these materials.</td>
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<tr>
<td>5294</td>
<td>Seminar in Teaching Elementary Science (3)</td>
<td></td>
<td>Art, science, and development of elementary science education. Emphasis on individual student presentations, projects, and investigations.</td>
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<tr>
<td>5295</td>
<td>Reading (3)</td>
<td></td>
<td>Instructional techniques, methods, and materials for teaching reading.</td>
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<td>5296</td>
<td>Language Arts (3)</td>
<td></td>
<td>Programs and special instructional aids associated with language arts.</td>
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<tr>
<td>5297</td>
<td>Seminar in Research and Theory in Teaching Mathematics in the Elementary School (3)</td>
<td></td>
<td>Systematic study of research and theory and their application to teaching of mathematics.</td>
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<tr>
<td>5298</td>
<td>Programs and Materials in Elementary School Language Arts (3)</td>
<td></td>
<td>Programs and special instructional aids associated with language arts.</td>
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<tr>
<td>5299</td>
<td>Programs and Materials in Elementary School Language Arts (3)</td>
<td></td>
<td>Programs and special instructional aids associated with language arts.</td>
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<tr>
<td>5302</td>
<td>Psychology of Reading (3)</td>
<td></td>
<td>The reading act, relationship between learning theory and reading, role of reading in child’s overall intellectual development.</td>
</tr>
<tr>
<td>5303</td>
<td>Methods and Materials for Teaching Critical Reading (3)</td>
<td></td>
<td>Instructional techniques, methods, and materials for development of higher level comprehension skills, concepts, and attitudes for creative (or productive) and critical (or evaluative) reading.</td>
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<tr>
<td>5304</td>
<td>Programs and Materials for Reading Instruction (3)</td>
<td></td>
<td>Examination, selection, and use of materials in reading program, distinguishing between approaches and materials for teaching reading. Prereq. 3281 or 4300 or consent of instructor.</td>
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<tr>
<td>5306</td>
<td>Reading to the Linguistically Different Learner (3)</td>
<td></td>
<td>Language characteristics and special reading problems pertaining to linguistically different learner.</td>
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<tr>
<td>5307</td>
<td>Assessment and Correction of Classroom Language Arts Difficulties (3)</td>
<td></td>
<td>Classroom approaches to assessing and correcting language arts (oral and reading) difficulties. Prereq. 5400 or 5280.</td>
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<tr>
<td>5350</td>
<td>Curriculum Development and Evaluation (3)</td>
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<td>5360</td>
<td>Curriculum Development and Local School (3, 3)</td>
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<tr>
<td>5365</td>
<td>Mathematics Laboratories in Elementary School (K-9) (3)</td>
<td></td>
<td>For elementary school teachers dealing with activity-oriented mathematics laboratory materials and pedagogical strategies. Theoretical considerations and development of curriculum and materials for laboratory. Prereq. Consent of instructor.</td>
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<tr>
<td>5366</td>
<td>Diagnosis of Remedial Reading Problems (3)</td>
<td></td>
<td>Remediation of remedial reading problems. Prereq. 5360 or consent of instructor.</td>
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<tr>
<td>5367</td>
<td>Reading Development Practicum (3)</td>
<td></td>
<td>Diagnosis and teaching children having developmental and productive reading needs. Prereq. 4260.</td>
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<tr>
<td>5368</td>
<td>Remedial Reading Practicum (3)</td>
<td></td>
<td>Remedial reading practicum. Prereq. 5381.</td>
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<tr>
<td>5370</td>
<td>Organization and Administration of Reading Programs (3)</td>
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<tr>
<td>5410</td>
<td>The High School Curriculum (3)</td>
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<td>Theoretical background and experimental approaches.</td>
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<td>5530</td>
<td>Curriculum Laboratory for High Schools (3)</td>
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<td>Production of syllabi, courses of study, source units, and other materials.</td>
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<td>5580</td>
<td>Curriculum Planning and Development (3)</td>
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<tr>
<td>5610</td>
<td>Educational Statistics (3)</td>
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<td>Problems in Direction and Supervision of Student Teaching (3)</td>
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<td>5620</td>
<td>Practicum in the Individualization of Instruction (3)</td>
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<td>Prereq. 4810-20.</td>
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<tr>
<td>5640</td>
<td>Newer Trends in Elementary Education (3)</td>
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<td>Trends in classroom procedures, equipment, and materials of instruction. Problems involving improvement of instruction.</td>
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<tr>
<td>5650-60</td>
<td>Curriculum Laboratory for Elementary Schools (3, 3)</td>
<td></td>
<td>Production of syllabi, courses of study, source units, and other materials.</td>
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<tr>
<td>5670</td>
<td>Curriculum Laboratory for Early Childhood (3)</td>
<td></td>
<td>Sp, Su Education.</td>
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<td>5680</td>
<td>Teacher-Parent-Community Relations (3)</td>
<td></td>
<td>Design and application of instructional development model to arrive at solutions to instructional problems, development and design of a learning sequence or module, using appropriate media in actual learning setting. Prereq. 4750 or consent of instructor.</td>
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<tr>
<td>5691</td>
<td>Advanced Production of Audiovisual Software (3)</td>
<td></td>
<td>Lettering, overhead projectors, mounted transparents, photogrammetry, non-photographic slides, and videotaping for producing classroom audiovisual software. Prereq. 5690 or equivalent.</td>
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<tr>
<td>5692</td>
<td>Evaluation of Instructional Media (3)</td>
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<td>5693</td>
<td>Administering Instructional Media Programs (3)</td>
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<td>5694</td>
<td>Utilization of Educational Television and Radio (3)</td>
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<td>5695</td>
<td>Research in Instructional Media (3)</td>
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<td>5696</td>
<td>Practicum Experience in Instructional Media (3)</td>
<td></td>
<td>Practicum experience in professional media role as identified by student in various organizational and learning settings. Prereq. Consent of instructor.</td>
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<tr>
<td>5697</td>
<td>Techniques of Research in Education (3)</td>
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<td>5700</td>
<td>Classroom Observation and Analysis (3)</td>
<td></td>
<td>Classroom observation and analysis procedures. Development of objective observation and analysis skills, examination of existing observation systems.</td>
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<tr>
<td>5790</td>
<td>Career Development: Workshop (1-4)</td>
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<td>Same as Educational Psychology 5790.</td>
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<tr>
<td>5800</td>
<td>Seminar in Cooperative Curriculum Research (3)</td>
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<td>Action research procedures and their application to programs.</td>
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<td>5820</td>
<td>Seminar in the Teaching of Mathematics (3)</td>
<td></td>
<td>Analysis of teaching strategies related to subject matter and learner problems. Student presentations initiate discussion sessions. Prereq. At least 1 year teaching experience (mathematics grades 7-12) or consent of instructor.</td>
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<tr>
<td>5825</td>
<td>Teaching Mathematics in the Middle and Junior High School (3)</td>
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<td>Problems related to teaching mathematics in middle and junior high schools. Understanding structure of mathematical concepts, strategies, methods, and materials for teaching. Materials suitable for individualized instruction, mathematical laboratories, and independent study. Opportunities for individual projects. Prereq. 3350 or 3751-52 or equivalent.</td>
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<tr>
<td>5830</td>
<td>Seminar in Mathematics Education (3)</td>
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<td>Current curricular issues. Emphasis on individual student projects and investigation.</td>
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<tr>
<td>5853</td>
<td>Teaching Mathematics in the Senior High School and Community/Junior College (3)</td>
<td></td>
<td>Curriculum and teaching of mathematics in high school and college. Emphasis on &quot;analysis&quot; courses such as Algebra II, trigonometry, analytic geometry and calculus. Prereq. 3751-52 or equivalent.</td>
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<tr>
<td>5841</td>
<td>Trends and Issues in Early Childhood (3)</td>
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<td>Historical background, trends, and issues as basis for evaluating current programs; materials and techniques of teaching.</td>
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<td>5842</td>
<td>Problems in Education: Early Childhood Education (3)</td>
<td></td>
<td>May be repeated. Maximum 9 hrs. Six hrs may be taken concurrently.</td>
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<tr>
<td>5843</td>
<td>Seminar in Early Childhood Education (3)</td>
<td></td>
<td>Analysis of research in early childhood education (K-3) with emphasis on application to programs and methods of instruction. Prereq. 5710 or 5600 or equivalent.</td>
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<tr>
<td>5844</td>
<td>Mathematics in Early Childhood Education (3)</td>
<td></td>
<td>Behavioral characteristics of children in regard to mathematics, content materials and functional instructional settings, and teaching strategies for development of mathematical ideas. Prereq. 3350 or equivalent.</td>
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<tr>
<td>5845</td>
<td>Social Studies and Science in Early Childhood Education (3)</td>
<td></td>
<td>Integrative approaches to and substantive classification systems of content areas of social studies and science for early childhood programs. Emphasis on integration of appropriate social studies and science content and approaches for the young child. Prereq. 3720 and 3720 or equivalent.</td>
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<tr>
<td>5846</td>
<td>Language Arts in Early Childhood Education (3)</td>
<td></td>
<td>Language development of young learner with emphasis on teaching methods, procedures, program materials and selection of language arts program. Prereq. 3260 and 3260-81 or equivalent.</td>
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<tr>
<td>5850-60</td>
<td>Problems in Education: English (3, 3)</td>
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<td>5851-61</td>
<td>Problems in Education: Mathematics (3, 3)</td>
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<td>5852-62</td>
<td>Problems in Education: Social Studies (3, 3)</td>
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<td>Problems in Education: Science (3, 3)</td>
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<td>Problems in Education: Language Arts (3, 3)</td>
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<td>5855-65</td>
<td>Problems in Education: General Curriculum (3, 3)</td>
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<td>5859-69</td>
<td>Problems in Education: Conservation (3, 3)</td>
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<td>5899</td>
<td>Field Experience (1-6)</td>
<td></td>
<td>Application of curricular and instructional principles, methods, and materials in schools. Program requisites must be met.</td>
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</tbody>
</table>
5900 Seminar in the Teaching of English in the Secondary School (3) Su
5901 Linguistics and the Teacher of English (3) Analysis and application of linguistics in the classroom. Su
5902 Teaching Composition in the High School (3) Techniques and procedures for composition instruction. Su
5903 Teaching Fiction in the Secondary School (2) Reading, study, and analysis of literary selections. F
5904 Teaching the Mass Media in the English Classroom (3) Nature of mass media and importance to American education and life. Sp
5905 Teaching English in the Community-Junior College (3) Emphasis on thorough understanding of communication needs of community/junior college students and objectives, strategies, and materials for meeting these needs. Su
5906 Teaching Poetry in Grades 7-12 (3) Materials and strategies for teaching poetry. F
5907 Teaching Drama in Grades 7-12 (3) Strategies and materials for teaching drama. W
5908 Developing Speaking and Listening Skills in Grades 7-12 (3) Strategies and materials for teaching skills of speaking and listening. Sp
5909 Instructional Theory and Design (3) For those individuals at Master's and doctoral levels who have interests in intensive study of instructional process and its relationship to curriculum and learning. 1910-20, 30 Problems in Lieu of Thesis (3, 3, 3)
5911 Directing the Forensic Program (4) Same as Speech 5911.
5912 Play Production in Secondary Schools (4) Same as Theatre 5912.
5915 The Function of the Thinking Process in Education (3) Analysis of thinking process for purposes of tracing its implications for education theory and practice. W
5960 The Teaching of Natural Science (3) Teaching strategies, testing and evaluation techniques, and professional guidelines for program planning in science. W
5961 Seminar in Science and Environmental Education (3) Recent developments in science education of concern to classroom instruction. Particular emphasis on interrelationships of environmental factors on science education. W
5970 The Teaching of the Social Studies (3) Su
5980 Projects, Programs, and Materials in Social Studies (3) Projects and aids associated with each social science discipline. W
6000 Doctoral Research and Dissertation (3-15) E
6010 Studies in English Education (3) Reading and study in various areas of teaching of English, comparative literature, and language. Su
6020 Seminar in Teaching the Social Studies (3) Problems associated with classroom instruction in junior and senior high schools. Su
6030 Research and Theory in Teaching Reading (3) Research and theory in application to teaching of reading; research design as it applies to reading investigations. Prereq: Two 5000-level courses in reading.
6031 Seminar in Reading and Language Arts (3) Topics new to broad area of language arts. Two topics each term chosen by need and instructor(s). Prereq: 5000-level course in reading and in language arts. Su
6040 Seminar in Curriculum and Instruction (1) Required three quarters. S/N only. E
6050 Advanced Study of Methodology in the Education of Children (3) (Continuation of 5640) Consideration to recent and current literature in field and to sound educational practices in guiding learning of children. Prereq: 5640 or consent of instructor. W
6060 Advanced Seminar in Philosophy of Education (3) Some selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education.
6081 Phenomenology and Education (3) Selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education.
6082 Philosophical Analysis and Education (3) Philosophical analysis of language and concepts in educational research and writing. Prereq: At least 2 courses in history or philosophy of education.
6150 Education as Social Policy (3) Education as instrument of national or cultural well-being; problems faced by society in shaping educational program; comparisons of education in this country and in other national school systems. F
6210 Seminar in Elementary School Social Studies Research (3) Current research in elementary school social studies, studies of research in field, needed research-related research from other fields. Prereq: Undergraduate course and one graduate course in social studies, or equivalent. Su
6230 Programs for Curriculum Improvement (3) W
6250 Seminar in History of Education (3) May be repeated with consent of instructor. W
6282 Advanced Studies in Elementary School Science (3) Critical analysis of current research in elementary school science. Prereq: Undergraduate course and one graduate course in science, or equivalent. W
6350 The Professional Education of Teachers (3) Basic theories, programs, and practices. W
6400 The Dynamics of Educational Change (3) Causes of lag between educational theory and practice; factors useful in reducing this lag. W
6500 Advanced Studies in Early Childhood Education (3) May be repeated. Maximum 6 hrs.
6510 Advanced Studies in Elementary School Language Arts (3) Critical research analysis of selected issues in language arts. Prereq: 5280 or equivalent and consent of instructor. Sp
6710 Advanced Educational Statistics (3)
6720 Interpretation of Data (3) Types of data in published materials in education; principles of sound interpretation.
6730 Theory and Evaluation in Curriculum Planning (3) Application of principles of evaluation to curriculum programs in elementary and secondary schools. Prereq: 5270 or 5410 or equivalent.
6731 Studies in Curriculum Theory and the Structure of Knowledge (3) Knowledge, theories, models, and designs; structures of knowledge and structures of disciplines in elementary and secondary school programs. Prereq: 5270 or 5410 or equivalent. W
6740 Curriculum Workshops in Instructional Improvement (3) Observation and participation in workshops sponsored by College of Education; evaluation of workshop approaches to teacher education and instructional improvement.
6750-60-70 Problems in Curriculum and Instruction (3, 3, 3)
6830 Studies in Mathematics Education (3) Reading and study related to historical trends and issues in mathematics education in United States providing broad perspective on current curriculum problems and future trends. Prereq: 5500 or consent of instructor.
6850 Principles of Educational Leadership (3) Conflict concepts, with application to major problems in instruction, supervision, and administration.
6889 Internship (1-6) Advanced level experiences in application of principles and practices of curriculum development and instructional improvement. Program prerequisites must be met and consent of instructor required. May be repeated. Maximum 12 hrs. S/N only.
6910 Doctoral Research and Dissertation (3-15) E
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E
5100 Internship in Educational Administration (3) May be repeated with consent of department. Maximum 6 hrs. Su
5130 Introduction to Educational Administration (3) Tasks, functions, and processes of educational administration; organization and structure of educational programs and institutions. W
5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) E
5220 Philosophy and Theory in Educational Administration (3) Philosophical and theoretical foundations of educational administration, programs, and institutions, within the framework of American culture. W, Su
5230 Seminar in the Behavioral Sciences in Educational Administration (3) Key behavioral science concepts/concepts and their application in administration such as semantics, communication, leadership, change process, organizations, and organizational behavior, motivation and morale, role theory. W, Sp
5290 The Politics of Education (3) Special emphasis on leadership structures, operational beliefs, and communication of ideas with regard to public and private decisions concerning education. E
5310 School Administration and Civil Rights Issues (3) To help school administrators meet responsibilities and resolve problems stemming from civil rights legislation pertaining to race, sex, and the handicapped. A

Educational Administration and Supervision

MAJOR

DEGREES

Educational Administration and Supervision


Programs are planned for (1) students preparing for administrative positions normally found in the educational structure of the state; (2) students preparing for the position of supervisor of education; (3) administrators and supervisors in service who wish to improve their professional competence; (4) students and teachers preparing for teaching positions involving administrative responsibilities; and (5) students preparing for teaching educational administration or for administrative positions in higher education.

In addition to M.S. and Ed.D. degrees, a special two-year graduate program is offered which leads to the Ed.S. (Specialist in Education) degree and which provides advanced preparation for applicants judged to be potentially competent school administrators.

5000 Thesis (1-15) E
5420 District Level Administration (3) Role of central administrative team, and relationships, behaviors, and decision making processes to develop an effective school organization. F
5430 Building Level Administration (3) For beginning school principals and administrators, and for those preparing in rural, secondary, or consolidated schools. W, Su
5440 Introduction to Law, Finance, and Business Management at the Building Level (3) Orientation for beginning principals for basic foundations of the American legal system; how case law affects daily building level operations; building level methods of fiscal and logistical support measures. F, W, Su
5450 Organization of the School Program (3) For principals and supervisors; conceptual and technical skills in organizing school program including curriculum, instruction, student grouping, staff, schedules, and space. F, Sp, Su
5460 Personnel Administration: Local School (3) Planning personnel needs; job analysis; recruitment; selection; placement; orientation of new staff; fair employment and dismissal; and contract administration for both professional and supporting staff. W, Su
5470 Introduction to School Facility Planning (3) For school administrators; facility planning; skills in building planning, use and evaluation. F, Su
5480 Instructional Supervision—Local School (3) Developing a concept of supervision; instructional help and support; curriculum development; supervision of curriculum; staff development; and staff evaluation. F, Sp, Su
5530 Introduction to Educational Planning (3) Processes for improving decision-making function through both quantitative and qualitative planning techniques. Relating educational policy analysis to educational planning.
5560 Research for Educational Administrators (3) Descriptive, experimental, and quasi-experimental designs to help student without quantitative background to read and understand technical literature. Primarily for nonthesis option students. Should be taken early in M.S. or Ed.D. program. W, Su
5580 Seminar in Communication Skills for Educational Administrators (3) Identification, development and use of interpersonal and group related communication skills. F, Sp
5711 Problems in Educational Administration and Supervision: School Operation (3) May be repeated. E
5712 Problems in Educational Administration and Supervision: Higher Education (3) May be repeated. E
5713 Problems in Educational Administration and Supervision: State School Administration (3) May be repeated. E
5714 Problems in Educational Administration and Supervision: Preparation Programs (3) May be repeated. E
5715 Problems in Educational Administration and Supervision: Community Education (3) Independent study of administrative problems. May be repeated.
5751 Problems in Educational Administration and Supervision: Theory (3) May be repeated. E
5752 Problems in Educational Administration and Supervision: Finance (3) May be repeated. E
5753 Problems in Educational Administration and Supervision: Transportation (3) May be repeated. E
5754 Problems in Educational Administration and Supervision: Business Management (3) May be repeated. E
5755 Problems in Educational Administration and Supervision: School Law (3) May be repeated. E
5756 Problems in Educational Administration and Supervision: School Plant (3) May be repeated. E
5757 Problems in Educational Administration and Supervision: Organization and Structure (3) May be repeated. E
5758 Problems in Educational Administration and Supervision: School Law (3) May be repeated. E
5759 Problems in Educational Administration and Supervision: Supervision (3) May be repeated. E
5770 Maintenance of School Plants (3) Skills in operating school custodial and maintenance programs. Sp, Su
5810 Survey Research Methods (3) Overview of descriptive studies, data collection, analysis, and interpretation for survey studies and school surveys, strategies for descriptive research in education. W, Sp, Su
5850-00-70 Independent Study in Educational Administration (3, 3, 3) Prereq: Consent of instructor. E
5890 Decision Making and Decision Theory in Educational Organizations (3) Theoretical constructs governing executive decision making; direct application of decision theory problem-solving activities for preservice and practicing administrator. Executive decision making at several administrative levels in complex educational organizations. S/NC only. A
5900 Special Topics (3) May be repeated. E
5910-20-30 Problems in Lieu of Thesis (3, 3, 3) E
5950 Elementary Administrators Seminar (3) For in-service training of elementary school administrators. Developments, problems, programs, and trends of elementary school organizations and management skills of elementary school administrators. Prereq: Presently an elementary school administrator or consent of instructor. May be repeated. S/NC. F
5960 Middle School Administrators Seminar (3) For in-service training of middle school administrators. Developments, programs, problems, and trends of middle school organizations and management skills of middle school administrators. Prereq: Presently a middle school administrator or consent of instructor. May be repeated. S/NC. F
5970 Secondary Administrators Seminar (3) For in-service training of secondary school administrators. Developments, programs, programs, and trends of secondary school organizations and management skills of secondary school administrators. Prereq: Presently a secondary school administrator or consent of instructor. May be repeated. S/NC. F
6000 Doctoral Research and Dissertation (3-18) E
6040 Seminar in Educational Administration and Supervision (3) Required three consecutive quarters. S/NC only. E
6100 Internship in Educational Administration (3) May be repeated at discretion of student's committee; opportunity for advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative. E
6110 Administrator Update (3) Current topics of concern to practicing school administrators, selected each quarter and presented by a specialist. Prereq: Presently a school supervisor or administrator, or consent of instructor. May be repeated. S/NC only. E
6190 Administration in Higher Education (3) Developing conceptual understanding of administrative theory and practice in higher education. F, Sp
6220 Programs for the Professional Preparation of Educational Administrators and Supervisors (3) Conceptual and empirical educational research in educational administration, personnel policies and their influence on educational service and program, national economy, welfare of individuals, and welfare of the nation. W, Su
6520 Programs for the Professional Preparation of Educational Administrators and Supervisors (3) Conceptual and empirical educational research in educational administration, personnel policies and their influence on educational service and program, national economy, welfare of individuals, and welfare of the nation. W, Su
6530 Futuristic Educational Planning Methods (3) Processes for improving decision-making function through both quantitative and qualitative planning techniques. Relating educational policy analysis to educational planning.
6540 Contemporary Economics and Educational Administration (3) Examination of social, economic, and political conditions and their influence on educational service and program. W, Su
6550 State-Federal Relations in Education (3) Purposes and functions of federal/State/local educational agencies, organizational control and political variables. Major education laws, rules and regulation-making process, grants and contracts as inter-level policy instruments. F, Su
6560 Legal Foundations of Public Education (3) Legal frameworks and theoretical concepts that impinge on operation of schools within present legal structure of the United States. Sp
6580 Seminar in Managing Conflict (3) Learning about and experiencing various forms of conflict. W, Su
6750-50-70 Independent Studies in Educational Administration and Supervision (3, 3, 3) Prereq: Consent of instructor. May be repeated. E
6800 Administration of Complex Educational Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational organizations. W, Sp
6870 Advanced Study in School Facility Planning (3) In-depth exploration of complex educational planning concepts and techniques of leadership in creation of quality educational facilities. W
6900 Special Topics (3) May be repeated. E
6981 Specialized Seminar: School Operation (3) E
6982 Specialized Seminar: Higher Education (3) Current trends of administrative and organizational relationships, and administrative issues in higher education. W, Su
6983 Specialized Seminar: State School Administration (3) E
6984 Specialized Seminar: Preparation Programs (3) E
6990 Specialized Doctoral Seminar in Politics of Education (3) Political theories and practices as they affect educational policy development. Appropriate interdisciplinary discussions based on literature and research from education, sociology, and political science. One field inquiry. Prereq: 5290, 5810 or equivalent or consent of instructor. A
6991 Specialized Seminar: Theory (3) E
6992 Specialized Seminar: Finance (3) E
6994 Specialized Seminar: Business Management (3) E
6995 Specialized Seminar: Personnel (3) E
6996 Specialized Seminar: School Plant (3) Theory and practice in planning and operating educational facilities: related research in education and other
Educational Psychology and Guidance

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Professors:
- L.M. Wolfinger, (Head), Ph.D. Michigan
- S.C. Dietz, Ed.D. Arizona State; S.W. Hulp, Ph.D. North Dakota; B.B. Lovd, Ph.D. Indiana
- E.W. McClain, Ph.D. Texas; W.A. Poppen, Ph.D. Ohio State; C.L. Thompson, Ph.D. Ohio State; R.L. Williams, Ph.D. George Peabody

Associate Professors:
- D. Tennessee; T.W. George, Ed.D. Tennessee; M.A. Hector, Ph.D. Michigan State
- M.N. Hightower, Ph.D. Ohio State; K.K. Swander, Ph.D. Florida.

Graduate programs (thesis or non-thesis option) lead to the Master of Science degree with majors in College Student Personnel, Educational Psychology (also with a concentration in school psychology), or Guidance, with concentrations in elementary or secondary guidance; to the Specialist in Education degree; and to the Doctor of Education degree, both with concentrations in educational psychology, guidance, school psychology, counselor education, counseling in college and mental health centers, educational measurement and research, career development, and sex-fair counseling and teaching. Appropriate courses taken in this department and in the Department of Psychology will satisfy requirements for certification as a school psychologist. Write the department for information concerning the program requirements. Application deadlines to Ed.D. are February 1 and May 1; Ed.S. and M.S. deadlines are October 15, February 1, May 1, and July 15.

4110 Psychology of Sex Role Development (3) Examination, from both a theoretical and research basis, of techniques which contribute to sex role development and definition in society and role of education in these changes. For student with minimal background in behavioral sciences. F, Sp, Su.

4130 Mental Health (3) Studies and exploration of positive mental health. Application of mental health criteria to a study of one's self based on a battery of personality assessment instruments. 4350-60-70 Problems in Educational Psychology and Guidance (3, 3, 3) E

4440 General Evaluation Procedures for Public Schools (3) Prereq: 2430 or equivalent. E

4554-55-56 Student Leadership Workshops (1, 1, 1) Small group and individualized experiences to develop knowledge and skills in leadership roles. Sections are designed for resident assistants, student government leaders, and student activities, and other student organizations. Prereq: Consent of instructor. S/NC only. E

4640 Standardized Testing (3) Use and interpretation of standardized tests in assessment of intelligence, aptitude, achievement, vocational interests, and personality adjustment. E

4650 The Construction of Classroom Tests (3) Concerned with teacher-made classroom tests: instructional objectives, principles of test construction, item analysis, evaluation of test reliability and validity, interpretation of test scores, and relationship between testing and grading. W, Ru.

4700 Advanced Child Study (3) Prereq: 2430 or 3810 or consent of instructor. W, Ru.

4800 Psychology of the Disadvantaged Child (3) Significant behavioral differences and causes; appropriate intervention approaches. F

4810 Psychosocial Aspects of Appalachian People (3) Exploration of psychology of people of Appalachian origin with emphasis on history of culture, and role of education. W, Ru.


4880 Differential Psychology (3) Nature and sources of individual differences in behavioral characteristics, and differences between racial, ethnic, socioeconomic, sex, and other groups. F

4910 Diagnostic and Corrective Teaching (3) Practical procedure for improving pupil's learning. F

5000 Thesis (1-15) E

5020 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5040 Guidance and Pupil Personnel Services in Education (3) (Same as Vocational-Technical Education 5040.) F, Su.

5050 Children and Adolescents (3) Mental, social, physical, and emotional growth; development, and learning of children and adolescents; prevention, identification, and remediation of learning problems. W, Ru.

5060 Group Approaches with Students (3) Knowledge and skills appropriate to functioning with groups in counseling; psychological and parent education. F, W, Ru.

5070 Seminar in Elementary School Guidance (3) Trends, role, function, and administration of guidance in elementary school. Sp.

5099 Field Work (1-6) Practical experience in departmentally approved field placement. Supervision by field and University personnel. Program prerequisites to field work must be met. May be repeated. Maximum 6 hrs. S/NC only.

5100 Developmental Psychology (3) (Same as Psychology 5100.) F, W.

5110 Psychology of Women (3) Past and current educational and psychological theory and practice with special attention to assumptions and practice in regard to women: social context in which various theories were developed and current theories and research focusing on women and/or sex differences. Prereq: 4130 or basic course in personality theory. E

5111-12-13 Seminar in Current Issues in School Psychology I, 1, 1 (Same as Psychology 5111-12-13.) S/NC only.

5120 Seminar in Bias-Free Counseling (3) Feminist psychology, bias-free education, and counseling. Prereq: 4110 and 5110 or consent of instructor. May be repeated. Maximum 9 hrs.

5140-50-90 Psychoeducational Assessment (3, 3, 3) (Same as Psychology 5140-50-90.)

5149-59-99 Practicum in School Psychology I, 2, 3 (Same as Psychology 5149-59-99.) S/NC only.

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) E

5210 Interpreting Published Articles: Statistics (3) Descriptive and experimental research in educational psychology, guidance and counseling, and college student personnel. Prereq: Non-thesis option students only or consent of instructor. F, W, Ru.

5220 Interpreting Published Articles: Research Design (3) For students not conducting research projects; interpret and evaluate statistical tables and statistical tests as reported in journals. Prereq: 5210 or consent of instructor. W, Sp, Su.

5310 Field Work in School Psychology: Level I (2)

5320 Advanced Classroom Behavior Modification (3) Current research in psychology and its application to educational problems. E

5330 Theory and Research in Human Learning (3) Contemporary research and its influence upon school practice. F

5340 Dynamic Groups (3) Principles of group dynamics as they apply to a variety of group settings. Group counseling, and group leadership skills. (Same as Psychology 5340.) E

5350 Educational Applications of Cognitive Theories (3) Developmental theory of Jean Piaget and implications for education. Related theories such as Bruner and Ausubel. F

5420 College and University Law—Constitutional Rights and Responsibilities of Students (3) Legal precedent affecting student personal services in public higher education. Student discipline, housing, dress, organizations, activities, fees, tuition, and related federal and state law. Same as Continuing and Higher Education 5420. Sp.

5550 Student Personnel in Higher Education (3) Philosophy and scope. F

5560 The College Student (3) Nature, characteristics, and needs. F

5570 Case Studies in College Student Personnel (3) Prereq: 5550 or consent of instructor. F

5720 Evaluation in Education (3) Techniques and instruments for identifying and appraising social values, the thinking processes, social adjustment, emotional needs, personal interests, and problems.

5750 Career Development: Theory and Research (3) F, W, Ru.

5785 Career Development: Program Development, Implementation and Evaluation (3) Career development and pre-vocational programs and projects. KSU with emphasis on development, implementation, and evaluation. Prereq: 5780 or equivalent, or consent of instructor. Sp.

5790 Career Development: Workshop (1-6) Designed for in-service training of school personnel. Develops, problems, and programs and trends related to career development. May be repeated. Maximum 6 hrs. (Same as Curriculum and instruction 5790 and Special Education 5790.)

5840 Student Appraisal (3) Gathering, interpreting, and using data for development of guidance programs and individual counseling. Prereq: Educational Psychology or Psychology 4640 or equivalent in standardized testing. (Same as Psychology 5840.) W

5850-60-70 Special Topics and Problems in Educational Psychology and Guidance (1-4, 1-6, 1-6) May be repeated. May be taken for letter grade or S/NC. E

5880 Career Development: Occupational and Educational Resources (3) Gathering, interpreting, and using educational, social, occupational, and community information in the guidance program; sources, types of materials, and occupational filing plans. For use both in group and individual guidance programs. W, Ru.
emphasize one of the specialized areas. Among the areas of specialization available is disability evaluation (non-thesis only). Students in the specialization in Social and Rehabilitation Services, a specialized institute for the preparation of professionals to adapt their skills toward services to hearing impaired and deaf people is provided.

For further information write the department head.

EDUCATION OF THE HEARING IMPAIRED

4000 Rehabilitation Practicum (3) Evaluation of client data practicing rehabilitation prognosis. Pre-req: 4290. F, Sp

4190 Speech Development of Hearing Impaired (3) Anatomy and physiology of speech system. Relation of hearing to speech development. Theories and techniques of speech development and improved; for hearing impaired children. Pre-req: Audiolog and Speech Pathology 3050. (Same as Audiology and Speech Pathology 4190.) F, Su

4200 Practicum in Speech Development of Hearing Impaired (3) Applications of theories and techniques of speech development and improvement with hearing impaired children. Prereg: 4190 and consent of instructor. (Same as Audiology and Speech Pathology 4210.) W, Sp

4210 Language Development of Hearing Impaired I (3) Systems by which formal language is presented. Pre-req: 4190. Consent of instructor. F (Same as Audiology and Speech Pathology 4210.) W, Sp

4220 Language Development of Hearing Impaired II (3) Techniques; various systems by which formal language is presented. Pre-req: 4190 or consent of instructor. (Same as Audiology and Speech Pathology 4220.) W, Su

4230 Communication Processes for the Hearing Impaired I (3) Various communicative skills required by hearing impaired person; speech and language development; auditory training, speech reading, manual language and its relation to other forms of communication. Observations and practicum. (Student must achieve a degree of proficiency in use of manual language.) Pre-req: Consent of instructor. E

4231 Communication Processes for Hearing Impaired II (3) Intermediate course in manual communications skills and techniques with emphasis on vocabulary development with receptive and expressive fluency. Pre-req: 4230 or consent of instructor. A

4240 Nature of Hearing Impairments (3) Basic principles of audiology and anatomy of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing loss; interpretation of audiograms; selection and use of hearing aids; relation of audiology services to medical and other rehabilitation disciplines. Observations and practicum. F

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) For those planning to enter field of teaching deaf and hard-of-hearing. Review of history of education of deaf. Research studies relating to psychology, social adjustment, and learning of deaf. Survey of professional literature in area of deaf child and adult. (Same as Audiology and Speech Pathology 4250.) E

4260 Curriculum Development in Elementary and Secondary Schools for Hearing Impaired (3) Adaptation of curriculum, selection of educational methods, and public school education to meet needs of deaf and hard-of-hearing students in residential and integrated settings. W

4290 The Teaching of Reading to Hearing Impaired Children (3) Readiness activities, developmental approaches, theories, and specialized materials for curriculum in teaching reading. W, Su

4600 Student Teaching with Hearing Impaired Children (9) Supervised practicum with preschool, day school, and residential pupils. S/NC only. F, W, Sp

- Application of career development principles and practices in planning and evaluating community, business, and industry. May be taken concurrently or separately: 5785, 5783, 5790, 5860, and/or consent of instructor. May be repeated. Maximum 6 hrs. E

5900 Application of Experimental Research Design in Educational Psychology and Guidance (3) Research design and statistical analysis unique to educational psychology, counseling, and college student personnel. Emphasis on designs "experimental" in nature. Prereq: 4190, 4440 or consent of instructor. F, Sp

6000 Doctoral Research and Dissertation (3-15) E

6040 Seminar in Educational Psychology and Guidance Required 3 quarters. F

6099 Internship (1-6) Supervised employment at departmentally-approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6110 Application of Research Design in Educational Psychology and Guidance (3) Research design and statistical analysis unique to educational psychology, counseling, and college student personnel. Emphasis on designs "experimental" in nature. Prereq: 4190, 4440 or consent of instructor. F, Sp

6120 Application of Experimental Research Design in Educational Psychology and Guidance (3) Experimental designs used by researchers in educational psychology, counseling, and college student personnel. Prereq: 6110 or equivalent. W, Sp

6319 Field Work in School Psychology: Level II (2) (Same as Psychology 6319.)

6550-6670 Seminar in College Student Personnel (2, 2, 2) Issues in college student personnel, college counseling, student development, etc. Prereq: Consent of instructor, admission to the doctoral program. S/NC only.

6610-6720 Seminar in Counseling Proposal Writing (2, 2) Preparation and evaluation of dissertation proposal. Prereq: Two consecutive statistics courses or consent of instructor. F, W, Sp

6650-6790 Systems Approaches in Psychological Services (3, 3) (Same as Psychology 6650-6790.)

6690-6799 Practicum in School Psychology II (3, 2) (Same as Psychology 6690-6799.) S/NC only. E

6750-6799 Practicum in Educational Psychology and Guidance (3, 3) S/NC only. E

6810 Seminar in Counseling (3) Selected counseling theory, topics, issues. Prereq: 5890 or consent of instructor. May be repeated. F, W, Sp

6840-50-60 Seminar in Professional Issues (1, 1, 1) Job selection, convention participation, writing, publishing, continuing education, etc. For final year doctoral students only. S/NC only. F, W, Sp

6910 Special Topics Seminar (3) Exploration of specific research or theoretical topics with students who have necessary background. Topic will vary from quarter to quarter, depending upon instructor. Prereq: Advanced standing as doctoral student. May be repeated. Maximum 6 hrs. E


6950 Counseling Supervision (3) May be repeated with consent of advisor. Prereq: 5890, 5940, 6810, 6941. S/NC only. E

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MAJORS

DEGREES

M.S. Counseling

M.S. Rehabilitation Counseling

MAJORS

DEGREES

M.S. Counseling

M.S. Rehabilitation Counseling

Associate Professors:


Instructors:


Lecturers:


Instructors:


The Department of Special Education and Rehabilitation provides competency-based programs for clients with hearing impaired; special education, and rehabilitation personnel to work with exceptional persons: children and adults. Specialized courses may be offered in the following areas of specialization: speech and language development; auditory training, speech reading, and learning of deaf. Survey of professional literature in area of deaf child and adult. (Same as Audiology and Speech Pathology 4250.) E

4290 The Teaching of Reading to Hearing Impaired Children (3) Readiness activities, developmental approaches, theories, and specialized materials for curriculum in teaching reading. W, Su

4670 Student Teaching with Hearing Impaired Children (9) Supervised practicum with preschool, day school, and residential pupils. S/NC only. F, W, Sp
5740 Disability and Work in Society (3) Relationship of work to physical, social, psychological, and economic development of disabled individual. Process and techniques of vocational evaluation, work adjustment services in rehabilitation. F

5750 Principles and Problems of Disability Evaluation (3) Identification and analysis of principles and problems of disability evaluation process or structures; emphasis on problems of disabilities evaluation of educational, vocational, and social rehabilitation of disabled individuals. Prerequisite: Consent of instructor. F

5760 Seminar: Functional Capacity Assessment (3) Criteria for residual functional capacity assessment in disability insurance claims evaluation; problems in achievement of completion of residual functional capacity assessments. Prerequisite: 5710-20 or consent of instructor. Su

5770-71 Current Problems in Disability Claims Evaluation (1-3, 1-3) Current problems in process, content, or administration of disability claims evaluation; workshops in identification and proposal of alternative solutions. May be repeated with consent of instructor. S/N only. A

SCHOOL SPEECH AND HEARING THERAPY

4030 The Public School Speech and Hearing Program (3) Organization, administration, and procedures. F, Sp

4035 Appraisal of Speech and Language Disorders (4) (Same as Audiology and Speech Pathology 4045.)

4310 Stuttering (3) (Same as Audiology and Speech Pathology 4310.)

4320-30-40 Clinical Practice in Speech Pathology (1-6, 1-6, 1-6) (Same as Audiology and Speech Pathology 4320-30-40.)

4341 Clinical Practice in Speech Correction in the Public Schools (3) Prerequisite: 4303; 4320-30-40 and consent of instructor. S/N only. F, W, Sp

4342 Seminar in Speech Correction in Public Schools (3) Prerequisite: 4303; 4320-30-40 and consent of instructor. F, W, Sp

4400 Voice Disorders (4) (Same as Audiology and Speech Pathology 4400.)

4450-60-70 Clinical Practice in Audiology (1-6, 1-6, 1-6) (Same as Audiology and Speech Pathology 4450-60-70.)

4720 Audiology II (4) (Same as Audiology and Speech Pathology 4720.)

4830 Aural Rehabilitation: Speechreading and Auditory Discrimination (3) (Same as Audiology and Speech Pathology 4830.)

4940 Introduction to the Verbo-Tonal System (1-6) (Same as Audiology and Speech Pathology 4940.)

5040 Advanced Clinical Practice in Audiology (1-8) (Same as Audiology and Speech Pathology 5040.)

5380 Cerebral Palsy (3) (Same as Audiology and Speech Pathology 5380.)

5390 Cleft Palate (3) (Same as Audiology and Speech Pathology 5390.)

5540 Seminar in Language Pathology (3) (Same as Audiology and Speech Pathology 5540.)

5720 Translation (3) (Same as Audiology and Speech Pathology 5720.)

GENERAL COURSES

3333 Education of the Exceptional Child (3) Principles, characteristics, and special needs; local and state programs for diagnosis and care; educational provision in regular or special classes; home teaching; social and vocational guidance. E

3520 Language-Speech Handicapped Child in the Classroom (3) Recognizing and understanding speech problems of handicapped children; defects of speech development in children; incorporating speech improvement into the curriculum. For students not majoring in speech and hearing. E

4350-60-70 Problems in the Education of Exceptional Children (3, 3, 3) Prerequisite: Consent of instructor. E

4740 Diagnostic and Remedial Approaches in Special Education (3) (Same as Audiology and Speech Pathology 4740.)

5401 Prescriptive Teaching for Children with Learning Disabilities (3) Diagnostic test materials to assess functional level of ability followed by specific remedial recommendation consistent with functional ability level. Emphasis on reading and mathematics skills; formal, diagnostic testing material emphasizing cognitive development. Optimizing teaching instruction combined with a prescriptive teaching approach to learning disabilities. F, Su

4501 Diagnostic and Remedial Approaches in Speech Pathology (3) Identification and remediation of learning problems of children: neurological and medical aspects; task analysis of cognitive, affective, and psychomotor skills; formal, diagnostic testing material emphasizing cognitive development. Optimizing teaching instruction combined with a prescriptive teaching approach to learning disabilities. F, Su

5402 The Exceptional Child in the Regular Classroom (3) Adoption, modification, delivery, and maintenance of instructional activities for exceptional children within regular classrooms. Learning and academic considerations stressed. Prerequisite: 5401 or consent of instructor. A

5403 Resource Teachers for the Handicapped (3) To help students acquire the skill to maintain integrated handicapped children in regular public education environments; job descriptions and expectations, interpersonal relations, assessments of abilities, modifications of curriculum content, and applied teaching methodologies. A

5410 Instructional Media for the Handicapped: Design, Production, and Evaluation of Prototypical Curriculum Materials (3) Perception, communication, and learning theories; media design and advanced production techniques; evaluation procedures. Emphasis on planning and producing prototypical media materials specifically designed to meet needs of handicapped learners. Enrollment limited to persons holding major responsibilities in media for program in handicapped or similar setting. (For Summer Media Institute only): A

5450-60-70 Experience in Teaching and Supervision of Exceptional Children (1-6, 1-6, 1-6) E

5510-20-30 Administrative Practicum in Problems in Institutional Care of Children (3, 3, 3) Physical and social development; business and personnel management; holding major responsibility in institutional care of children, or consent of instructor. A

5550-60-70 Problems in the Education of Exceptional Children (3, 3, 3) E

5820 Counseling Parents of Exceptional Children (3) Interpreting exceptionalities (handicapped and gifted) to parents and helping in understanding and acceptance of the child in school/home. E

5630 Psychology of the Exceptional Child (3) Entire field of exceptional child psychology: needs, and scope of each group. Educational provisions; impact of group on family life; social factors. Prerequisite: Consent of instructor. E

5790 Career Development: Workshop (1-6) (Same as Educational Psychology 5790) A

5790 Seminar: Issues and Theories in the Education of the Exceptional Child (3) Current trends in education of exceptional child, application of philosophical approaches to education, analysis of current theories of integration as applied to exceptional child. Current research concerning education and rehabilitation of exceptional persons. Prerequisite: Curriculum and Instruction 5800 or equivalent. A

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) E

5970 Juvenile Delinquency and the School (3) Responsibilities of school in studying sources of maladjustment; school function in community programs for children’s welfare; curricular adjustments; directed study of socially maladjusted children, environment, and programs for meeting needs. A

Vocational-Technical Education

MAJORS

DEGREES

Education: M.S.

Business Education: M.S., MACT

Distributive Education: M.S.

Industrial Education: M.S.

Vocational-Technical Education: M.S., Ed.S., Ed.D.

Professors: J. I. Matthews (Head) Ph.D. Arizona State; R. J. Woodin (Emeritus) Ph.D. Ohio State.


Distributive Education: C. B. Oakey (Chairperson) Ph.D. Wisconsin.

Industrial Education: R. W. Haskell, Ph.D. Purdue; J. L. Reed (Chairperson) M.S. Oklahoma.


Distributive Education: B. J. Radcliff, M.S. West Virginia; J. A. Stallard, (Chairperson) Ph.D. Ohio State.


Home Economics Education: J. H. Moxley, Ph.D. Florida State; S. W. Miller, Ph.D. Ohio State; H. Stark (Emeritus) M. S. Colorado State.

Industrial Education: J. Bies, Ph.D. Missouri; D. V. Brown, Ed.D. Utah; P. E. G. D. Cheek, Ph.D. Kansas State; R. Hanson, Ph.D. Purdue.


THE MASTER’S PROGRAM

Each vocational service area (agricultural education, business education, distributive education, industrial education and vocational-technical education) offers similar programs leading to the Master’s degree. Both thesis and non-thesis options are available. Details regarding the Master’s programs of each of the service areas may be obtained from the chairpersons of the different services. Each M.S. degree with a major in Vocational-Technical Education is available
with concentrations in agricultural education, business and office education, distributive education, general vocational-technical education, home economics education, industrial education, and technical education.

Requirements are:

- Concentration
  - 18 hrs
- Research
  - 6 hrs
- Electives
  - 12 hrs
- Thesis Option
  - 9 hrs
- Problems in Lieu of Thesis Option
  - 9 hrs
- Course Option
  - 15 hrs

Total 45-51 hrs

All course work must be approved by the student's committee.

The MACT is also available in the business education area.

### THE SPECIALIST PROGRAM

The Ed.S. degree program, which is a thesis or non-thesis program, is a cooperative undertaking involving all vocational service areas. Options are available in agricultural, business, distributive, and industrial education and in general vocational-technical education.

### THE DOCTORAL PROGRAM

The comprehensive Ed.D. program in Vocational-Technical Education is designed to provide for achieving professional objectives, developing needed competencies, and gaining desirable experiences and understanding of vocational-technical areas.

The Vocational-Technical Education doctoral curriculum consists of the following: professional education core, 9 hours; service area, 18 hours; vocational-technical education, 18-27 hours; cognate fields, 9-18 hours; research techniques, 15 hours (consult advisor for details); and dissertation, 36 hours. A minimum of 120 hours above the baccalaureate is required.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>5000 Thesis 1(15)</td>
<td>E</td>
</tr>
<tr>
<td>5002 Non-Thesis Graduation Completion 3(15)</td>
<td>Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E</td>
</tr>
<tr>
<td>5010 History and Organization of Vocational-Technical Education 3(15)</td>
<td>May be repeated. Maximum 18 hrs.</td>
</tr>
<tr>
<td>5011 Problems in Lieu of Thesis 3(15)</td>
<td>Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E</td>
</tr>
<tr>
<td>5000 Thesis 1(15)</td>
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### Agricultural Education

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>4510-20-30 Problems in Agribusiness Education 1(1), 1(1), 1(1)</td>
<td>May be repeated. Maximum 9 hrs.</td>
</tr>
<tr>
<td>4710-20-30 Seminar in Agricultural Education (1, 1)</td>
<td>E</td>
</tr>
<tr>
<td>5000 Thesis 1(15)</td>
<td>E</td>
</tr>
<tr>
<td>5002 Non-Thesis Graduation Completion 3(15)</td>
<td>Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E</td>
</tr>
<tr>
<td>5011-21-31 Graduate Seminar in Business Education 3(1), 3(1), 3(1)</td>
<td>Field experiences in selected areas of vocational and technical education. S/NC only.</td>
</tr>
<tr>
<td>5450 Supervised Occupation Experience in Agriculture 3(1)</td>
<td>Prereq: 4350.</td>
</tr>
<tr>
<td>5620 Teaching Agricultural Mechanization in Vocational Agriculture 3(1)</td>
<td>Prereq: 4350.</td>
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<tr>
<td>5750-60-70 Special Problems in Agricultural Education 3(1), 3(1), 3(1)</td>
<td>May be repeated. Maximum 18 hrs.</td>
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### Business Education

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<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>4230 Curriculum Construction in Business Education 3(3)</td>
<td>Aims, principles, practices and problems in construction of business curricula for various types of educational institutions in which business subjects are taught.</td>
</tr>
<tr>
<td>4610-20-30 Problems in Business Education 3(3)</td>
<td></td>
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<tr>
<td>5000 Thesis 1(15)</td>
<td>E</td>
</tr>
<tr>
<td>5020 Non-Thesis Graduation Completion 3(15)</td>
<td>Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E</td>
</tr>
<tr>
<td>5110 Graduate Seminar in Current Problems 3(3)</td>
<td></td>
</tr>
<tr>
<td>5111-12-13 Graduate Seminar: Current Problems in Business Education 1(1), 1(1), 1(1)</td>
<td></td>
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<tr>
<td>5120 Graduate Seminar in Tests and Measurement 3(3)</td>
<td></td>
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<tr>
<td>5130 Graduate Seminar in Guidance 3(3)</td>
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<tr>
<td>5140 Organization and Operation of Area Vocational-Technical Systems 3(3)</td>
<td>Same as Industrial Education 5140.</td>
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<tr>
<td>5410-20-30 Practicum in Business Education 2(2)</td>
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<tr>
<td>5510 Evaluation of Research in Business Education 3(3)</td>
<td>Prereq: Curriculum and Instruction 5610 or equivalent.</td>
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<tr>
<td>5611-21 Problems in Business Education: Typing 3(3)</td>
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<tr>
<td>5612-22-32 Problems in Business Education: Shorthand 3(3)</td>
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<tr>
<td>5623-33 Problems in Business Education: Bookkeeping and Account. 3(3)</td>
<td></td>
</tr>
<tr>
<td>5614 Methods and Materials for Vocational Office Education 3(3)</td>
<td>Methods and materials for vocational office education programs. Development of instructional aids, recent developments and research, individualized instruction, and occupational clusters for VOE.</td>
</tr>
<tr>
<td>5624 Problems in Business Education: Clerical Practice 3(3)</td>
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<tr>
<td>5615-25-35 Problems in Business Education: General Business 3(3)</td>
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<tr>
<td>5618 Organization and Management of Vocational Office Education Program 3(3)</td>
<td>Developing office occupational skills and related institutional activities (clubs), enrollment, advisor, and advisory committee.</td>
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<tr>
<td>5628 Problems in Business Education: Administration 3(3)</td>
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<tr>
<td>6110-20-30 Current Issues in Business Education 3(3)</td>
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<tr>
<td>6210-20-30 Advanced Studies in Business Education 3(3)</td>
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<tr>
<td>6410 Higher Education for Business 3(3)</td>
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</table>

### Distributional Education

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>4130 Areas of Distribution 3(3)</td>
<td>Marketing, product or service technology, social skills, basic skills, and distributional areas as these areas affect the distribution of educational programs.</td>
</tr>
<tr>
<td>4140 Supervised Distribution Experience 3(3)</td>
<td>Minimum 200 hours experience in approved distributional business; concurrent analytic project.</td>
</tr>
</tbody>
</table>
4310 Organization and Operation of Distributive Education Programs (3) Background and development of trade, vocation, and related subjects; curriculum implications; establishing, evaluating, reporting, and improving the programs.

4320 Methods and Materials in Distributive Education (3) Prereq: 4310 or consent of instructor.

4330 Coordination Techniques in Distributive Education (3) Selecting training agencies; job analysis; selecting and briefing training supervisors; advisory committees; adult and other community services. Prereq: 4310, 4320.


5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5110 Administration and Supervision of Distributive Education (3) Operation of a distributive education program and work of city or county supervisor. Understanding and appreciating problems from highly technical and specialized department head's point of view. Trends in distributive education; community surveys; state plans; teacher-coordinator qualifications; changing needs. Prereq: 4320.

5120 Organizing and Teaching Adult Distributive Education (3) Planning, organizing, promoting, teaching, and evaluating continuing education programs in distributive education; utilizing trade associations; employment agencies; business groups; and advisory committees in implementation.

5210-20-30 Special Problems in Distributive Education (3, 3, 3) Individual research, conferences; selected workshops in teaching and supervising high school, postsecondary, and adult programs.

5616-26-36 Problems in Distributive Education: Retailing (3, 3, 3)

Home Economics Education

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5110 Administration and Supervision of Home Economics in the Public Secondary School-Day School, Adults, Home Experience in Relation to Total Homemaking Program in Secondary Schools (3) Recent advances in home economics programs; techniques used in evaluation. Purpose of evaluation in development of home economics. Underlying philosophy; skills and techniques. Prereq: Consent of instructor.

5120-20-30 Seminar in Home Economics Education (3, 3) Research literature and techniques. Prereq: Consent of instructor.

5130 Furthering Good Human Relationships in the Classroom (3, 3) Individual research, conferences, and workshops in teaching and supervising high school, postsecondary, and adult programs.

5616-26-36 Problems in Home Economics Education: Retailing (3, 3, 3)

5620 Wage Earning Programs in Home Economics (3) Planning, establishing, and implementing wage earning programs in public and private industry; the development of curricula for these projects. May be repeated. Maximum 3 hrs per course.

5710-20-30 Special Problems for Non-Thesis Students (3, 3, 3)

5810-20-30 Problems in Home Economics Education (1-3, 1-3, 1-3) May be repeated. Maximum 3 hrs per course.

5910-20 Seminar in Home Economics Education (3, 3) Research literature and techniques. Prereq: Consent of instructor.

Industrial Education

3110 History and Philosophy of Industrial Education (3)

3210-20-30 Part-Time Programs in Cooperative Industrial Training (3, 3, 3) Principles of organization, methods, and materials.

3310 Shop Organization and Management (3)

3320-30 Materials and Methods for Teachers of Shop and Related Subjects (3, 3)

3340 School Shop Safety (3)

3610 Development and Utilization of Advisory Committees (3) Craft advisory committees, selection, organization, implementation, and utilization.

4110 Foremanship Training by the Conference Method (3)

4120-30 Job Analysis (3, 3) Principles, practice, instructional methods.

4310-20 Curriculum Building in Trade and Industrial Subjects (3, 3) Course material in trade subjects, results of job analysis, checking sheets and individual job sheets in both trade and related subjects. Prereq or coreq: 4120.

4510-11-12 Seminar in Industrial Education (3, 3, 3) Educational innovations, current events, problems, and other topics associated with the field of industrial education.

4520-21-22 New Developments in Industrial Education (3, 3, 3) Developments, pressing problems, and recent trends in field of industrial education as presented by a coordinating instructor in conjunction with knowledgeable resource personnel.

4621 Special Topics in Drafting (3) Industrial practices in specialized areas of drafting selected for the individual student. Prereq: 6 hrs drafting.


4670 Manufacturing Processes (3) The manufacturing processes of industry and their relationship to careers. Prereq: 2621, 2641, 2660, 3651, or consent of instructor.

4671 Materials and Processes (3) Organic and inorganic materials and processes used to produce finished products. Content, curriculum and techniques of laboratory operation. Prereq: Consent of instructor.

4682 Power and Energy (3) Development, control, transmission, conversion, interrelationships of power sources; content, curriculum, and techniques of laboratory operation. Prereq: Consent of instructor.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5110-20 Administration and Supervision of Industrial Education (3, 3, 3) Principles of vocational education, relationships with general education and trade and labor organizations; administering and supervising schools and classes under federal vocational education acts.

5140 Organization and Operation of Area Vocational-Technical Schools (3) Area vocational-technical school concepts; administration and supervision of vocational and technical education programs in area schools. (Same as Business Education 5140. E

5210-20-30 Special Problems in Industrial Education (3, 3, 3)

5310 Methods of Research in Industrial Education (3)

5410 Improving Teachers in Service (3) Problems of coordination in part-time and apprentice training programs.

5420 Advisory Committees and Apprentice Training (3)

5430 Vocational School Administration and Management (3)

5440 Advanced Methods of Teaching Skills and Technical Information (3) Proper selection and effective application of contemporary methods and techniques in teaching of specialized skills and technical related information.


5540 New Developments in Industrial Technical Education (3) Prereq: B.S. in Industrial Education and teaching experience.

School of Health, Physical Education, and Recreation

Majde M. Phillips, Director

Graduate programs are available to students preparing for (1) teaching and research positions in colleges, high schools and elementary schools; (2) administrative and supervisory work in athletics, health education, physical education, and recreation; (3) recreation specialist positions in various public, voluntary, private, and commercial agencies and institutions; and (4) public health positions in community health education, health planning and administration, and environmental health.

THE MASTER'S PROGRAM

Four programs leading to the Master of Science degree are available: Physical Education, Recreation, Safety Education and Service, and School Health Education. Forty-five quarter hours are required for the M.S. Approximately 23 quarters hours of work selected from courses numbered 5000 and above are included in the M.S. requirement. Course selection shall be made according to each student's professional interests in health, physical education, safety, or recreation with the approval of the major professor. Non-thesis options are available in all M.S. degree programs. A 3 quarter-hour course in research techniques and/or statistics and/or a seminar in research will be required. Each non-thesis degree candidate will take a final comprehensive examination.
safety. Fifty-four quarter hours are required for the M.P.H. degree. One full quarter of field practice is required. During field practice, no student shall hold a full-time job except by special permission of the division chairperson. Students may be placed in all parts of this country.

DOCTORAL PROGRAM

The Doctor of Education and the Doctor of Philosophy degrees are offered in Health Education. See further description under Health Education. The Doctor of Education degree is offered with a major in Physical Education and two collateral areas of study. The curriculum to be pursued will be determined by the student and a doctoral committee. Selection of this curriculum will be based on the past training, experience, and interest of the student.

The basic requirements for admission are:

a. A minimum of 40 (physical education) or 50 (health education) quarter hours.

b. Submission of satisfactory scores on the aptitude section of the Graduate Record Examination is required for all doctoral and specialist programs.

c. A superior grade point average.

d. Submission of satisfactory references relating to training, employment, and character.

e. Evidence of successful teaching or potential for success in the major area of study.

Graduate Assistantships. A variety of graduate assistantships are offered in health education, physical education, safety education, and recreation to qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the Master's and doctoral programs.

Assistantships are made available by local schools, agencies, and the School of Health, Physical Education, and Recreation in return for part-time services rendered. The services may consist of teaching physical education classes, teaching safety classes, leading recreational activities, supervising recreation field work students, and/or directing or helping to manage extracurricular programs. Students interested in these opportunities should file their applications before February 1. Letters should be addressed to: The School of Health, Physical Education, and Recreation, The University of Tennessee, Knoxville, Tennessee 37916.

Public Health Traineeships. A few Public Health Traineeships are offered for Master of Public Health candidates concentrating in community health education. These are provided by the United Public Health Service. Letters should be addressed to: Health and Safety Division, The University of Tennessee, 1914 Andy Holt Avenue, Knoxville, Tennessee 37916.

Departments of Instruction

Division of Health and Safety

MAJORS

Health Education

Public Health

Safety Education and Service

School Health Education

DEGREES

Ed.D, Ph.D.

M.P.H.

M.S., Ed.S.

M.S.

Professors:


Associate Professors:

A. J. Brown, Ed.D. Tennessee; C. B. Hamilton, Dr. P.H. Oklahoma; J. Gorski, Dr. P.H. California (Los Angeles); M. A. Miliken (Emeritus), M.A. Yale; A. F. Thompson, Ph.D. Michigan State.

Assistant Professors:


Lecturers:


The Health and Safety Division offers the following degree programs:

Master of Public Health degree with a major in Public Health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in School Health Education or Safety Education and Service (thesis and non-thesis options). Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and health-related contemporary issues. Prereq: 1 yr of biological science and 1 course in bacteriology. F, W, Sp

3210 First Aid and Emergency Care (4) Theory and practice of first aid and emergency care. Instruction in medical self-help. Course leads to Red Cross Certification in Advanced First Aid and Emergency Care. (Applicant must be at least 18 years of age for certification.) Same as School Health 3210. E

3310 Communicable and Noncommunicable Diseases (3) Modern concepts of diseases, etiology of common communicable and chronic disease problems including prevention and control. Prereq: 1 yr of biological science and 1 course in bacteriology. F, W, Sp

3320 Sanitation (3) History of sanitary awakening; disease-producing relationships and controls of water, sewage, refuse, milk, meat and other foods, air, insects, and soil; sanitation of homes, swimming pools, industrial plants, markets, restaurants, camps, and public bathing places. Healthful school living as affected by buildings and grounds, lighting, acoustics, thermal control, and safety provisions. Prereq: 1 yr biological science, 1 course in microbiology. 2 hrs and 1 lab. E

4120 Community Health Problems—Alcoholism (3) Explores problems of alcoholism regarding overall health of community. Emphasis placed on factors making alcoholism a public health problem. Various types of educational programs to control the disease covered. F

4130 Community Health Problems—Suicide (3) Explores problems of suicide regarding overall health of community. W

4140 Community Health Problems—Death Education (3) Exploration of ramifications of death and dying as related to personal and community health. E

4210 Urban and Industrial Health (3) Health problems created by a burgeoning population and the megalopolis; industrial health problems of concern to management, supervisor, and industrial worker, control of occupational diseases, poisons, accidents, and other conditions incidental to industry. Sp

4220 Communications for Better Health (3) Selective study of communications in health enterprise. Consideration in logical progression of the problems of transmitting current and new information to practitioners; communications among members of the modern health team, among health agencies, and use of mass media for transmitting health information. W, Sp

4410 Consumer Health and Safety Education (3) Survey of major consumer health and safety problems: selecting, purchasing, and financing of safety and medical services. E

4411 Instructor's Advanced First Aid and Emergency Care (3) Designed to teach first aid. Satisfactory completion qualifies one for American National Red Cross Certification as an Advanced First Aid and Emergency Care Instructor. Applicant must be at least 21 years of age. Prereq: 3210 or valid Advanced First Aid and Emergency Care Certificate. F, W, Sp

4420 Drug Abuse Education (3) Drug abuse problem and suspected causes; pharmacology of drugs and their effect on society and methods of drug abuse education. F, Sp

4700-10-20 Field Practice in Public Health (3, 3, 3) Field practice in public health under supervision of public health profession. S/NC only. E

4730 Workshop in Public Health Education (3-6) For teachers, nurses, case workers, sanitarians, and other voluntary and public health agency personnel; emphasizes the problem-solving approach through small group interaction, case method, and critical incident technique. May be repeated. Su

4840-50-60 Problems in Public Health Education (1, 1, 1) Individual identity of student centers study of current problems in public health education. Extensive reading of literature required. E

5020 Non-Thesis Graduation Completion (3-15) Required for the non-thesis option. Credit registered during any quarter when such a student uses university facilities and/or faculty time before degree completion. May not be used toward degree requirement. May be repeated. S/NC only. E

5010-30-30 Workshop in Public Health (3, 3, 3) Designed to deal with specific public health problems in short or extended period of time. Su

5070-80-90 Field Practice and Seminar in Public Health (3-5, 3-5, 3-5) Internship or field experience under professional supervision in public health. S/NC only. E

5110 Environmental Health (3-5) Varied environmental factors within general framework of air, food, water, shelter, transportation as they affect humani ty's survival, prevention of disease, performance and enjoyment. Lecture, demonstrations, laboratory, and field practice. Prereq: Consent of instructor. Su

5120-30 Occupational Health and Safety (5, 5) Occupational health and safety theory and practice related to overall improvement of community health and safety; lecture, demonstrations, and field practice. Prereq: Consent of instructor. F, W
Division of Physical Education

MAJOR

DEGREES

M.S., Ed.D.

Professors:


Associate Professors:

E. T. Hawley, Ph.D. Wisconsin; N. E. Lay, Ph.D. Florida State; B. J. Mead, Ph.D. Purdue; C. A. Wrisberg, Ph.D. Michigan.

Assistant Professors:


The Physical Education Division offers the following degree programs:

Master of Science degree in Physical Education (thesis and non-thesis programs): Doctor of Philosophy degree in Physical Education with concentrations in exercise physiology, motor behavior, adapted physical education, and philosophical and sociological foundations.

5000 Thesis (1-5)

5002 Non-Thesis Graduation Completion (3-15)

5100 Advanced Problems in Health and Physical Education (3)

5102 Problems of the Curriculum in Physical Education

5103 Methods in Physical Education (3) Characteristics of different school age levels, and applications of learning procedures in physical activities at these levels.

5140 Advanced Philosophy of Sport (3) Critical examination of most rigorous and sophisticated essay pieces concerning metaphysical, epistemological, and axiological status of sport. Prereq: Consent of instructor.

5180 Systematic Philosophical Analysis of Sport (3) Critical examination of most comprehensive, systematic, and revealing accounts of metaphysical, epistemological, and axiological status of sport. Prereq: 5140 and/or consent of instructor. Supervised laboratory and film analysis of sports skills.

5220 Readings in Physical Education (3) Comprehensive review of literature in physical education and related areas.

5230 Supervisory Problems in Physical Education (3) For students interested in supervision of physical education teachers.

5310 Analysis of Basic Motor Skills (3) Mechanical analysis of basic motor skills, emphasizing application of these skills to physical education and athletics.

5320 Seminar in Research Techniques in Physical Education (3) Evaluation of appropriate research techniques in a specialized area.

5350 Psychology of Sport (3) Human behavior in sport context. Prereq: General psychology course and consent of instructor.

5340 Motor Behavior and Skill Acquisition (3) Application of research on human movement behavior to sport and physical education. Prereq: 4880 or consent of instructor.

5410-20-30 Specialization Study in a Selected Physical Education Area (1-3, 1-3, 1-3) Advanced research techniques under supervision of major interest. S/N only.

5500 Advanced Kinesiology (3) Action of muscles involved in cardiovascular movements, calisthenics, sports, and gymnastics. Prereq: 3320 or equivalent.

5510 Selected Topics in Anatomy (3) Intensive study of various systems of human body. Prereq: 5500 or equivalent. May be repeated with consent of instructor. S/N only.

5500 Physical Rehabilitation (3) Physical disabilities and rehabilitation techniques. Prereq: 5500 or equivalent.

5580 Physical Activity and Health (5) Relationship of physical exercise to longevity, weight control, cardiovascular diseases, low back pain and other disorders, mental health, growth, and aging. Applications for maintenance of health. Prereq: Course in physiology of exercise or consent of instructor. 5 lectures per week. (Same as Public Health 5580.)

5600 Applied Physiology (6) Principles of physiology with special emphasis on application of physiological findings to physical education. Prereq: 1 yr general chemistry, consent of instructor.

5810-20-30 Practicum (2, 2) Intern experience in areas with major interest. S/N only.

6000 Doctoral Research and Dissertation (3-15) E, S/NC only.

6010 Seminar in Physical Education (1, 1) Research topics in literature related to physical education. May be repeated with consent of instructor. S/N only.

6220 Independent Research (3) Selection of topic, development of procedure, and conduct of study including final writing of research paper. S/N only.

6330 Advanced Motor Behavior (3) Theoretical issues of contemporary significance in human movement. Prereq: 5500 or consent of instructor.

6410 Practicum in Kinesiology (3) Electromyography laboratory and film analysis of sport skills. Prereq: 5310, 5500 and Physics 2210 or equivalent. May be repeated with consent of instructor. S/N only.

6510-20 Issues and Problems in Physical Education (3, 3) Critical examination and evaluation of current issues and problems in physical education.

6610 Seminar in Applied Physiology (2) Prereq: 5510. May be repeated with consent of instructor. S/N only.

6640 Research Participation in Applied Physiology (1-6) Advanced research techniques under supervision of faculty member whose research area coincides with interests of student. Prereq: Consent of instructor. May be repeated with consent of instructor. S/N only.

6810-20 Practicum (2, 2) Intern experience in areas of major interest. S/N only.

Division of Physical Education

MAJOR

DEGREE

M.S., Ed.D.

Professor:

M. L. Peters (Chairperson), Ph.D. Illinois.

Assistant Professors:

M. J. Carter, Re.D. Indiana; K. L. Krick, Re.D. Indiana.

The Recreation Division offers the following degree program:

Master of Science degree in Recreation (thesis and non-thesis programs) with concentrations in recreation administration, and therapeutic recreation.

4130 Recreation Administration (3) Introduction to recreation administration, including planning, personnel, programs, facilities, finances, and public relations. Prereq: 3140, 3200, 3880, or consent of instructor. F, W

4200 Survey of Recreation for Special Populations (3) Responsibility of recreation profession to minority groups whose leisure opportunities and needs may require special services. Prereq: 3140, 3200, 3880, or consent of instructor. F, W

4500 Specialized Study in a Selected Area of Recreation (1-8) Comprehensive study in a selected specialized area within the broad field of recreation. Prereq: consent of instructor.
5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5130 Interpretations of Leisure (3) Concepts of leisure including social, psychological, cultural, and philosophical; recreational uses of leisure. Prereq: 3140 or consent of instructor. F

5140 Leisure Service Delivery Systems (3) Various systems—public, private, and commercial—involved in provision of leisure services for community at large. Prereq: Consent of instructor. F

5150 Current Issues in Recreation (3) Identification and consideration of broad issues—social, environmental, ethical—which currently have greatest impact on use of leisure and implications for recreation administration. Prereq: Consent of instructor. Sp

5420 Therapeutic Recreation (3) Role of recreation in lives and treatment of persons with disabilities—mental, physical and medical. Possibilities for helping ill and disabled realize their fullest potential. Prereq: Consent of instructor. W

5250 Implementations of Recreation Services for the Ill or Disabled (3) Policies and guidelines for organizing and implementing programs of recreation for ill or disabled in treatment centers and other community agencies. Prereq: 4200 or consent of instructor. Sp

5260 Leisure and Mental Health (3) Relationship between leisure activity and mental health, with emphasis on its use in therapeutic recreation. Prereq: Psychology 3650 or equivalent, and consent of instructor. W

5300 Seminar in Recreation (1) Presentation and general discussion of students' research studies, projects, and thesis in recreation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. F, W

5340 Administration of Recreation Funds (3) Development and management of budgets for recreation agencies with special emphasis on obtaining federal funds appropriated specifically for recreation, management of revenue received, and exploration of funding alternatives. Prereq: 4130. Sp

5350 Organizational Policies for Recreation (3) Advanced study in the analysis of organizational policies and functions of management in recreation. Prereq: 4130. W

5360 Management and Operation of Recreation Facilities (3) Management process as it pertains to operation of recreation facilities. F

5440 Problems and Projects in Recreation (1-9) Individual research on problem of special significance to student. Research projects of limited nature undertaken in lieu of thesis. May be repeated. Maximum 9 hrs. New problem must be undertaken for each repetition. E

5450 Specialized Study in Recreation (1-9) Advanced comprehensive study in selected specialized area within leisure and recreation field. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
Graduate degree programs of the College of Engineering provide opportunities for advanced study leading to the Master of Science degree, the Master of Engineering degree, and the Doctor of Philosophy degree. For a listing, consult majors and degrees available on page 8.

OFF-CAMPUS GRADUATE INSTRUCTION BY VIDEOTAPE-ELECTROWRITER

Since 1966, the College of Engineering has made use of electronic communication techniques to reach students beyond the confines of Knoxville classrooms. These remotely-taught classes make the specialized talents of engineering college faculty available to students at off-campus centers and industrial sites. This effort makes use of videotapes prepared from a regular on-campus class in specially-equipped classrooms. The tapes contain a visual and audible record of a professor’s lecture and classroom. The tapes are played back at remote locations. Telephone/Electrowriter contact is established periodically between the professor and the off-campus class to allow full discussion and questions before or after a tape is played. Occasional visits by the professor are made to each remote class and students visit the Knoxville campus at selected times.

Graduate courses have been offered to students at other campuses and established centers of the UT System (Chattanooga, Kingsport, Martin, Nashville, and Tullahoma). A limited number of graduate courses have also been made available to engineers in industrial plants. Such courses are also offered to students using classroom facilities at Jackson State, Columbia State, and Walters State Community Colleges.

The remotely-taught courses offered by UTK carry full graduate credit toward the Master’s degree under authorization of the regional accrediting agency, the Southern Association of Colleges and Schools.

YEAR-IN-JAPAN M.S. PROGRAM

This is a unique program allowing American engineering students to develop some understanding, both scientific and cultural, of Japan. It allows an M.S. candidate to obtain a degree from UTK while carrying out research work at a Japanese university. The program requires approximately two years, one year being spent in Japan and the remaining period being spent at UTK to fulfill the course requirements and to write the thesis or project report, as appropriate to the particular department. The program is administered in the framework of each department’s regular graduate program except that the research is done in Japan.

Although the language of communication in Japan would be English, cultural understanding is one of the important objectives of the program and as such a participant would be asked to begin Japanese language study. At the option of the department, up to 6 hours of graduate credit may be allowed for language study, either at UTK or in Japan.

Financial support for living expenses in Japan and for the roundtrip transportation can usually be arranged through fellowships from the Japanese Ministry of Education.

Engineering Experiment Station

F. N. Peebles, Director
W. K. Stair, Associate Director

The Station is organized to conduct investigations in fundamental engineering science and to aid in the development of the state’s resources and industries as far as funds available will permit.

The Station may also make special arrangements with any person or company to study any technical question within the capacity of its resources, and to report the results exclusively to the company requesting the study. In such case, the whole expense will be carried by the parties requesting the investigation.

Engineering Administration

MAJOR
Engineering Administration

DEGREE
M.S.

Committee:

A program of study leading to the degree of Master of Science with a major in Engineering Administration is offered. This program is aimed at providing education for graduate engineers in the organization and direction of work in engineering functions, at a level which requires understanding of such areas as marketing, finance, and industrial relations. It should be emphasized that this is an engineering program, aimed at preparing individuals for line management positions in construction, design, development, and manufacturing where both technical and nontechnical factors exert significant influence on the success of a given activity.

The program does not provide the opportunity for in-depth study of any of the traditional areas of business administration. Students with such interests are advised to consider graduate programs available in the College of Business Administration.

To be admitted to the Graduate School as a potential candidate for a Master’s degree with a major in Engineering Administration, the applicant must submit reasonable evidence of ability to pursue graduate studies at an acceptable level of performance. In general, the applicant should have graduated from a recognized undergraduate institution in engineering with a satisfactory grade point average. In addition, applicants must satisfy one of the following experience requirements: (1) at least two years of engineering experience after graduation if a full-time student or (2) current employment in engineering work if a part-time student.
THE MASTER’S PROGRAM

Minimum requirements for the Master's degree are the satisfactory completion of the following:

1. An Engineering Core, 27 hours of graduate credit consisting of Engineering Administration 5900, at least three courses from Industrial Engineering 4150, 5130, 5510, and 5710, and a complement of engineering courses normally selected from the student’s undergraduate major department or from courses of other departments pertinent to the program.

2. A Business Administration Core, 15 hours of graduate credit consisting of Accounting 5810, Finance 5650, Marketing 5500, Management 5130, and Transportation 5210.

3. General Electives, 9 hours of graduate credit chosen from computer science, economics, engineering, management science, mathematics, psychology, statistics, and other program-related disciplines.

The program requirement totals 50 hours of graduate course credit. No thesis is required. A final oral and written examination on the work offered for the degree. Course prerequisite for the program are Accounting 2110, Computer Science 3150, Industrial Engineering 4520, and Statistics 3450 or their equivalents. None of these prerequisites may be counted as part of the 50 hour credit offered for the degree. These course prerequisites will be waived upon presentation of evidence of competency in the course subjects. Other prerequisite courses may be required, depending on the student’s background and the electives chosen.

5002 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5900 Project in Engineering Administration (3-15)
Study and formal report of an engineering administration topic, normally performed during last quarter of work toward degree. For M.S. in Engineering Administration candidates only. May be repeated. Maximum 3 hrs credit to be applied toward degree. Must register for 5900 until project is completed. S/NC only. E

The DOCTORAL PROGRAM

Minimum departmental requirements include the satisfactory completion of:

1. A major consisting of 18 to 27 quarter hours of graduate courses in chemical engineering, metallurgical engineering, or polymer engineering. The polymer engineering major must include Polymer Engineering 5110, 5220, 5310, 5410, and 5420. 2
2. One or two minors or collateral work, 9 to 18 hours total in engineering, chemistry, mathematics, physics, or related fields.
4. Active participation in graduate seminars in the program. Resident students must register for the appropriate 5010 every quarter offered.
5. Final examination covering thesis, related fields, and graduate course work.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program may display evidence of ability to perform independent research, and complete the satisfactory completion of:

1. Graduate courses in chemical engineering, metallurgical engineering, or polymer engineering amounting to approximately 36 quarter hours, at least 12 of which must be in 6000 series courses. The polymer engineering major must include Polymer Engineering 5110, 5210, 5230, 5310, 5410, and 5510. 2
2. Supporting courses in related scientific and engineering fields amounting to approximately 36 quarter hours, subject to approval by the student’s faculty committee. These related fields may include mathematics, physics, and engineering.

1. Alumni Distinguished Service Professor.
2. Space Institute, Tullahoma.

Chemical, Metallurgical and Polymer Engineering

MAJORS

Chemical Engineering

Ph.D.

Polymers, Ph.D.

Lecturers:

W. T. Becker, Ph.D. Illinois.

Graduate programs lead to the degrees of Master of Science and Doctor of Philosophy in Chemical Engineering with concentrations in chemical engineering, chemical biomedical engineering, advanced control systems, and polymer science and engineering, in Metallurgical Engineering, and in Polymer Engineering.

THE MASTER’S PROGRAM

Minimum departmental requirements include the satisfactory completion of:

1. A major consisting of 18 to 27 quarter hours of graduate courses in chemical engineering, metallurgical engineering, or polymer engineering. The polymer engineering major must include Polymer Engineering 5110, 5220, 5310, 5410, and 5420.
2. One or two minors or collateral work, 9 to 18 hours total in engineering, chemistry, mathematics, physics, or related fields.
4. Active participation in graduate seminars in the program. Resident students must register for the appropriate 5010 every quarter offered.
5. Final examination covering thesis, related fields, and graduate course work.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program may display evidence of ability to perform independent research, and complete the satisfactory completion of:

1. Graduate courses in chemical engineering, metallurgical engineering, or polymer engineering amounting to approximately 36 quarter hours, at least 12 of which must be in 6000 series courses. The polymer engineering major must include Polymer Engineering 5110, 5210, 5230, 5310, 5410, and 5510.
2. Supporting courses in related scientific and engineering fields amounting to approximately 36 quarter hours, subject to approval by the student’s faculty committee. These related fields may include mathematics, mathematics, physics, and engineering.

1. Alumni Distinguished Service Professor.
2. Space Institute, Tullahoma.

Chemical Engineering

3410 Flow of Fluids (4) Differential and overall momentum balances, mechanical energy balances; flow in pipes, pumps, and equipment. Prereq: Chemical Engineering 2850, Mathematics 2850. 3 hrs and 1 lab.

3420 Heat Transfer (4) Differential and overall energy balances; steady and unsteady heat conduction in simple geometries; heat transfer in tubes and heat exchangers; convection and boiling; radiation. Prereq: 3410, 3 hrs and 1 lab.

3440 Stagewise Operations (3) Analytical and graphitical methods applied to stage wise separatory operations.

3450 Diffusional Operations (3) Diffusion, simultaneous heat and mass transfer, applications including humidification, gas absorption, extraction. Prereq: 3420. Chemical Engineering 3040.

3610 Introduction to Process Dynamics and Control (3) Introduction to concepts of process dynamics and control. Steady-state analysis of chemical process control systems. Unsteady state analysis of chemical processes. Laplace transform techniques, block diagram algebra and transfer functions. Mathematical models for several processes are developed and analyzed in detail. Prereq: Mathematics 2840.

3620 Chemical Process Control (3) Basic control...
theory applied to chemical processes: feedback control systems, cascade control, decoupling, multiloop control, stability analysis, frequency response. Survey of modern control of typical industrial unit operations. Prereq: 3410.

4110 Chemical Engineering Data Analysis (3) Analysis of experimental data. Statistical estimation of system parameters; experimental uncertainty; regression analysis; correlation of variables; least squares method. Analysis of data of chemical processes. Prereq: 3420 and Mathematics 3150.

4120 Probabilistic Chemical Engineering Systems (3) Experiment designs, simulation of stochastic systems, prediction of a priori knowledge, and analysis of networks in the process industries. Prereq: 4110.

4130 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process systems; sensitivity analysis; dynamic optimization; equality constrained optimization, inequality constrained optimization, and dynamic programming. Prereq: Mathematics 2840.


4200 Process Design and Economic Analysis (3) Development of basic information on a process into an integrated plant design considering mass and energy balances, product specifications, equipment choices, capital investment, operating costs, and economic merit. Prereq: 4410, 4530.

4400 Special Problems in Design and Economics (3) Extension of 4420 for student participation in the American Institute of Chemical Engineering annual contest problem; other advanced design projects. Prereq: 4420.

4450 Hydrocarbon Processing (3) Study of special processes used in the processing of fossil fuel raw materials and products, and of processes for conversion of fossil raw materials into products needed in industrial energy, industrial raw material, and consumer markets. Prereq: 3440.

4470 Sulfur Removal from Coal and Associated Problems (3) Chemical and physical properties of coal, sulfur distribution, beneficiation by both physical and chemical methods; fluidized bed combustion with both natural and synthetic Syn Solts; gas and SO x scrubbing. Prereq: Consent of instructor.

4610 Coal Processing to Liquid Fuels (3) Characterization of various methods; modeling of conversion processes; estimation of maximum yields; waste and oxygen requirements; pyrolysis; catalytic hydrogenation; reactor design considerations; review of current literature, and emphasis on the current literature and patents. Prereq: Consent of instructor.

4710 Advanced Diffusional Operations (3) Fixed bed operations; stagewise and differential mass transfer bed concepts. Prereq: Consent of instructor.


5610 Applied Chemical Reaction Kinetics (3) Chemical reactions in gas and liquid phases, homogeneous catalysis, catalyst effectiveness and role of transport in kinetics. Emphasis on development of phenomenological description; although mechanistic models are discussed. Prereq: 5510.


5710 Thermodynamics of Heterogeneous Equilibrium (3) Phase rule; equilibrium between phases; composition relationship between phases; ideal and nonideal solutions. Prereq: 5510.

5810 Advanced Topics in Chemical Engineering (3) Advanced topics of current interest to chemical engineers. May be repeated. Maximum 9 hrs.

6210 Advanced Diffusional Operations (3) Fixed bed operations; stagewise and differential mass transfer bed concepts. Prereq: Consent of instructor.

6250 Venture Analysis in the Process Industries (3) Interactions among financial, operating, and investment considerations for use in formulation of modern decision theory and mathematical models to achieve optimum product investment decision in face of external uncertainty. Prereq: 5520.

6310 Thermodynamics of Irreversible Processes (3) Thermodynamic treatment of irreversible chemical processes, transport processes, coupling phenomena, with special topics and methods of interest to engineering and bioengineering students. Prereq: 5310.

6400 Chemical Reaction Engineering (3) Chemical reaction engineering principles of interest to engineering and bioengineering students. Prereq: 5310.


6510 Applied Chemical Reaction Kinetics (3) Chemical reactions in gas and liquid phases, heterogeneous catalysis, catalyst effectiveness and role of transport in kinetics. Emphasis on development of phenomenological description; although mechanistic models are discussed. Prereq: 5510.

6620 Process Dynamics (3) Development of models of process equipment from conservation and rate laws; testing of models by frequency, step, and pulse response methods. Prereq: Consent of instructor.

6700 Process Dynamics (3) Development of models of process equipment from conservation and rate laws; testing of models by frequency, step, and pulse response methods. Prereq: Consent of instructor.

6900 Advanced Topics in Chemical Engineering (3) Advanced topics of current interest to chemical engineers. May be repeated. Maximum 9 hrs.

Metallurgical Engineering

3050 Production Metallurgy (3) Thermodynamics and kinetic principles of melting, smelting, refining. Prereq: Chemical and Metallurgical Engineering 3040.

3060 Metallurgical Kinetics (3) Application of principles of chemical reaction kinetics, fluid flow, and heat and mass transfer to pyro-, hydrometallurgical processing. Reaction order and basic rate laws; activated complex theory; principles of adsorption and catalysis. Roasting of sulfides; reduction of oxides; smelting; refining; electrochemical processes. Prereq: Chemical Engineering 3410 and 3420 or equivalent. 3 hrs or 2 hrs and 1 lab.

3130 Engineering Materials I (3) Introductory concepts of the behavior and deformation of solids with mechanical, physical, and chemical properties of engineering significance. 3 hrs or 2 hrs and 1 lab.

3120 Engineering Materials II (3) Extension of 3110 or 3110 with emphasis on control of mechanical properties of materials by specification of composition and microstructure. Prereq: 3130. 3 hrs or 2 hrs and 1 lab.

3130 Engineering Materials III (3) Extension of 3110 or 3110 with emphasis on control of electrical and
magnetic properties of materials by specification of  
strains. Effects of state of stress, loading rate,  
temperature, and metallurgical structure. Prereq:  
3210 or 3230, or 4730 or Mechanical En-  
gineering 3650 or consent of instructor. Also  
suggested for mechanical engineering,  
mechanical engineers, and engineering science  
students. 3 hrs or 2 hrs and 1 lab.

4740 Mechanical Metallurgy II (3) Ductile and brittle  
fracture, creep and stress rupture, fatigue, and  
residual stresses. Effects of state of stress,  
loading rate, temperature, and metallurgical  
structure. Pre req: 3210 or 3230, or 4730 or  
Mechanical Engineering 3650 or consent of  
instructor. Also suggested for mechanical  
engineering, mechanical engineers, and  
engineering science students. 3 hrs or 2 hrs  
and 1 lab.

4760 Casting and Welding (3) Principles and  
processes of casting and welding; heat transfer,  
solidification, and solid state transformations;  
thermal treatments, associated stresses.  
Prereq: 3210 or 3230, 3 hrs, or 2 hrs and 1  
lab.

4770 Mechanical Metallurgy III (3) Finite plastic  
strain. Plastic stress-strain relations. Principles  
of fabrication: forging, swaging, extrusion,  
rolling, deep drawing. Pre req: 4730 or consent  
of instructor. Suggested for mechanical  
engineering, mechanical engineers, and  
engineering science majors. 3 hrs or 2 hrs  
and 1 lab.

5000 Thesis (1-15) E  
5010 Graduate Seminar (1) Pre req: Admission to  
graduate program. May be repeated. E  
5050 Engineering Analysis (3) (Same as Chemical  
Engineering 4050.)  
5110 Point Defects and Dislocations (3) Theoretical  
and experimental analysis of point, line, and  
planar imperfections in solids. Pre req: 4730 or  
consent of instructor.

5120 Plastic Deformation I (3) Geometry and  
mechanics of plastic deformation of single  
crystals; slip and twinning; work hardening;  
effects of temperature and alloying on  

5130 Plastic Deformation II (3) Plastic deformation  
of polycrystalline materials; theoretical and  
experimental analysis of texture formation  
resulting from deformation and annealing.  
Pre req: 5120.

5140 Diffusion and Annealing in Solids (3) Analysis  
of models and experimental observations  
relating to phenomenological and mechanistic  
description of diffusion and annealing of  
point defects and cold work.

5150 Phase Transformations I (3) Analysis of  
models and experimental observations relating  
to phase transformations by nucleation and  
coalescence; precipitation, spinodal  
decomposition. Pre req: 5140.

5170-80 Plastic Deformation III (3, 3) Fundamental  
analysis of plastic deformation. Fatigue,  
fracture, precipitate, and phase transformations  
in solids. Pre req: 5130.

5210-20 Welding Metallurgy (3, 3) Welding  
processes and physical metallurgy of welding,  
including power supplies, heat flow, residual  
stresses, solidification, and solid state  
reactions, for both simple and complex solids.  
Current theories of cold cracking, hot  
cracking and porosity formation are  
developed. Pre req: Physical metallurgy.

5310 Solidification and Crystal Growth I (3) Solute  
redistribution, thermodynamic considerations,  
kinetics, convection and fluid flow effects on  
solidification. Pre req: Mathematics 4550.

5410-20 Advanced X-Ray Diffraction (3, 3) Review  
of mathematical techniques; generalized  
diffraction theory, analysis of scattered intensity  
in reciprocal space; relationship of scattered  
intensity to thermal motion, order-disorder,  
particle size and lattice defects. Pre req:  
Crystallography, space group theory, and  
crystal structure problems; some laboratory  
work. Pre req: Mathematics 4610.

5510-20 Applied Properties of Solids (3, 3) Proper- 
erties of solids as related to mechanical  
behavior; fatigue, fracture, creep, and  
solidification. Pre req: Mathematics 4610.

5540-50 Electron Microscopy I and II (3, 3) Kinemat- 
ical and physical problems of electron  
microscopy are discussed. Special attention  
is given to methods related to materials testing  
such as plastic deformation, fracture, precipitation,  

5610-20 Radiation Effects on Materials (3, 3) Inter- 
actions of radiation with solids to produce  
changes in physical and mechanical  
properties, theory and experiment. Effect of  
radiation on solid state reactions. Phenomena  
associated with use of radiation in manufacturing  
processes. Pre req: Mathematics 4540, Physics 3730  
or consent of instructor.

5756 Corrosion (3) Analysis of corrosion processes  
in terms of polarization measurements and the  
Pourbaix diagram. Influence of stress,  
temperature, and localized conditions contributing  
to pitting, crevice, and stress corrosion.

5810-20 Special Topics in Metallurgy (3, 3, 3)  
Lectures and recitation on more recent advances  
in metallurgy and related fields.

5840 Metallurgy of Deformation and Fracture (3, 3)  
Theoretical and practical considerations of  
rate processes in solids; the role of  
plastic deformation, fracture, precipitation,  
and grain growth, and phase transformations.

5860-30 Solidification and Crystal Growth II and III  
Fluid flow, magnetohydrodynamic effects in  
compressible liquid conductors, morphology,  
stability of steady state coupled heat and mass  
transfer processes in liquid to solid transition,  
multiphase solidification, composition,  
nonsteady state dendritic phenomena, some  
nuclear phenomena. Pre req: 5310.

5890-20 Radiation Thermodynamics (3, 3) Classical  
and statistical thermodynamic analysis of  
stability of solid solutions, growth,  
metallurgical reactions, and phase transitions.  
Pre req: 5810-20 or consent of instructor.

5910 Mechanical and Physical Properties of Crys- 
tals I (3) Anisotropic behavior of crystalline  
materials: interatomic interaction; lattice  
forces; elasticity; and applications of  
property classification according to  
temperature behavior. Pre req: Core  
curriculum in Metallurgical Engineering and  
Mathematics 4650 or 4710 or consent of  
instructor.

5920 Mechanical and Physical Properties of Crys- 
tals II (3) Continuation of Metallurgical  
Engineering 5910, with emphasis on transport  
phenomena and irreversible thermodynamics.  
Pre req: 6810 or consent of instructor.

5970 Seminar in Anisotropic Properties of Crys- 
tals (3) Selected topics of current interest  
in the area of anisotropic behavior of  
crystalline materials. Pre req: 5810 or  
6820, or consent of instructor. May be  
repeated.

Polymer Engineering

4910 Applied Polymer Science (3) First course in  
the physical properties of polymers. Polymer  
structure, crystallinity, melting and solidification  
transitions, physical properties of amorphous  
crystalline polymers, commercial polymers  
are covered. Special attention is given to  
properties of single and polycrystalline materials,  
kinetics and thermodynamics of solid reactions,  
diffusion.

5290 Polymer Processing (3) Rheological proper- 
ties of polymer melts, solutions, viscoelasticity  
and operations of fiber, plastics and rubber  
industries: dimensional analysis and scale-up,  
flow through
dies and pipelines, screw extrusion, spinning of fib-ers, injection molding. Not for credit for Polymer Engineering majors.

4890 Principles of Fiber and Textile Engineering (3) Chemical and crystalline structure of important fib-ers; melt, wet and dry spinning of manmade fibers; drawing and texturing; preparation of yarns, twist- ing, weaving and knitting. Emphasis on qualitative aspects.

4940 Plastics Fabrication Operations (3) Lecture and laboratory course covering the design and operation of the plastic fabrication process using techniques including injection, coextrusion, injection molding including structural foam, thermoforming, blow molding, ro- tational molding.

5000 Thesis (1-19) E

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) (Same as Chemical Engineering 5050)

5110 Structural Characterization of Polymers (3) Experimental methods of determining nature of transitions and structural characteristics of poly-mers most pertinent to plastics, fibers, and rubber applications. Methods of determination of tacticity, crystallinity, orientation, morphology, including x-ray diffraction, nuclear magnetic resonance, and electron microscopy. Coreq: 4910 or equivalent.


5310 Polymer Solution Properties and Characterization (3) Molecular weight determination, chromatography, solution thermodynamics, phase separation, application to synthetic and naturally occurring polymers. Coreq: Undergraduate physical chemistry.

5410 Rheology and Polymer Processing (3) Methods of determining the rheological properties of polymer melts, emulsions, suspensions, gels, and in solution. Simple non-linear constitutive relationships, viscous heat generation; application to processing techniques, including extension, injection molding, film production.

5510 Modern Research Tools and Instruments for Polymer Science (3) Laboratory course in methods of characterization of polymers; gel permeation chromatography, intrinsic viscosity, spectral analysis, measurement of melt flow properties, calorimetry, and mechanical mechanical measure-ments Coreq: 5310.

5710 Phase Transformations in Polymer Systems (3) Analysis of nucleation and growth of phases in polymer systems, spinodal decomposition, application to crystallization from the melt, precipitation from solution.

5810 Physical Properties of Polymer Structures (3) Molecular weight and composition distributions in copolymers plus structures of two phase block polymers and polymer mixtures as related to glassy and crystalline transitions, phase incompatibility, thermal-mechanical, and optical properties.

5910-20-30 Selected Topics in Polymer Science (3, 3, 3) Advanced problems in modern polymer re-search. May include topics of morphology, structure, processing particularly extrusion, injection mold-ing, casting, and solid polymer behavior. Prereq: 4910, 4920 or equivalent.

6000 Doctoral Research and Dissertation (3-15) E

6110 Optical Properties of Polymers (3) Maxwell's equations and electrodynamic theory of light, optical properties of isotropic and anisotropic dielec-trics, birefringence, and applications to spherical structures and fibers studies of Stein, light scattering from polymer films.

6150 Advanced X-Ray Diffraction Methods for Characterization of Polymers (3) Classical methods of crystal structure determination; Patterson and Fourier functions; helical nets and Bessel function techniques; autocorrelation functions, defects, order-disorder transitions and para-crystallinity. Precision and Weisenberg photogra- phy, single crystal and powder diffraction with applications to synthetic and biological macromolecules.

6210 Nonlinear Viscoelasticity (3) Tensor formulation of constitutive equations of viscoelastic ma-terials subjected to large deformations. Integral, dif-ferential, and acceleration tension formulations. Applications to polymer flow problems. Prereq: 5210 or equivalent. (Same as Engineering Science and Mechanics 6500)

6220 Advanced Methods of Polymer Processing (3) Application of theories of rheological properties and structures formation to analysis of polymer process operations. Prereq: 5210.

6230 Advanced Mechanical Behavior of Polymers (3) Stress analysis with emphasis on determining constitutive equations for yielding behavior of solid polymers, failure analysis and general deformation behavior of engineering materials. May include topics of morphology, structure, characterization. Prereq: Consent of instructor.

6910-20-30 Recent Advances in Polymer Science and Engineering (3, 3, 3) Treatment of latest de-velopments in science and technology of polymers, may include topics of morphology, structure, characteriza-tion. Prereq: Consent of instructor.

Civil Engineering

MAJORS

Civil Engineering  M.E., M.S., Ph.D

Environmental Engineering  M.E., M.S.

Emeritus Professors:

F. C. Larson, M.S. Virginia Polytechnic Institute, P.E.; E. G. Shelton, MCE Brooklyn Polytechnic, P.E.

Professors:


Associate Professors:


Assistant Professors:


Lecturers:

J. M. Corum, Ph.D. Illinois; C. Franks, B.S. Tennessee; B. J. Frederick, BCE Clarkson

College of Technology; D. L. Garrett, B.S. Purdue; G. J. Hyfantis, Ph.D. Northwestern; R. L. Colley, Ph.D. Tennessee; L. Miller, Ph.D. Tennessee.

The Department of Civil Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with a major in Civil Engineering, concentrating in environmental engineering, structural engineering, soils engineering and materials, and transportation engineering; and to the Master of Science and Master of Engineering in Environmental Engineering with concentrations in water quality, water resources, and air quality.

MASTER OF SCIENCE PROGRAM

The Master of Science programs in Civil Engineering and in Environmental Engineering are offered to graduates of recognized undergraduate curricula.

Departmental requirements provide that for a major in Civil Engineering, the Bachelor's degree must be in civil engineering, or certain prerequisite undergraduate courses may be taken before admission to candidacy for the Master of Science in Civil Engineering.

CIVIL ENGINEERING

The Department of Civil Engineering offers two options for the Master of Science degree in Civil Engineering.

Option I: A minimum of 45 quarter hours, including at least 9 hours of thesis, is required.

Option II: A minimum of 48 quarter hours, including a 3-quarter-hour special problems course, is required. The special problem will culminate in a written report which must be approved by the student's major professor.

ENVIRONMENTAL ENGINEERING

For a major in Environmental Engineering the Bachelor's degree may be in fields other than civil engineering, in some cases prerequisite undergraduate courses may be indicated, and in general these must be completed before courses for graduate credit can be taken.

The Department of Civil Engineering offers both thesis and non-thesis options for work toward the Master of Science degree in Environmental Engineering.

Option I: The student must present a minimum of 45 quarter hours of approved graduate courses. The major shall include a minimum of 8 quarter hours of thesis and 18 quarter hours credit of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option II: The student must present a minimum of 48 quarter hours of approved graduate courses. The major shall include a minimum of 27 quarter hours of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option I or II must be approved by the department.

Normally, the graduate program of study will be adjusted by the head of the department and the student's committee to suit the individual academic requirements.

MASTER OF ENGINEERING PROGRAM

Graduate programs in Civil Engineering and in Environmental Engineering leading to the degree of Master of Engineering are available to qualified graduates of ECPD-accredited undergraduate curricula in
civil engineering or environmental engineering. At least one-third of the program of study must be classified as engineering design. The student's advisor will assist in planning the program of study to ensure that it includes the necessary design content. The thesis and non-thesis options noted under the Master of Science programs are available under these programs.

THE DOCTORAL PROGRAM

A graduate program leading to the degree of Doctor of Philosophy is offered in Civil Engineering.

Specific departmental requirements for the Ph.D. degree include the following:

1. A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 36 quarter hours credit in Doctoral Research and Dissertation will be required.

2. A minimum of 36 quarter hours of graduate courses in the Civil Engineering Department, exclusive of thesis or dissertation credit, at least 9 hours of which must be at the 7000-level.

3. Supporting courses in related scientific and engineering fields, amounting to approximately 36 quarter hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 12 quarter hours of mathematics will be required beyond the civil engineering undergraduate requirements.

4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

5. Upon completion of at least one-half of all course work, each student must pass a preliminary examination.

6. After completion of the dissertation, prior to graduation, each student must pass a final examination administered by a faculty committee.

Civil Engineering

4120 Concrete Design (3) Reinforced concrete continuous beams and floor slabs; footings, and retaining walls. Prereq: 4110 and 4410.

4220 Foundations and Substructures (3) Foundations explorations; principles of design of dry and submerged foundations. Prereq: 3310. Su.

4230 Legal and Ethical Aspects of Engineering (3) Legal principles underlying engineering work; laws of contracts, torts, agency, real property; problems of professional registration and ethics. F.

4240 Structural Design (3) Plastic theory, eccentric connections, industrial building design, timber design. Prereq: 3230 and 4410. 2.3-4 hr periods. F, Sp.

4250 Photogrammetry (3) Methods of plotting maps from aerial photographs; plotting of photogrammetric instruments; applications. Prereq: 2960 or Forestry Summer Camp for forestry majors. F.

4260 Analysis of Framed Structures (3) Maximum stresses due to moving loads; uses of influence lines; lateral forces due to earthquake and wind; analysis of portals, building frames and space frames. Coreq: 4410. W.

4300 Construction Methods and Equipment (3) Fundamental operations in construction and selection of equipment: production rates, balancing of equipment, and cost estimates. F, W.

4510-20 Advanced Structural Design (3, 3) Plastic design in steel in 4510; design of typical short span highway bridges in 4520. Prereq: 3230 for 4510; and 4320 and 4110 in 4520. W, Sp.

4530 Cost Comparison in Design and Construction (3) Cost comparison in design and construction. Cost comparison of alternate designs with emphasis on applications to civil engineering problems. Prereq or coreq: 3230. F.

4540 Computer Utilization (3) Computer use, economic justification, and extent of use by industry. Utilization of computers for solution of civil engineering problems. Prereq: 3310 or consent of instructor. F, W.

4550 Engineering Behavior of Soils (3) Plastic and elastic behavior of soils, determination and use of engineering properties of in-situ soils. Prereq: 4220 or consent of instructor. 2 hrs and 1 lab. W.

4960 Stabilization of Soils (3) Mechanical stabilization of soils by compaction, drainage, and blending; chemical stabilization of soils with admixtures; water proofing and modifying soils with additives. Prereq: 3310. 2 hrs and 1 lab. W.

4620 Airport Planning and Design (3) Emphasis on airport master planning. Included for consideration on the air side are runway configuration, capacity, geometrics and lighting; on the land side are included terminal layout and design and ground access systems and parking. Prereq: 3600 and 3610. Sp.

4640 Traffic Engineering (3) Characteristics of driver, vehicle and roadway and their interrelationship; traffic studies; basic considerations of traffic circulation, design of elements of urban transportation planning studies. F.

4660 Airport Planning and Design II (3) Integration and application of principles of airport master planning for purposes of identification of design and development of an airport facility through a comprehensive team project, includes environmental evaluation of design. Prereq: 4620. 1 hr and 2 labs. Su.

4710 Portland Cement Concrete Mix Design (3) Properties and tests of portland cement concrete, methods of concrete mix design, nondestructive concrete evaluation testing, use of concrete admixtures. Prereq: 3710. 2 hrs and 1 lab. F.

4720 Asphalt and Bituminous Concrete (3) Properties and tests of asphalts and asphaltic mixes, mix design of bituminous concrete. Emphasis on use of asphalt in transportation construction projects. Prereq: 3710. 2 hrs and 1 lab. W.

4731-32 Earthquake Resistant Structures I, II (4, 4) (Same as Architecture 4711-32.) Su.

4800 Introduction to Civil Engineering Systems (3) Models of civil engineering systems and their specific application to problems of transportation, environment, water resources and materials. Prereq: Senior standing or consent of instructor. Su, Sp.

4850 Elementary Structural Matrix Methods (4) (Same as Civil Engineering and Mechanics 4850 and Architecture 4850.) Su.

5000 Thesis (1-15) E.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E.

5110-20 Statically Indeterminate Structures (3, 3) Deflections of beams and trusses; analysis by force methods and by slope-deflection in 5110; analysis by moment distribution and other displacement methods, second moments of area in 5120. F.

5140 Statically Indeterminate Structures (3) Analysis of complex planar and space frames. Prereq: 5110 and 5120. Sp.

5150 Matrix Formulation of Structural Problems (3) Review of matrix algebra, vectors, stability considerations; stiffness and flexibility analysis of plane trusses, general members and structures composed of general members. Prereq: 4540 or consent of instructor. F.

5160 Analysis and Design of Plate Structures (3) Bending and buckling of plates; analysis and design of bridge and building floors and structural plate components. Prereq: 5110. F.

5170 Introduction to Structural Dynamics (3) Analysis of response of structural systems to external loads and response of structures having many degrees of freedom; elastoplastic behavior considered for structural systems; approximate design methods developed. Prereq: 5120, 5150. Sp.

5180 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; planar and spatial elements, axisymmetric, and three-dimensional elements; use of typical computer programs, Prereq: 5150, and Engineering Science and Mechanics 5860. (Same as Engineering Science and Mechanics 5860.) A.

5220 Pavement Design (3) Pavement design; design practices; construction and maintenance. Prereq: 3310. Sp.

5240 Advanced Properties of Materials: Cement and Concrete (3) Permeability and durability, volume changes and creep; elastic and thermal properties of concrete, special types of concrete; causes of failure. Prereq: 4710. W.


5270 Planning and Transportation (3) Preparation of transportation and elements of comprehensive development plan; planning aspects of airport facilities; between various transportation modes and other community features. (Same as Planning 5270.) W.

5310 Engineering Practice (3) Valuation and feasibility studies; depreciation and useful life; engineering economics. F.

5320-30 Engineering Practice Applied to Administration of Engineering Projects (3, 3) Engineering administration; planning of governmental and industrial projects; cost estimates and methods of financing. W; Sp.


5430-40-50 Construction Management I, II, III (3, 3, 3) Management and organization of heavy and building construction projects. Prereq: 4430 or consent of instructor. F, W.

5460-70 Construction Estimating I, II (3, 3) Project costs, estimating techniques; market cost conditions and feasibility of design as it applies to costs. Prereq: 4430 or consent of instructor. W; Sp.

5550 Soil Mechanics—Plastic Equilibrium (3) Failure theories; earth pressure analysis, bearing capacity analysis, and slope stability analysis. Prereq: 3310 or consent of instructor. W.

5560 Soil Mechanics—Elastic Behavior (3) Stress deformation characteristics, consolidation, settlement analysis. Prereq: 3310 or consent of instructor. W.

5570 Soil Mechanics—Seepage (3) Saturated flow through embankments, filter design criteria, seepage forces and velocities, subdrains, and embankment failures. Prereq: 3310 or consent of instructor. W.

5610 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; relation between research results and current specialization for design. Prereq: 3230. W.

5730 Prestressed Concrete (3) Properties of pre-stressing materials and anchorage systems; methods of pre-stressing and post-tensioning; analysis and design of members and continuous structures. F.

5740 Behavior of Reinforced Concrete Members (3) Ultimate strength and behavior of reinforced concrete members; relation between research results and current specifications for design. Prereq: 4430. F.

5800 Urban Systems: Engineering and Management I (3) Management of various urban systems usually under city manager and/or city engineer. Organization, finance, personnel administration,
government policy decisions, as they affect air and highway investments. Prereq: 5860. W, A

6870 Future Transit Technology and Research (3) New transit systems and new technology; identification of possible technologies and technology planning and process and possible research designs. Prereq: 5670. Sp, A

6880 Planning Models for Transportation System I (3) Analytical models of urban transportation planning processes; mathematical, statistical, and computer science techniques. Modal split, trip distribution, and trip assignment. Mathematical, statistical, and computer science techniques in modeling process. Models integrated for urban transportation planning process. Prereq: 6880. Sp, A

6910-20-30 Special Topics in Civil Engineering (3, 3, 3) Selected advanced problems of current interest in civil engineering. Prereq: Consent of instructor. 

Environmental Engineering

3000 Introduction to Environmental Engineering (3) Introduction to human interaction with the air, water, and land environment in which one lives; role of engineering in environmental control. F, W


4150 Urban Water Management (3) Introduction to urban water modeling; evaluation of optimum urban water policies; formulation of system constraints and analysis of decision-making process; management of storm water for beneficial use. Prereq: 3000 and 3330. Sp

4210 Water Resources Engineering Design (3) Elements of water resource structures and systems, including reservoirs, dams, control works, and open channel design. Dam safety control, environmental impact of reservoir projects. Prereq: 3350 or consent of instructor. F

4220 Water Resources Engineering Development (3) Multibjective evaluation procedures for comparing and selecting among water resources development alternatives; achieving project optimality, single- and multi-purpose projects, special topics in water resources engineering. Prereq: 3350 or consent of instructor. W

4330 Hydrologic Design (3) Application of frequency and regression analysis to hydrologic design of water resources systems. Surface runoff and streamflow modeling; urban peak runoff design using kinematic wave theory; evaluation of effects of land use changes on streamflow, quantity and quality. Prereq: 3350. W

4510 Elements of Water and Wastewater Transportation Systems (3) Introduction to theory and design of water transportation and distribution systems and wastewater collection systems. Prereq: 3120 and 3330. F, W

4520 Elements of Water and Wastewater Treatment Systems Designs (3) Introduction to unit operations and processes employed in physical, chemical, and biological treatment of water and wastewater: Application of unit operations and processes in design of water and wastewater treatment plants. Prereq: 3000 and 3120. Sp, Su

4530 Sanitary Engineering Laboratory (3) Physical, chemical, and bacteriological analysis of water and wastewater. Prereq: 4300. 3 labs. W

4600 Solid Waste Management (3) Quantities and characteristics of solid wastes; collection methods and equipment; use of advanced incineration techniques; economics; planning and management. Prereq: 3000. Sp

4700 Air Pollution-Air Resources Management (3) Introductory course on concepts of air pollution, analysis of relationship among emission sources, meteorology and topographic factors, and adverse effects on receptors; engineering approaches for air pollution control. Sp

4810 Water Law (3) Survey study in water law, including case studies and water law doctrines. (Same at Water Resources Development 4810.)

4820 Environmental Engineering Law (3) Legal aspects of water and air pollution, drainage, land use controls and environmental impact statements with emphasis upon federal-state relations, recent legislation and court decisions, and enforcement. Prereq: Senior standing. F

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or requires a major's fee to be added to the degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

5150 Water and Urban Welfare (3) Social, environmental, and economic impact on planning and management of urban water systems. Emphasis upon conflict and choice, application of social and environmental values, and the state's need; user preferences; modal split models; and enforcement. Prereq: Consent of instructor. 

5160 Planning and Utilities (3) Planning for administration of water, wastewater, solid waste, air pollution, and recycling programs in the urban environment. Impact of utility patterns on area development, and problems of utility service policies for urban areas. Nature of public policy decisions, as they affect air and water pollution control. Sp

5230 Surface Water Transport Processes (3) Dynamics of flows in streams, lakes and estuaries. Hydromonic dispersion, diffusion, boundary layer effects, unsteadiness, kinematic wave approximation, geometric and hydraulic nonuniformities. Prereq: Engineering Science and Mechanics 3110 or consent of instructor. F

5232 Sediment Transport (3) Sediment properties and measurements, bed loads and suspended load, movement, erosion patterns, and deposition of sediments by flowing water; siting of reservoirs and related topics. Prereq: 5230. W

5234 Flood Damage Reduction (3) National, regional, local flood problems; hydrologic design criteria; traditional flood control measures; land use controls and adjustments; floodproofing, flood insurance, and other flood damage reduction elements; interdisciplinary approach in floodplain management; case studies. Prereq: Consent of instructor. 

5261 Basic Principles of Remote Sensing (3) Applications of remote sensing in agriculture, engineering, forestry, meteorology, land use planning, and resource management. Use of remote sensing techniques and equipment; interdisciplinary approach in floodplain management; case studies. Prereq: Consent of instructor. 

5262 Remote Sensing Data Acquisition (3) Active and passive sensors, their areas of special application and limitations; description of remote sensing platforms, including the Earth Resources Satellite Communication Systems; mission planning. Prereq: 5261 or consent of instructor. 


5301 Stormwater Modeling I (3) Interpretation of hydrologic data using methods of systems analysis. Hydrologic components are analyzed as linear and nonlinear systems and techniques using time series analysis and computer models of watershed response. Optimizing model parameters with illustrative examples. Prereq: Consent of instructor. 

5302 Stormwater Modeling II (3) Continuous
streamflow records interpreted using methods of stochastic hydrology, frequency and time series analysis. Hydrologic design of water resources systems using streamflow simulation techniques, including autoregressive and fractional gaussian noise models. Prereq: Consent of instructor. Sp.

5310 Groundwater Transport Processes (3) Dynamics of ground water with emphasis on physical processes important in subsurface hydrology. Hydrodynamic dispersion, anisotropic, layered soil, and unsaturated flow phenomena. Analytical solutions of flow equations, Dupuit approximation, analog and numerical methods, Hele-Shaw, and gravity-driven solutions. Engineering Science and Mechanics 3110 or consent of instructor.

5330 Descriptive Hydrology (3) Occurrence and description of elements of hydrologic cycle, effects on earth and related to natural systems. Not for civil engineering majors. (Same as Water Resources Development 5330.)

5400 Introduction to Environmental Systems (3) Models of air and water quality, water resources, solid waste disposal, and location of central facilities; exposure to current literature on environmental management problems; optimization of these systems. Prereq: Graduate standing, Civil Engineering 4800 or consent of instructor. Sp.

5501 Water and Wastewater Treatment Theory I (3) Theory and unit operations employed in sanitary engineering. Prereq: 4520. F.

5502 Water and Wastewater Treatment Theory II (3) Theory of physical, chemical, and biological processes employed in sanitary engineering. Prereq: 5501. W.


5530 Environmental Engineering and Natural System Behavior (3) Interrelationships between environmental engineering and natural systems, focusing on eutrophication and limiting nutrient concentration, sediment research and translation into lake and wastewater engineering practice. Seminar-open discussion format. Prereq: Graduate standing or consent of instructor. W.

5551 Water Quality Management (3) Water quality control objectives, methods, and philosophies; water quality criteria; effect of various uses on water quality; receiving water characteristics and waste assimilation capacity; regulatory standards, economic considerations. Prereq: 3000 or consent of instructor. W.

5561 Environmental Management of Water Quality (3) Structural and procedural approaches to water quality management as a dimension of water; effects of agriculture, domestic, and industrial use upon water quality; legal and administrative natural system behavior; focusing on eutrophication and limiting nutrient concentration, sediment research and translation into lake and wastewater engineering practice. Prereq: 3000 or equivalent. Sp.

5582 Microbiology for Sanitary Engineers (3) Microorganisms and microbiological processes significant in sanitary engineering, including basic microbiology, detection and identification, enzymes, metabolic reactions, energy transfer, synthesis and growth; aerobic and anaerobic biological treatment processes. Prereq: Graduate standing. Sp.


5600 Solid Wastes (3) Magnitude and characteristics of solid waste problem, methods for collection and disposal of solid wastes, including sanitary landfill, composting, anaerobic processes, and recycling technologies, and recycling. Prereq: Graduate engineering major or consent of instructor. F.

5610 Solid Waste Disposal (3) Problems in the areas of landfill design and costing, incinerator design and costing, and special topical areas. Prereq: 5600 W.


5700 Planning and Air Pollution Control (3) Relationship between air pollution, area development, and urban growth. Social, economic, and political processes involved in air pollution control. Prereq: 5710. Sp.

5710 Air Pollution Control Engineering (3) Emission control systems for industrial and power generating processes, stack sampling methods, air monitoring, dispersion of pollutants. Prereq: 4700 and Engineering Science and Mechanics 3110. F.

5720 Air Pollution Particle Collection Theory (3) Mechanics of particles suspended in gas and fine particulate matter, coagulation, and aerodynamic capture of particles. Prereq: 4700 and Engineering Science and Mechanics 3110. W.


5730 Air Pollution Control Device Design (3) Design and evaluation of systems used to control emission of gaseous and particulate pollutants. Comprehensive descriptive design of specific devices and systems. Prereq: 5720. Sp.

5735 Industrial Source Sampling (3) Sampling methods for air pollution monitoring, emissions from industrial processes. Prereq: Graduate standing, 2 hrs and 1 lab. Su.


5750 Turbulence in the Atmosphere (3) Theoretical and observational analysis of turbulent boundary layer, mean flow, and turbulence characteristics. Prereq: 5740. Su.

5760 Diffusion in the Atmosphere (3) Movement and dilution of natural or man-made material released into the atmosphere, including basic theory of buoyant plumes, diffusion in a zonal wind shear and diffusion from urban area sources. Prereq: 5740. W.

5900 Special Problems in Environmental Engineering (1-9) To fulfill the special problem requirement in the non-thesis program. Enrollment limited to environmental engineering students in the non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N only. E.

5910-20-30 Special Topics (3, 3, 3) Problems and topics related to current developments in field of environmental engineering not included in other courses. E.

5990 Environmental Engineering Seminar (1) All graduate students in environmental engineering and related fields. All. Prereq: Consent of instructor. E.

5999 Environmental Engineering Seminar (1) All phases of environmental engineering including reports on current research at The University of Tennessee, Knoxville. Course credit not applicable to graduate degree program. Prereq: Active graduate standing in environmental engineering. May be repeated. S/N only. F, W, Sp.

6110-20 Advanced Topics in Fluid Mechanics and Convective Transport (3, 3) (Same as Engineering Science and Mechanics 6110-30). E.

5. Satisfactory performance on both a basic and an advanced preliminary examination must be shown. The basic examination consists of a 3-hour written examination in each of the following five areas: (1) networks, (2) electronics, (3) electro-magnetics, (4) power, (5) systems and computers. The advanced examination must be passed and a formal dissertation proposal accepted by the student's doctoral committee before the student is reported as ready for admission to candidacy for the Ph.D. degree. The basic examination is normally taken after the completion of 36 hours of graduate course work. A comprehensive examination covering the basic part of the preliminary examination is given at the conclusion of the student's research efforts.

3. An additional 18 quarter hours of 5000-level work in electrical engineering or 9 quarter hours of 5000-level work in one area of electrical engineering and 9 quarter hours of 5000-level work in another area approved by the student's Master's committee.

4. Master's thesis, totaling 9 quarter hours or more.

5. A final oral examination covering the thesis and related course work.

MASTER OF ENGINEERING PROGRAM

A graduate program leading to the Master of Engineering degree is available to qualified graduates of ECPD-accredited undergraduate curricula in electrical engineering or its equivalent.

Specific degree requirements which must be fulfilled include:

1. Electrical Engineering 5070-80 and 5710.

2. Nine quarter hours of graduate credit in mathematics consisting of Mathematics 4710, 4850, and 4250, or 4510-20-30. Other approved 4000-5000 level mathematics courses must be submitted for any of the above course material covered in undergraduate work.

3. An additional 18 quarter hours of 5000-level work in electrical engineering or 9 quarter hours of 5000-level work in one area of electrical engineering and 9 quarter hours of 5000-level work in another area approved by the student's Master's committee.

The 18 quarter hours of 5000-level work in electrical engineering must be divided equally between two different electrical engineering areas.

4. Master's thesis, totaling 9 quarter hours or more.

5. A final oral examination covering the thesis and related course work.

A minimum of one-third of the program must be in the research area, and one-third in one of, or a combination of, advanced math, computer sciences, basic sciences, or engineering sciences.

DOCTORAL PROGRAM

The Ph.D. degree with a major in Electrical Engineering may be pursued in the areas of circuit theory, computer, electrics, optics, communication theory, electromagnetic theory, plasma engineering, power systems, solid-state electronics, and control systems.

Overall departmental requirements for the Ph.D. degree include the following:

1. A Master of Science or Master of Engineering degree.

2. A minimum of 72 quarter hours of course work beyond the B.S. degree excluding thesis, research, and dissertation credit.

3. A minimum of 36 quarter hours credit in doctoral dissertation.

4. One foreign language if the student's faculty committee so recommends. Knowledge of a foreign language is crucial to the student's research efforts.

5. Satisfactory performance on both a basic and an advanced preliminary examination must be shown. The basic examination consists of a 3-hour written examination in each of the following five areas: (1) networks, (2) electronics, (3) electro-magnetics, (4) power, (5) systems and computers. The advanced examination must be passed and a formal dissertation proposal accepted by the student's doctoral committee before the student is reported as ready for admission to candidacy for the Ph.D. degree. The basic examination is normally taken after the completion of 36 hours of graduate course work. A comprehensive examination covering the basic part of the preliminary examination is given at the conclusion of the student's research efforts.

3090 Energy System Operation (3) Synchronous machines, transmission-lines, and transformers as power system elements; power system representations, per unit calculation, symmetrical components, and fault studies. Prereq: 3060 includes biweekly lab.


3110 Basic Electrical Engineering—Circuits and Fields (3) For non-electrical engineering majors. Prereq: Mathematics 2850, Physics 2310-30. 3 hrs including biweekly lab.

3120 Basic Electrical Engineering—Electronics (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3130 Basic Electrical Engineering—Machinery (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3180 Logic Design of Digital Systems (3) Introduction to boolean algebra and design of combinational circuits. Present gates and flip-flop characteristics. Design-Check circuits and other systems containing memory. Introduction to minicomputer architecture and system components to include arithmetic, storage, input-output, and control systems. Instruction set capabilities and machine language programming. Prereq: 3110. 3 hrs including biweekly lab.

3190 Plasma I (3) Electrical Engineering applications of physical electronics, plasma effects and devices. Topics include plasma production, plasma light sources, laser operation and applications (electronics), and MHD, controlled thermonuclear and other techniques of controlled nuclear and controlled power production. Prereq: Physics 2310-20-30. 3 hrs including biweekly lab.

3720 Linear Systems Analysis (3) Steady-state and transient response; log-frequency, gain-phase, and polar plots; block diagram transformation; signal flow graphs; analogous systems, properties of second order systems; introduction to feedback theory; stability criteria. Coreqs: 3010 and Mathematics 3150. Coreq: 3180. 3 hrs including occasional labs.

3810 Basic Electronics I (3) Basic electronics, principles and devices. Coreqs: 3010 and Mathematics 2860. Coreq: 3110. 3 hrs including biweekly lab.

3820 Basic Electronics II (3) Physical operation of bipolar transistors and vacuum tubes with applications in basic amplifiers. Integrated circuit fundamentals. Prereq: 3110. 3 hrs including project laboratory.

3830 Basic Electronics III (3) Frequency and transient response of open-loop transistor amplifiers. Fundamentals of integrator and circuit operational amplifiers and applications in basic feedback configurations. Basic digital switching circuits. Prereq: 3110. 3 hrs including project laboratory.

4020 Direct Electrical Energy Conversion (3) Basic principles, typical devices and applications for production of electrical energy by thermoelectric effects, thermionic conversion, magnetohydrodynamics, solar cells, and fuel cells. Laboratory demonstrations. Prereq: 3060 and 3610.

4080 Microwave Circuits and Electronics (3) Microwave circuits and systems, including waveguides, transmission lines, wave transformers, filters, impedance matching, and coupling networks. Design of microwave vacuum diodes and Gunn devices, traveling wave tubes, parametric amplifiers, power generators, semiconductor varactors, and microwave devices. Prereq: 3060. 3 hrs including biweekly lab.

4100 Digital Communication Systems (3) Principles of digital computer communication systems. Sampling theorems, pulse amplitude, duration, and posi-


4410 Power System Components and Control (3) Analysis of power system components and their interconnection. Studies in control of power and frequency as well as voltage and reactive power. Prereq: 3090.

4420 Power Systems Analysis (3) System studies including load flow, faults, and stability. Prereq: 3090.

4430 Transmission, Distribution, and Protection (3) Studies in underground and d.c. transmission; consideration of over-voltages and insulation requirements; system protection against faults. Prereq: 3090.

4460 Lasers and Masers (3) Introduction of principles and properties of laser devices based on classical concepts and electrical engineering analogies. Consideration of practical devices and applications.


4480 Plasma III (3) Macroscopic plasma equations, particle orbits, interactions, oscillations and waves. Prereq: 3190.


4500 Electro-optics Detection and Instrumentation (3) Sensitivity, resolution (frequency response) and noise concepts and practical engineering data for both spatial recording media (e.g. photographic emulsions) and temporal detectors (e.g. photodiodes) will be given. The last third of the course will be devoted to selected electro-optic instrumentation systems (e.g. laser light scattering, optical data processing, holographic interferometry).


4570 Electro-Acoustics (3) Reproduction of monaural and stereoacoustic sound. Microphones, loud speakers, disc recording, magnetic recording, film recording; acoustics of studios, auditoriums.

4600 Analog Signal Processing Circuits for Electronic Instrumentation (3) Operational amplifiers, instrumentation amplifiers and other integrated circuits in signal processing. Active filters, amplifiers, attenuators, function generators, active rectifiers, and synchronous demodulators. Analysis of interconnection of active components. Designer parameters for control and feedback. Prereq: 3630. 3 hrs including project laboratory.

4610 Analog-Digital Systems (3) Principles of analog computing components. Applied to analog computing to include problem set up and scaling. Characteristics of analog multipliers, dividers and function generators are developed. Present the concept of computer, digital to analog conversion, and analog to digital conversion techniques. Prereq: 3180 and 3190. Lab included. Consent of instructor.

4620 Sequential Machine and Digital System Theory (3) Considers design aspects of pulse-mode, clock-mode, and level-mode sequential circuits. Theory and characteristics of one- and two-dimensional iterative networks. Design of large scale digital computer circuitry and technologies. Introduces principles of reliability and error detection in digital systems. Prereq: 3180. 3 hrs including project laboratory.

4630 Digital System Organization and Design (3) Considers system organization of digital systems including microcomputer and microprocessor architecture and storage. Emphasis on hardware and software considerations of ALU and CPU structures, storage systems (RAM, ROM, and PROM building blocks), and input-output system of control. Consideration of the inclusion of parallel operations, synchronous-asynchronous time sequencing and microprogramming techniques. Prereq: 3180. 3 hrs including PBI library.

4660 Bioelectric Instrumentation (3) Nature and origin of bioelectric potentials, transducers, amplifier elements, recording systems and noise problems.

4680 Electronic Amplifiers (3) Feedback amplifier principles. Bandwidth linear amplifiers. Audio and radio-frequency power amplifiers. Prereq: 3830, 3720. 3 hrs including project laboratory.

4690 Communications Electronics (3) Receiver and transmitter circuits for communications. Prereq: 3040, 3830. 3 hrs including project laboratory.

4700 Digital Integrated Electronics (3) Comparison of design issues and basic principles for digital microcircuits. Flip-flops, registers, counters, memories, analog switches, A/D and D/A conversion, clipping, clamping and sweep circuits. Prereq: 3830, 3720. 3 hrs including project laboratory.

4740 Integrated Circuits (3) Processing and fabrication of active and passive components for monolithic and hybrid circuits. Design techniques for linear and digital circuits. Prereq: 3830. 3 hrs including project laboratory.


4800 Hardware-Sofware Interface in Minicomputer and Microprocessor System Design (3) Presents minicomputer and microprocessor inter- face design. Hardware-software interaction and trade-off. Priority interrupt structures are discussed and utilized. Communications are developed. Project oriented, contract course. Completion of two projects, one utilizing a minicomputer and the other a microprocessor, is minimal course requirement. Prereq: 3180.

4810 Discrete-Data Systems (3) Introduction to analysis and design of discrete data control systems using computer-aided techniques. Real-time digital filtering techniques; application of digital computers in closed-loop feedback systems.

4820 Introduction to Pattern Recognition (3) Role of pattern recognition within framework of artificial intelligence. Topics dealing with the design of learning and adaptive machines. Typical applications of pattern recognition to problems of practical significance. Computer simulation of elementary pattern recognition problems. Prereq: Either 3100 and Computer Science 1510 or Computer Science 4540 and Computer Science 1510. (Same as Computer Science 4820.)

4830 Digital Image Processing (3) Principal methods for coding, storing, and processing images by means of digital computers. Computational algorithms for image operations, Prereq: 3100 and Computer Science 1510. Prereq: 3440 and Computer Science 1510. (Same as Computer Science 4830.)

4850 Small Computer Systems (3) Basic structure of small computer systems. Input-output tech- niques, interrupt structures, peripheral devices, system software and assembly language programming. Course is project oriented. Prereq: Basic Engineer- ing 1410, Computer Science 1510 or 3150 or consent of instructor. (Same as Computer Science 4850.)


5000 Thesis (1-15) E

5040-50-60 Electrical Engineering Research (3, 3, 3)

5070-80 Modern Transform Methods (3) Laplace transform and complex variable theory. Z-transforms, difference equations and parameterized system theory.


5120 Network Synthesis and Design (3) Frequency domain and time domain synthesis of network functions; realization of one-port two-port networks by L and C elements, approximation problems and filter design; computer aided techniques. Prereq: 5070 or equivalent.


5170 Bioengineering Systems I, Models, Systems Analysis and Simulation (3) Modeling techniques applied to physiological systems. Systems proper- ties, resistance, impedance, and storage are investigated. Analog and digital simulation of biological systems. Prereq: 4370 or consent of instructor.

5180 Bioengineering Systems II Bioelectric Phenomena (3) Analysis of select biological phenomena associated with biological systems as stimuli and responses. Quantitative theories in neurophysiology and electrocardiography Prereq: 4660 or consent of instructor.

5210-20 Advanced Electrical Machinery (3, 3) Fundamental processes of electromechanical energy conversion; application in conventional devices. Differential equations for rotative machinery, Park's transformation and harmonic analysis, model behavior of isolated and interconnected rotative machines. Prereq: 4780 or equivalent.

5230 Advanced Electrical Machine Applications (3) Motors and generators; motor and generator applications, and other speed control techniques; variable frequency operation. Prereq: 5210.


5271 Modern Systems Theory I (3) Introduction to linear systems theory. State-space model, linear dynamical system, state transition map, matrix expon- ential, controllability, observability, optimal control theory, pole placement, observers, stability theory for linear systems. Prereq: Consent of instructor.

5281 Modern Systems Theory II (3) Optimal estima- tion. Probability theory and stochastic processes, uncertain dynamical systems, estimation and filtering theory, Wiener filtering, the Kalman filter and Kalman extensions. Prereq: 5271 or consent of instructor.

5291 Modern Systems Theory III (3) Optimal control theory. Deterministic optimal control theory, minimum principle for first order systems, linear time invariant systems, and dynamic programming, stochastic control theory.
5440 Distribution System (3) Electric power distribution with particular reference to utility systems. Systems organization and planning; power system operation and regulation. Prereq: 4410, 4420, 4430 or equivalent.

5460 Selected Topics in Power Systems (3) To meet special needs of students. Possible topics: power system management; electromechanical methods; power plant operation, electrical transients in power systems, and power system relaying. Prereq: Consent of instructor. May be repeated with consent of department.

5510-20-30 Advanced Analog Electronics (3, 3, 3) Principles of electronic devices. Basic semiconductor devices such as diodes, bipolar transistors, J-FETs, and MOSFETs. Small-signal equivalent circuits and noise models of active devices. Theory and computer methods for fault analysis; including switching regulators. Use of specialized electronic systems in analog signal processors. Advanced topics in analog electronics from current literature. Prereq: 4370, 4600, 4680, 4740 or consent of instructor. Coreq: Math 4510 or 4710. Project laboratory included.

5540 Thick-Film Hybrid Microcircuits (3) Processing and design techniques for prototype production of hybrid thick-film integrated circuits; from circuit design to final assembly; properties of thick-film pastes; cost-effective design techniques. Project oriented, includes biweekly laboratory.

5570-80-90 Advanced Electrical Switching Circuits (3, 3, 3) Conception, design, analysis, and applications of electromagnetic devices; discrete, monolithic, and hybrid configurations; clipping and clamping circuits, negative resistance circuits, d.c. to d.c. converters, inverters, output networks, latches, circuits, blocking oscillators, analog switches, logic families, registers and counters, analog-to-digital, and digital-to-analog converters, and digital memories. Prereq: 4700 or consent of instructor. Project laboratory included.


5615-25 Introduction to Switching Theory and Logic Design (3, 3) Boolean algebra and applications. Combinational switching circuits. Sequential machines. Information structures and sub-systems. For computer science majors and those without prior experience in hardware and logic design. Prereq: Elementary linear algebra and calculus of several variables. 4 labs per quarter.


5650-60 Electronic Communication Systems (3, 3) Information transmission in communications systems; mathematical treatment of modulation and demodulation in analog and pulse-type systems. Bandwidth requirements, noise, system performance in noise. All modern systems; emphasis on digital data transmission. Prereq: 5710.

5700-80 Pattern Recognition (3, 3) (Same as Computer Science 5840-50.)

5690 Artificial Intelligence (3) (Same as Computer Science 5210.)

5710 Random Process Theory for Engineers (3) Probability and random variables as approaches by set theory. Spectral analysis of random variables. Random processes, stationarity, correlation functions and temporal analysis, power spectrum and sampling. Use of statistical methods applied to response of systems to random signals.


5740 Digital Processing of Signals (3) Analysis of discrete signals; sampling theorem and its implications; frequency domain design of digital filters; time domain design of digital filters; optimization criteria; processing of digital signals; discrete Fourier transform. Prereq: 4100 or equivalent.


5770 System Identification (3) Various identification schemes; deterministic, stochastic, and hierarchical methods. Applications in all areas of engineering and science. Prereq: Consent of instructor.

5800 Power Transmission Lines (3) New and unconventional power transmission systems. Transmission line parameters for overhead and underground lines. Corona and radio interference of high voltage transmission. Insulation coordination and design. Project procedures for high voltage transmission. Prereq: 4120-20-30 or equivalent.

5810-20 Electromagnetic Fields (3, 3) Vector analysis. Maxwell's equations, special relativity, plane waves, reflections, waves in anisotropic media, guided waves, rectangular and cylindrical wave guides, radiation from current elements. Coreq: Mathematics 4510 or 4710.

5830 Linear Antennas and Antenna Arrays (3) Heat equation, dipole, line source, impedance loop antennas, receiving antennas, linear arrays. Prereq: 5820.

5840 Antenna Arrays (3) Huygens principle, equivalent currents. Fourier transform and optical transfer function. Horn, lens, and reflector antennas. Prereq: 5820.

5850 Microwave Electronics (3) Space charge waves on electron beams, coupling between beams and guided waves, Klystrons, magnetrons, traveling wave amplifiers and backward wave oscillators. Prereq: 5830.

5860 Electromagnetic Wave Propagation (3) Wave propagation in isotropic and anisotropic media, transmitted power, stored energies, propagating and nonpropagating modes, orthogonality properties, boundary and radiation conditions, sources. Prereq: 5860.

5870 Introductory Microwave Networks (3) Circuit equations for reciprocal networks; scattering and fillings. One way and two way devices, directional devices, parameter measurements, reflection characteristics. Prereq: 5810.

5940-50 Advanced Small Computer Systems (3, 3) Real-time applications, memory and CPU organization, interface software, and peripheral devices of minicomputer and microprocessor systems are studied. Project-oriented supported by hardware and software interface design. Prereq: 4850 or equivalent or consent of instructor. (Same as Computer Science 5940-50.)

6000 Doctoral Research and Dissertation (3-15) E

6240-50-60 Advanced Systems Theory I, II, III (3, 3, 3) Advanced topics in modern theory. Topics vary. Prereq: 5240. Graduate standing or consent of instructor.

6260 System Identification (3) Various identification schemes; deterministic, stochastic, and hierarchical methods. Applications in all areas of engineering and science. Prereq: Consent of instructor.

6340-50-60 Special Topics in Quantum Electronics (3, 3, 3) Advanced topics in quantum devices and
Ph.D. Tennessee; L. R. Schoe, M.S. Kansas State (Emeritus); P.E.; D. G. Thomas, Ph.D. Ohio State, P.E.


Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy with a major in Engineering Science are available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. Program options include solid mechanics, fluid mechanics and biomedical engineering. In the biomedical and engineering science option interdisciplinary programs are arranged to meet individual needs or interests. Each applicant will be advised as to any prerequisite courses before entering a program; the student's program of study must be approved by his/her advisory committee, and must comply with the requirements of the Graduate School. The student's program may be selected from a department other than the Department of Engineering Science and Mechanics.

A departmental application is required in addition to the Graduate School application. The names and addresses of four references must be included with the departmental application.

The flexibility and interdisciplinary aspect of the program options are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering, or can best be met by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek, for example, employment in engineering areas requiring specialization in mechanics, or in related interdisciplinary studies such as biomechanics.

THE MASTER'S PROGRAM

Two M.S. plans are offered: Plan I requires a thesis, while Plan II does not. The second plan is offered to meet the needs of engineers employed in industry, or those who plan to teach in community colleges and technical institutions. It will be available, however, to any student who, in the opinion of his/her advisory committee, can benefit from additional course work more than from work on a thesis.

In Plan I a minimum of 45 quarter hours, including the thesis, is required. In Plan II a minimum of 48 hours is required. The requirements include the following:

Mathematics 9
Engineering courses 18 27*

(Major option; may include

*Engineering courses under Plan II may include advanced laboratory work or special project work; for example Engineering Science and Mechanics 5910 or analogous courses in other departments.

but is not restricted to courses offered by the Engineering Science and Mechanics Department.)

Related courses (May include additional courses in mathematics, computer science, or physical and life sciences as part of engineering courses.)

Thesis 9
A final examination is required under both plans, covering graduate course work and the thesis (if any).

THE DOCTORAL PROGRAM

General policies and requirements of the Graduate School relating to admission, residence, languages, research, examinations, faculty advisory committee, and admission to candidacy apply to this program.

Specific departmental requirements for the Ph.D. degree include:

1. A minimum of 108 quarter hours credit beyond the Bachelor's degree. These shall include a minimum of 36 quarter hours credit in Doctoral Research and Dissertation and a minimum of 72 quarter hours credit in other courses.

2. A minimum of 36 quarter hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 5000 and above, with at least 12 quarter hours of 6000-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.

3. A minimum of 18 quarter hours in mathematics or computer science in courses numbered 4000 and above, exclusive of first course in ordinary differential equations.

4. A minimum of 9 quarter hours of courses numbered 5000 and above, offered in departments other than mathematics, computer science, and the student's major department and which are not included in the areas of concentration under item 2.

5. Active participation in graduate seminars and colloquia.

6. Preliminary examination consisting of a written qualifying examination and an advanced examination. The qualifying examination covers areas of engineering science and mathematics, for the most part at a level and scope expected of well-qualified recipients of a Bachelor's degree in engineering. The advanced examination requires demonstration of special competence in the areas of concentration selected by each candidate.

7. Submission of a written proposal for dissertation research to the student's advisory committee. Oral defense of the proposal is normally required when the student takes the advanced portion of the preliminary examination.

8. Submission of a dissertation which meets the requirements of the Graduate School, the department, and the student's advisory committee.

3311 Mechanics of Materials (4) Concepts of stress and strain; stress-strain relations and Mohr's circle; static analysis of members; area moment of inertia; stress and displacement analysis of axially-loaded...


6310 Theory of Plates (3) Classical theory of bending of plates of various shapes; thick plates; plates of variable thickness, buckling and large deflection problems. Prereq: 5310-30-30.

6320 Analysis and Design of Thin Shell Structures (3) Geometry of surfaces, derivation of thin shell theory, and applications of theory for structural engineer. Prereq: 6310 or Civil Engineering 5160.


6340 Theory of Plasticity (3) Yield conditions; strain hardening; plastic potential equations; plastic potential; uniqueness theorems; extremum and variational principles; problems in perfectly plastic solids, finite plastic deformations; piecewise linear plasticity. Prereq: 5410 and Mathematics 4550.

6610 Photoelastocity (3) Stress-optic law in three dimensions and index ellipsoid, rotational effects in thinnest plates and shells, plasticity, techniques and applications of three-dimensional photoelasticity, scattered light method, dynamic photoelasticity, photoelasticity, photoplasticity and photo- viscoelasticity, recent developments in photoelas- ticity. Prereq: 5640, 5420 and consent of instructor. 2 hrs and 3 labs.

6710 Impact and Stress Waves in Solids (3) Mechanical impact; wave propagation in elastic solids; impact and waves in elastic rods, beams, and plates; contact problems in impact of elastic bodies; dynamic loading in viscoelastic and plastic mat- rials; dynamic properties and materials. Prereq: 5410. Coreq: Mathematics 5630.

6800 Nonlinear Viscoelasticsity (3) (Same as Polymer Engineering 6210).

6810 Energy Methods (3) Virtual work, minimum potential energy, and complementary energy: Castiglia's theorem, Hamilton's principle, and La- grange's equations of motion; variational methods; examples from theory of structures, plates and shell, and beams, and linear viscoelastic and linear dynamics. Prereq: 5710-20 and Mathematics 5610- 20-30.

9190 Special Topics in Engineering Mechanics (3) Advanced problems of interest in mechanics, worked either as group or individually. Prereq: Consent of instructor. May be repeated with consent of department.

NOTE: Not all of the above courses will be offered in any one year.

Industrial Engineering

MAJOR

DEGREES

M.S., M.E.

Professors:

J. N. Snider (Head), Ph.D., Ohio State, P.E.; R. W. Davis, M.S., Tennessee, P.E.; H. P. Emerson (Emeritus), S.B. Massachusetts Institute of Technology, P.E.; R. M. LaForge, (Emeritus), M.S., Georgia Institute of Technology, P.E.; H. L. Lovless, M.S. North Carolina State, P.E.; W. G. Sullivan, Ph.D., Georgia Institute of Technology, P.E.

Associate Professors:

J. A. Buchan, M.S. Georgia Institute of Technology, W. R. Johnson, Ph.D. Virginia Polytechnic Institute, P.E.; D. H. Hutchinson, Ph.D., Georgia Institute of Technology, P.E.

Assistant Professors:

E. L. Deporter, Ph.D., Virginia Polytechnic Institute; M. E. Eaton, M.S., Clarkson, P.E.; M. J. Doonan, M.S., Tennessee, P.E.

THE MASTER'S PROGRAM

A graduate program leading to the degree of Master of Engineering is open to graduates of recognized undergraduate curricula in industrial engineering or to graduates of other engineering curricula who take up to 15 quarter hours of prerequisite course work. A non-thesis option with 45 hours of course work plus a 3-hour design project is available.

Graduate work in Industrial Engineering provides for concentrations in operations research, industrial administration, manufacturing and production systems, human factors engineering, and systems engineering. Either one or two minors can be elected in Engineering, Mathematics, Psychology, Business, Computer Science, Statistics or Economics.

MASTER OF ENGINEERING PROGRAM

This professional degree program is intended as a culminating year in a five-year baccalaureate-master program which emphasizes engineering design and professional practice. Admission requirements: application for graduate study as described above plus the requirement of a Bachelor's degree from an ECPD-accredited engineering program. This 45-quarter hour program requires 16 hours of course work in an industrial engineering major, 18 hours of technical methods electives, 9 hours of industrial engineering design electives and 9-hour thesis or design project.

4060 Material Requirements System Design (3) Theory and applications of forecasting, production planning, inventory analysis, planning and control, and systems design and implementation. Design of the material requirements process as an integrated system. Prereq: 3510-20. Not available for graduate credit for industrial engineering students.

4080 Forecasting Methods in Industrial Engineer- ing (3) Application of technological forecasting techniques to industrial engineering problems. Includes moving averages and exponential smoothing technique, moving averages and exponential techniques, autoregressive time-series analysis, Delphi methods, and other selected industrial forecasting methods. Prereq: 3510-20.

4150 Project Control with CPM and PERT (3) A study of project planning and control based primarily on critical path techniques, including resource allo- cation, computer-scheduled, and interactive network models, and computer application. Prereq: 3510-20 and 3520.

4160 Materials Handling (3) Analysis and planning for the overall problem of moving, packaging, and storing of materials; equipment comparison and selection, cost analysis. Prereq: 4520 and Engineer- ing Science and Mechanics 3310. Not available for graduate credit for industrial engineering students.

4170 Automatic Process Control (3) Characteristics of automation of scientific and controllers; element- ary open and closed loop analysis, and applications to industrial process control. Prereq: Mathematics 2860 and Engineering Science and Mechanics 2720.

4230 Scheduling Systems (3) Performance measures for job shop and flow shop scheduling, including both static and dynamic conditions, as well as techniques for open and closed fixed and modifiable scheduling. Deterministic and probabilistic dispatching conditions. Prereq: 3520.

4250 Work Measurement Applications (3) Application of techniques of standard time measurement, work measurement, and incentive systems to the design of industrial work situations.

4520 Engineering Economy (3) Methods and problems in selection or replacement of equipment. De- cisions among engineering alternatives, involving capital recovery, economic life of equipment, and rate of return on investment. Prereq: 4530. Not available for graduate credit for industrial engineering students.

4530 Case Studies in Engineering Economy (3) Ex- tension of basic engineering economy principles to actual problems faced by companies in the manufac- tured industries. Case studies taken from literature and class discussion. Out-of-class assignment is made which involves working with local companies to evaluate make or buy options, leasing versus cash purchases, equipment repla- cement studies, energy source economies. Pre- req: 4520.

4540 Industrial Development (3) Factors other than mechanical or chemical which enter into successful establishment of manufacturing enterprise. Cost and location studies and market analysis to deter- mine the commercial feasibility of new plants or projects.


4830 Health Systems Engineering (3) Hospital management systems and means by which they may be improved through application of modern industrial engineering principles and techniques.

4850 Industrial Systems Analysis (3) Matrices and linear vector spaces for industrial systems models. Laplace and Z-transform techniques and applications of transformations to industrial problems and systems. Applications to industrial processes and systems. Prereq: 3510, 3620 and Mathematics 2860. Not available for graduate credit for industrial engineer- ing students.

4910-20-30 Special Industrial Engineering Topics (3, 3, 3) Prereq: Consent of instructor. May be re- peated.

4950 Industrial Safety (3) Development of organi- zation and programs for prevention and control of accidents with emphasis on OSHA Rules and Regu- lations.

5000 Thesis (1-15) E.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E.

5110 Work Design (3) Advanced methods analysis of design and improvement of work systems, human factors, workers' response and management par- ticipation. Prereq: Motion and time study work methods.

5210 Advanced Work Measurement (3) Characteristics of predetermined time systems, application to formula construction, and practice in application. Prereq: 3600 or 3620.

5240 Facilities Planning and Design (3) Modern materials handling techniques, computer-aided layout techniques, applications of operations research models, and use of these to design manufacturing facility. Prereq: Production facilities planning or consent of instructor.


5260 Information Systems Design - Industrial engineer- ing approach to information systems design. System model, analysis, and evaluation of informa- tion systems: information objectives and design criteria. Optimization and simulation in system design.


5340 Applied Decision Theory (3) Application of theory of decision making problems in industrial engineering. Decision making under conditions of

5420 Reliability Engineering (3) Reliability concepts, failure distribution, equipment reliability, time dependent failure; Markovian dependent systems. Maintenance data analysis and replacement problem. Prereq: Statistics 3450.


5600 Human Factors Engineering (3) Human factors engineering within given context. Design of tools, equipment, environments, and products. Modeling of human as process or system controller. Prereq: Consent of instructor.

5610 Human Factors Engineering (3) Human factors engineering, design of tools, equipment, environments, and products. Modeling of human as process or system controller. Prereq: Consent of instructor.


5701 Operations Research Applications (3) Survey of operations research techniques with emphasis on application to industrial engineering problems. Prereq: Mathematics 2860 (or equivalent), Statistics 3450, computer programming. Available for credit only to students without a B.S. degree in industrial engineering.

5710 Linear, Quadratic and Dynamic Programming (3) Mathematical programming, linear programming, quadratic programming, and dynamic programming. Applications in business and industrial problems. Prereq: Computer Science 3150 and matrix algebra.

5720 Queuing Models, Inventory, and Simulation (3) Single and multi-server queuing models and inventory systems. Simulation methods and computer simulations applied to inventory and queuing line problems. Network models and simulation applications to transportation problems. Prereq: 5700 and 5360.

5730 Game Theory and Random Processes (3) Operations research including game theory with applications to decision making in competitive environments and random processes with applications to queueing, inventory models and decision making. Prereq: 5360.


5830 Health Systems Engineering I (3) Health systems for analysis, control, and improvement of function and total health system. Prereq: 4830.

5840 Air Traffic Control Systems (3) Current systems and design of traffic control systems. Traffic control and design of applicable system models. Prereq: Statistics 3450, Computer Science 3150.


5900 Design Project (1-6) Industrial engineering techniques to complete a non-thesis program. Enrollment limited to industrial engineering students in non-thesis program. May be repeated, maximum 9 hrs. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6010-20-30 Special Topics in Industrial Engineering (3, 3, 3) Special problems for students qualified to do individual or group research projects. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.


6520 Operations Research Models in Engineering Economy (3) Traditional capital planning and budgeting techniques; operations research approaches to capital budgeting problems. Mathematical programming and computer simulation. Interrelated problems; uncertain cash flows and choice of appropriate evaluation criteria. Prereq: 5250, 5710.

6700 Nonlinear Programming (3) Optimization techniques for static and dynamic nonlinear systems subject to various constraints. Applying optimization theory to solve nonlinear optimization problems. Variable metric methods, search methods, constrained nonlinear programming, and penalty function methods. Prereq: 5700.


6910 Advanced Topics in Industrial Engineering (3) Will cover topics not covered in other graduate courses. A forum for advanced graduate students to study individually or in group as appropriate. Prereq: Graduate standing and consent of instructor. May be repeated with consent of department.

Mechanical and Aerospace Engineering MAJORS

Mechanical and Aerospace Engineering

MAJORS

M.E., M.S., Ph.D.

Professors:


Associate Professors:


Assistant Professors:


GRADUATE STUDY PROGRAMS

Graduate programs in Mechanical Engineering or Aerospace Engineering are available which lead to the degrees of Master of Engineering, Master of Science, and Doctor of Philosophy with concentrations in solar energy, energy conversion, utilization, power generation, machine design and dynamics, aeronautics and gasdynamics, aeracoustics, stress analysis, propulsion, heat transfer, fluid mechanics, and thermodynamics. In addition to the general policies and requirements of the Graduate School, each student must satisfactorily complete a program of study which has been approved by the student's committee. Specific program requirements are given below.

MASTER OF ENGINEERING PROGRAMS

Entrance into the Master of Engineering program is restricted to qualified graduates of ECPD-accredited undergraduate curricula in mechanical or aerospace engineering. At least one-third of the program of study must be classified as engineering design. The student's advisor will assist in planning the program of study to ensure that it includes the necessary design content. Three program options (thesis, course, and problems) are described below. Note that some students may not be eligible for the course option.

MASTER OF SCIENCE PROGRAMS

Entrance into the Master of Science programs is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites.

Three program options (thesis, course, and problems) are described below. Note that some students may not be eligible for the course option.

MASTER'S PROGRAM OPTIONS

Three program options are available:

A. The Thesis Option. The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in Mechanical Engineering or Aerospace Engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.

2. A minimum of 9 quarter hours of credit in a thesis.

3. Participation in the departmental seminar programs.

4. Submission and defense of a written thesis which demonstrates the ability to conduct and report on an independent investigation.

5. Passing a final examination on all work submitted for the degree.

B. The Course Option. Normally, this program is restricted to those students who have had significant engineering work experience. The evaluation of the work experience and the final selection of the student's program of study are left to the student's committee. The requirements of this option are that the student must...

1. Alumni Distinguished Service Professor.

2. Space Institute, Tullahoma.
satisfactorily complete a program of study that includes:
1. A minimum of 45 quarter hours of course work which includes at least 27 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics. No more than 36 quarter hours of engineering course work may be below the 5000 level.
2. Participation in the departmental seminar program.
3. Passing a comprehensive written final examination of course work submitted for the degree. The student's committee will be of sufficient size to include all the study areas reflected in the course program.
4. The Problems Option. The requirements of this option are that the student must satisfactorily complete a program of study that includes:
   1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.
   2. A minimum of 9 quarter hours credit in Selected Engineering Problems (5900).
   3. A written report must be presented for each problem investigated.
   4. Participation in the departmental seminar program.
   5. Passing a comprehensive written final examination of all course work submitted for the degree and an oral examination of all work (including problems) submitted for the degree.

THE DOCTORAL PROGRAM

Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds.

The student must satisfactorily complete an approved program of study which normally includes:
1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or problems.
2. A minimum of 5 quarter hours credit in doctoral dissertation.
3. A minimum of 18 quarter hours in mathematics in courses numbered 4000 or above.
4. A minimum of 36 quarter hours in mechanical and/or aerospace engineering courses numbered 5000 and above, with at least 12 quarter hours of 6000-level courses. These are exclusive of thesis, problems or dissertation credit.
5. Participation in the departmental seminar program.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Junior (3000-level) and senior (4000-level) mechanical and aerospace engineering courses may be taken for graduate credit by non-mechanical or non-aerospace engineering majors, if approved by the student's major department. Mechanical or aerospace engineering majors may not normally use more than one 4000-level engineering course to meet their advanced degree requirements. Non-mechanical or non-aerospace engineering graduate students should consult with instructors regarding prerequisites for undergraduate courses.

Mechanical Engineering

3000 Energy—An Overview (4) Introduction to energy, available energy resources, energy recovery and utilization; power generation techniques including conservation schemes; emphasis on the resources-environment-technology relationship associated with energy; primarily for non-engineering students.

3110 Applied Engineering Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties; applications to engineering problems.

3111 Engineering Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties.

3300 Engineering Thermodynamics (3) Properties of gases and mixtures; chemical reactions; equilibrium; applications to mechanical engineering problems.

3410 Fluid Flow (3) Development of continuity, momentum and energy principles for fluid systems; applications of mechanical and aerospace engineering problems.

3440 Heat Transfer (3) Heat transfer processes; heat conduction, thermal radiation.

3520-30-40 Thermal Sciences (3, 3, 3) Fundamental principles of thermodynamics and transport phenomena as applied to engineering design. To be taken in sequence.

3610 Mechanics of Machinery—Kinematics (3) Machine motions, graphical and analytical methods; instantaneous centers; velocities; accelerations.

3620 Mechanics of Machinery—Dynamics (3) Applications of Newton's laws, work, energy, and impact to machinery. Force analysis of mechanisms, balancing, gyroscopic effects, flywheels. Prerequisite: 3610.


3650 Introduction to Machine Design (3) Ductile-brittle behavior of materials under static and cyclic loading. Stress concentration, design factors and theories of failure. Changes in material behavior in processing and fabrication. 2 hrs and 1.5-2 hr lab.

4150 Energy Conversion Systems (3) Laws governing energy transformations and their application to power plants.

4150 Energy Conversion Systems (3) Operating and design characteristics of new technology energy conversion systems, selected direct conversion techniques.

4160 Energy Conversion Systems (3) Economic and technical design parameters as applied to power plants for public utilities or industrial applications; selected design and layout problems.

4170 Turbo-Machinery (3) Basic principles of turbo-machinery; systematic methods or analysis, design, performance evaluation.

4180 Energy Production and Utilization (3) Thermodynamics constraints on energy production; comparison of power generation methods; evaluation of new energy sources and concepts; energy conservation schemes.

4220 Environmental Noise (3) Basic principles of acoustics—measurement and control of noise in industrial and community environments.

4240 Heat Transfer (3) Heat transfer by free and forced convection, heat transfer in phase change, heat transfer in high speed flow, heat exchanger application.

4450 Lubrication (3) Hydrodynamic theory of lubrication of sliding bearings; application of Navier-Stokes equations to infinite and finite bearings; analytical and numerical solutions; applications to design.

4471-91 Experimental Mechanical Engineering (3, 3) Experimental methods and measurements of force, length, time, temperature, pressure, transport rates, and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications.

4510 System Dynamics (4) Analytical models of physical systems, linearization, Laplace transforms, dynamic characteristics and stability of systems, numerical simulations, and analog computer solutions. Not for non-mechanical graduate credit.

5200-30 Creative Design (3, 3) Application of engineering principles to the solution of current problems with emphasis on design innovation.

4621 Manufacturing Processes (3) Comparison of machining methods, plastic production; metrology.

4623 Manufacturing Processes (3) Principles underlying tool and die design, design of high-volume production tools and molds, work holding fixtures.

4624 Manufacturing Engineering Systems Design (3) Design of complete manufacturing system for a particular product: production planning, tool and fixture design, selection of manufacturing operations, redesign of product to reduce cost.

4625 Manufacturing Process Engineering I (3) Product specification: dimensional analysis of size and form, true position tolerance theory; tolerance analysis; and workpiece control for production to tolerances.

4631 Energy Methods in Mechanical Design (3) Application of strain energy principles in complex beams and structures.

4632 Application of Lagrangian Mechanics in Vibration Problems (3) Generalized coordinates and multiple degree of freedom vibrating systems.

4633 Matrix Analysis (3) Application of matrices to solution of complex structures and lumped parameter vibratory systems.

4660 Materials and Manufacturing Process (3) Selection of materials in design process, emphasizing relationship between stress and strain analysis, material properties, environment, temperature, manufacturing technology, etc.

4670 Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements, springs and arborings, selection of sleeve and rolling element bearings.

4680 Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements, springs and arborings, selection of sleeve and rolling element bearings.

4690 Machine Design (3) Innovative design of complete machine; documentation including specifications, design calculations, working drawings and cost analysis. Written and oral report.

4710 Thermal Environmental Systems (3) Vapor compression and absorption cycles; heat pump systems; moist air properties; psychrometric processes.

4720 Thermal Environmental Systems (3) Design of environmental control systems, cooling towers and extended surface coils, solar radiation, building heat transmission; physiological effects.

4730 Thermal Environmental Systems (3) Design of heating ventilation and air conditioning systems.

4740 Solar Energy Utilization (3) Nature and availability of solar radiation, review of selected heat transfer topics pertinent to solar energy collection and use; design analysis of solar energy collectors and method of storage; selected applications.

4810 Internal Combustion Engines (3) Thermodynamic cycles, internal combustion engine, propulsion and engine systems. Combustion, detonation,
Equilibrium, dissociation. Analysis of internal combustion engines using ideal and real fluids.

4830 Propulsion System (3) Design of propulsion engines for aircraft, ships, rockets, and space vehicles.

4910-20-30 Selected Topics in Mechanical Engineering (3, 3, 3) Problems related to developments and practice in mechanical engineering.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Requirements for a student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree completion. May not be used toward degree requirements. May be repeated. S/NC only. E

5110 Conduction Heat Transfer (3) Analysis of steady state and transient heat conduction by analytical and numerical techniques. Prereq: 3910, 4420 and Mathematics 3150.

5120 Convection Heat Transfer (3) Equations of viscous fluid flow, energy equation, convection analysis of internal and external flows including effects of variable heat flux, surface temperature, and fluid properties. Prereq: 5310 or equivalent.


5140 Phase Change Heat Transfer (3) Prereq: 5120.

5210 Classical Thermodynamics (3) Macroscopic thermodynamics with emphasis on First and Second Laws of Thermodynamics and the equations and thermodynamics of phase relationships. Prereq: 3330.

5220 Microscopic Thermodynamics (3) Thermodynamic properties, kinetic theory and statistical mechanics. Prereq: 5210.

5230 Special Topics in Thermodynamics (3) Prereq: Consent of instructor.

5310 Intermediate Fluid Mechanics (3) Vector descriptions in fluid mechanics; derivation of basic equations; two-dimensional potential flows; viscous flows with emphasis on boundary-layer theory. Prereq: 3410.

5410-20 Research in Mechanical Engineering (3, 3, 3) Design of experiments, data analysis, experimental investigation.


5610-20-30 Experimental Stress Analysis (3, 3, 3) Theory of elasticity; experimental methods; photoelasticity; and assumption of irrotational motion, solution of characteristics. Prereq: 4210 for 5210, and 5210 and 5260.

5640-50-60 Advanced Machine Design (3, 3, 3) Design of bearings, gears, shafting; lubrication.

5670-80-90 Dynamics of Machinery (3, 3, 3) Dynamics of machinery; vibrations; balancing flywheels and governors.

5710 Metal Machining (3) Analytical approach to mechanics of machining. Basic phenomena-plastic flow, fractures, friction and wear. Prereq: 3650, 3440, and Metallurgical Engineering 2110.

5800 Transfer Matrix Methods in Elastomechanics (3) Application of transfer matrix methods to static and dynamic lumped parameter elastic systems in mechanical engineering. Calculation of forced response, mode shapes, and natural frequencies of beams and rotating shafts having complex and condition-dependent characteristics. Prereq. Prereq: Graduate standing in engineering and consent of instructor.

5810-20-30 Rocket Propulsion System (3, 3, 3) Rocket propulsion systems. Chemical, electrical and nuclear propulsion systems.

5840-50-60 Turbomachinery Systems (3, 3, 3) Design, development, and systems integration of turbomachinery components. Prereq: First year graduate standing and consent of instructor.

5870 Dynamic Modeling and Simulation (3) Modeling physical systems including mechanical, thermal, hydraulic, and electrical systems. Techniques for experimentally determining system parameters. Analog and digital computer simulation techniques. Prereq: 3630, 4420, and Aerospace Engineering 3511.

5900 Selected Engineering Problems (3) Selected problems in mechanical engineering to fulfill requirements of Program. Enroll limited to students in Program. Prereq: Consent of advisor. May be repeated. S/NC only.

5950 Seminars (1) All phases of mechanical engineering, including reports on current research at The University of Tennessee, Knoxville. May be repeated. S/NC only.

5980 Special Topics in Mechanical Engineering (1-3) May be repeated.

6000 Doctoral Research and Dissertation (3-15) E

6110-20 Advanced Topics in Fluid Mechanics and Heat Transfer (3-3) Advanced theory and applications of fluid mechanics and heat transfer; natural convection, two-phase flows, high speed reacting and non-reacting flows, advanced boundary layer techniques. Prereq: Consent of instructor.

6130-40 Advanced Radiation Heat Transfer (3, 3) Radiation heat transfer in absorbing, emitting and scattering media; interaction of thermal radiation with conduction and convection heat transfer; radiation heat transfer in hypersonic flow; radiative characteristics of combustion and non-reacting gases; scattering by planetary atmosphere. Prereq: 5110-20-30; Mathematics 4550.

6420 Selected Topics in Thermodynamics (3) Comparative analysis of macroscopic and microscopic approach; equilibrium of pure substance; meta-stable states. Prereq: Consent of instructor.

6430 Selected Topics in Thermodynamics (3) Analysis of internal and external flows including effects of variable heat flux, surface temperature, and fluid properties. Prereq: 5310 or equivalent.

Aerospace Engineering

3610 Dynamics (3) Newton's Law-work-energy impulse-momentum. Lagrange equations, central force, gyroscopic effects. Applications to aerospace systems.

3620 Mechanical Vibrations (3) Free and forced vibrations of single and multiple degree vibrating systems, balancing of rotating machinery.

3630-40 Structural Analysis of Aerospace Vehicles (3, 3) Fundamentals of structural analysis as applied to configurations of aerospace interest. Introduction to aeroelasticity phenomena. Must be taken in sequence.

4110 Aeroelastic Fundamentals (3) Atmospheric, dynamics and thermodynamics of perfect gases, fluid flow typology; wing theory, drag. For non-aerospace engineering majors only.

4210 Propulsion and Performance (3) Propulsion systems for aircraft, static performance and special performance problems, maneuvers, control surfaces, stability and control. For non-aerospace engineering majors only.

4210 Compressible Flow (3) One-dimensional internal flow; shock and expansion waves; friction and nonadiabatic flow.

4220 Low Speed Aerodynamics (3) Potential flow theory; kinematics and dynamics of perfect fluids; analysis and design of aerodynamic bodies.

4230 Viscous Flow (3) Boundary layer theory; laminar and turbulent flow; compressibility effects; numerical solution methods.

4240 Astronautics (3) Propulsion, trajectories, guidance, control, and atmospheric reentry of space vehicles.

4250 Propulsion (3) Principles of propulsion devices: rocketjet, ramjet, and rocket engines.

4260 System Design (3) Synthesis of aerospace system. Design report on the system.
flows, wind tunnel testing at transonic speeds, interference problems. Prereq: 5220 or equivalent.

5510-20-30 Aerospace Mechanics (3) 3) Principls of mechanics applicable to aerospace vehicles including equations of motion, multibody problems, and trajectory analysis. Prereq: Mathematics 4710.


5610 Applied Acoustics (3) Energy flow in acoustics, general equations of sound propagation in nonhomogeneous moving medium, sound waves due to turbulence, verticable sound, pseudosound, wave propagation in an absorbing medium, wave form, instrumentation and measuring techniques. Prereq: Consent of instructor.

5620 Aeroacoustics (3) Special topics and recent research results in field of aeroacoustics. Turbomachinery noise, jet noise, and general theoretical developments, empirical equations. Prereq: 5610.

5610 Aviation Systems: An Overview (3) Aviation systems, present and future, emphasis on systems approach. Socioeconomic base, aerospace and propulsion technology, meteorology, air traffic control, airport-community interface, and technological developments pertinent to present status and future development of air transportation. For non-aerospace and non-mechanical engineering majors only. Prereq: 4120.

5820 Air Vehicles (3) Current capabilities and future requirements for air transport vehicles. Parameters significant in aircraft type selection. Integration of air vehicle into aviation system. For non-aerospace and non-mechanical engineering majors only. Prereq: 5810.

5900 Selected Engineering Problems (3-9) Selected problems in aerospace engineering to fulfill requirement of Problems Program. Enrollment limited to students in Problems Program. Prereq: Consent of advisor. May be repeated. S/N only.

5950 Seminars (1) All phases of aerospace engineering, including reports on current research at The University of Tennessee, Knoxville. May be repeated. S/N only.

5990 Special Topics in Aerospace Engineering Credit to be arranged; 3 hrs maximum each quarter.

6000 Doctoral Research and Dissertation (3-15) E

6310 Magnetohydrodynamics I (3) Electromagnetic field equations, motion of single charged particle, static or dynamic plasma, Boltzmann equation, conduction and diffusion in ionized gases. Prereq or coreq: 5240. Prereq: Mathematics 5610, Physics 5610.

6320 Magnetohydrodynamics II (3) Continuum magnetohydrodynamic equations. Alfvén and shock waves, exact solutions for magnetohydrodynamic characteristic lines, second order in magnetic flux, magnetohydrodynamic boundary layer. Prereq: 6310, Mathematics 5620.

6330 Magneto-hydrodynamics III (3) Engineering applications of magnetohydrodynamics, propulsion and power generation. Prereq: 6320, Mathematics 5630.

6410 Physical Gasdynamics (3) High-speed, high temperature flow of gas from molecular point of view; molecular and kinetic theory of gases, equilibrium properties of gases and gas mixtures from steady-state kinetic theory of chemical thermodynamics, nonequilibrium gasdynamics. Prereq: 5120, and Mechanical Engineering 5220.

6420 Physical Gasdynamics (3) Continuation of 6410; flows of gas mixtures in local thermodynamic and chemical equilibrium, and basis of rate equations; flow with vibrational and chemical nonequilibrium. Prereq: 6410.

6510-20-30 Advanced Aerodynamics (3, 3, 3) Subsonic, transonic, supersonic, and hypersonic flows treated in a generalized and unified manner with combined viscous/inviscid effects. Relationships among various regimes of fluid flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics with emphasis on applications to airplanes, rocket, ground testing, and jet propulsion. Discussion of special topics according to students' interest. Prereq: 5110, 5220, and 5480 or equivalent.

6810 Advanced Boundary Layer Theory (3) Derivation and critical review of governing equations. Asymptotic solutions; similarity methods; boundary layer transition, approximate integral methods to include compressibility and heat transfer. Attached and separated flows; shock-wave boundary layer interaction. Prereq: 5220, Mechanical Engineering 5120, and Physics 5530.

6910 Advanced Topics in Gasdynamics (3) Selection of topics based on particular interests of students: nonequilibrium gases, nonequilibrium gasdynamics, advanced kinetic theory, perturbation techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6920 Advanced Gasdynamics (3) Continuation of 6910, emphasis on nonequilibrium gasdynamics, nonequilibrium gasdynamics, advanced kinetic theory, perturbation techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Nuclear Engineering

MAJOR

DEGREES

Nuclear Engineering

M.S., M.E., Ph.D.

Professors:
P. F. Pasqua (Head), Ph.D. Northwestern, P.E.;
J. B. Fusseil, Ph.D. Georgia Institute of Technology; F. W. Kerlin, Ph.D. Pennsylvania;
J. E. Mott, Ph.D. Minnesota; J. C. Robinson, Ph.D. Pennsylvania; P. N. Stevens, Ph.D. Northwestern, P.E.

Associate Professors:
H. L. Dodds, Ph.D.Tennessee, P.E.;
H. C. Roland, Ph.D. Tennessee.

Assistant Professors:
E. M. Katz, Ph.D. Tennessee; L. Miller,
Ph.D. Texas; A. B. Udipi, Ph.D. University of California.

The Department of Nuclear Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with concentrations in nuclear dynamics, nuclear reliability and risk, and radiation transport.

MASTER OF SCIENCE PROGRAM

A graduate program leading to a degree of Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the nature of the courses he/she enters the program. The student must complete a program of study of 45 quarter hours which has been approved by his advisory committee and which includes the following:

1. A major consisting of a minimum of 18 quarter hours of graduate courses in nuclear engineering.

2. A major of 9 quarter hours in mathematics, statistics or computer science.


4. Final examination covering the thesis and graduate course work.

The alternative program is available for the Master of Science degree which involves engineering practice rather than a thesis. The student must complete a program of study which includes the following:

1. A minimum of 36 quarter hours in nuclear engineering courses similar to the requirements for the Master of Science program (see above).

2. Twenty-four quarter hours of Nuclear Engineering Practice. A student usually registers for 6 hours of Nuclear Engineering Practice each quarter and investigates problems assigned by a member of the faculty. At the end of each quarter the student submits a written report, and makes an oral presentation of the work.

3. Final examination covering graduate course work and practice school problems.

MASTER OF ENGINEERING PROGRAM

A graduate program in Nuclear Engineering leading to the degree of Master of Engineering is available to those graduates with an accredited engineering degree or one with a B average. All candidates will be required to demonstrate general competence in the preliminary examination in the areas of engineering science, mathematics, and physics. At the same time, all candidates will be required to demonstrate special competence in nuclear design.

Specific course requirements for the Ph.D. degree in Nuclear Engineering include:

1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.

2. A minimum of 36 quarter hours of credit in doctoral research.

3. A minimum of 45 quarter hours in nuclear engineering courses numbered 5000 and above (or the equivalent), with at least 12 quarter hours of 6000-level courses. These are exclusive of the thesis or dissertation credit.

4. A minimum of 18 quarter hours in...
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mathematics, computer science, or statistics in courses beyond nuclear engineering undergraduate requirements. Must be numbered 4000 or above. A minimum of 9 quarter hours in courses numbered 5000 or above from a department other than nuclear engineering. The choice depends on the student's overall program and should expand his/her knowledge in a given field.

6. A reading knowledge of one foreign language will be determined by the student's doctoral committee.

4110-20-30 Introduction to Nuclear Reactor Theory (3, 3, 3) Nuclear structure, decay laws, neutron interaction; fission process, chain-reacting systems; diffusion equation including multigroup diffusion theory, neutron moderation, reactivity coefficients; perturbation theory. Prereq: Physics 3730 or consent of instructor. F, W, Sp

4140 Thermonuclear Systems (3) Fusion reactions; properties of plasmas, plasma containment; plasma diagnostics; thermonuclear devices. Prereq: Physics 3730, Mathematics 4550. F

4210-20-30 Nuclear Engineering Laboratory (3, 3, 3) Radiation detection and measurement instrumentation; counting statistics, half-life and decay schemes, gamma spectrometry, cross-section measurements, and computing; diffusion properties of neutrons, critical loading experiments, control rod calibration, statistical weight, shielding, xenon poisoning, neutron critical reactor behavior, fission density, and adjoint flux. Prereq or coreq: 4110 or equivalent. F, W, Sp


4710 Energy Transport (4) Development of differential and integral energy conservation equations; conduction, convection, and radiation heat transfer; applications to nuclear reactor fuel elements and heat exchangers. Prereq: 3730. F

4720 Reactor Thermal Design (4) Hydrodynamics and heat transfer in boiling systems; boiling crises; fuel element thermal design, steam generator design. Prereq: 4710. W

4730 Nuclear Reactor Design (3) First order reactor design, integration with non-nuclear heat transfer and power conversion system, economic evaluation, optimization procedures, description of typical systems. Coreq: 4730. Sp

4810 Radiation Shielding (3) Types of radiation sources, gamma ray and neutron attenuation, biological effects of radiation, fuel design. Prereq: Physics 3730, Mathematics 4550. F

4820 Reactor Kinetics and Controls (3) Derivation of kinetic equations; basic kinetic parameters; transient response with feedback; control and protective systems. Prereq: 4110. W

4840 Nuclear Reactor Safety (3) Presentation of reactor safety concepts and criteria; credible accidents; fission product release and transport; containment systems, accident analysis, engineered safeguards. Prereq: 4120.

4930 Nuclear Fuel Management (3) Discussion of problems associated with processing of nuclear materials, fuel cycle analysis, burnup calculation. Prereq: 4120. W

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during summer quarter when such a student uses university facilities and/or faculty time before degree is completed. May be repeated. S/NC only. E

5110-20-30 Transport Processes in Nuclear Engineering (3, 3, 3) Momentum and heat transport; development of conservation equations; elementary theory of turbulence; heat transfer and flow through conduits; conduction, radiation, reactor core thermal analysis. Prereq: 4720 or equivalent. Mathematics 4710, 4650. F; W; Sp

5210 System Dynamics (3) Transient analysis, Laplace transforms, frequency response, stability (linear and non-linear), and sensitivity analysis by state variable methods. Dynamic analysis of distributed systems. Prereq: Consent of instructor. F

5220 Reactor System Dynamics (3) Application of methods of general system dynamics to reactor systems. Modeling of neutron and non-neutron processes. Dynamics, stability, and control of zero power reactors and power reactor systems. Prereq: 4210, 4130 or equivalent. W

5230 Experimental Methods in Reactor Dynamics (3) Measuring system dynamic characteristics in time domain and frequency domain. Measurement, analysis, and interpretation of dynamics data using random and deterministic system perturbation. Prereq: Consent of instructor. W

5240 Reactor Instrumentation (3) Intrument components and systems for operation, control, and safety of nuclear reactors; role of instrumentation in public health and safety; engineered safeguards for nuclear power plants. Prereq: 4820, or consent of instructor. A


5310-20-30 Nuclear Systems (3, 3, 3) Various reactor types; flow diagrams, thermodynamic analysis, control methods, component descriptions of power systems using various reactor types and nuclear power economics. Prereq: 4610-20-30 or equivalent, with consent of instructor.


5740 Reactor Shielding (3) Application of analytic solutions of Boltzman transport equation to shield design problems. Spherical harmonics, moments methods, numerical solutions, adjoint calculations, and invariance imbedding cases studied. Prereq: 4610. F


5840-50 Fast Breeder Reactors (3, 3) Special characteristics of fast breeder reactors; emphasis on LMFBR. Need for breeders; neutron physics and thermal characteristics of reactor core; development status of engineering components; fuel cycle cost analysis; safety; coolants other than sodium; world status of development.

5870 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.

5880 Nuclear Engineering Practice (3-12) Experiences in solving and reporting on engineering problems. Prereq: Approval of Nuclear Engineering Department. May be repeated. Only Alternate Plan students may take this course. S/NC only. E

6000 Doctoral Research and Dissertation (3-15) E

6110-20-30 Selected Topics in Reactor Theory (3, 3, 3) Transport theory, control rod theory, and perturbation theory. Selected topics from literature. Prereq: Consent of instructor. F, W, Sp


6150 Reactor Dynamics (3) Special topics in reactor dynamics and control. Prereq: Mathematics 5630. Su

6410 Selected Topics in Nuclear Systems Reliability Engineering (3) Advanced state-of-the-art topics in nuclear systems reliability engineering and risk assessment. Prereq: 5330 or consent of instructor.

6710 Two-Phase Flow and Heat Transfer (3) Pool boiling and flow boiling, hydrodynamics of two-phase flow, boiling crises, two-phase instabilities. Prereq: 5130 or equivalent. Su
APPLICATIONS FOR ADMISSION

Graduate study programs lead to the degree of Master of Science in Child and Family Studies; Consumer Studies and Housing; Public Policy; Interior Design and Housing; Food Science; Food Systems Administration; Vocational-Technical Education (concentration in home economics education); Nutrition; and Textiles and Clothing. Graduate study programs lead to the degree of Doctor of Philosophy in Home Economics with three options: interdisciplinary, food science, and nutrition. Graduate programs provide advanced specialized training needed for college and university teaching, for leadership positions in governmental and professional agencies, in the various professions in business, for secondary school and adult teaching, for research and for extended services.

GENERAL REQUIREMENTS FOR GRADUATE STUDENTS

Requirements for graduate study are prescribed by the Graduate School and by the student’s major department. Students lacking adequate preparation may be required to take additional courses at the undergraduate level as prerequisites to graduate study. A student deficient in English may be required to take courses as necessary to remove the deficiency.

APPLICATIONS FOR ADMISSION

Two copies of the student’s transcript and an application for admission are submitted directly to the Graduate School. In addition, a College of Home Economics application and three letters of reference are sent to the Associate Dean of the College of Home Economics. (Forms may be obtained from the college.) The Graduate Record Examination scores for the aptitude test including the quantitative, verbal, and analytical sections are required for the application for admission.

in the interdisciplinary doctoral program, the Master’s program in Child and Family Studies, and the Master’s program in Consumer Studies and Housing: Public Policy.

In submitting applications for admission to graduate study in home economics, students are requested to indicate choice of major area of study.

GRADUATE ASSISTANTSHIPS AND FELLOWSHIPS

Information and application forms regarding graduate assistantships, fellowships and general requirements for admission to graduate study may be obtained from the department head in the area of the student’s major interest or from the Associate Dean of the College of Home Economics for the interdisciplinary doctoral program.

PROGRAMS LEADING TO THE DEGREE OF MASTER OF SCIENCE

Thesis Option.

 Majors and minors are offered in the following areas:

- Child and Family Studies
- Consumer Studies and Housing: Public Policy*
- Interior Design and Housing

*Requirements include Interior Design and Housing 5615 or Child and Family Studies 5170; Child and Family Studies 5700 or Planning 5100 or Economics 5340 or Agricultural Economics 4350. Three-hour course in research methods or statistics. Twenty-four hours in consumer studies or housing to include 9 hours of Child and Family Studies 5000 or Interior Design and Housing 5000.

- Consumer studies courses to be selected from Child and Family Studies 5140, 5170, 5180, 5700, 5800, 5900; Interior Design and Housing 5125; Food Science 4040; Textiles and Clothing 5180; Agricultural Economics 4710; Economics 5050-60; Political Science 5641, 5670-80, 5710; Library and Information Science 5260.

- Housing courses to be selected from Agricultural Mechanization 5110, 5610: Interior Design and Housing 4350, 5615, 5610-20-30; Planning 5360-80, 5450; Geography 5520.

Twelve hours in an area of home economics other than the area (consumer studies or housing) chosen above. Minimum 27 hours in and 9 hours outside College of Home Economics. Minimum of 27 hours 5000-6000 level courses and total minimum of 45 hours. Courses may be used to meet more than one requirement but all minimum requirements will need to be met.

In some instances two related collateral areas may be selected with 9 hours in each area and a minimum of 3 hours of a 5000 course in each. Collateral area(s) of study may be chosen in an area other than in home economics with the approval of the appropriate professors. An oral examination is required.

Note: Nine hours is the maximum credit allowed for special problems work and seminar work in any one area of home economics.

Non-Thesis Option

The non-thesis option is available for all majors listed under the thesis option and is the only option available for public health nutrition.

In addition to the regulations of the Graduate School, the non-thesis program of study for all majors except Consumer Studies and Housing: Public Policy** will consist of 45 credit hours with a minimum of 24 hours in the major field and 18 hours at the 5000 and 6000 level. A minimum of 27 hours of 5000 and 6000 level courses is required in the program. Some majors may require 9 hours in one collateral area.

Request for the non-thesis option must be made in writing by the student to the department head not later than the end of the first term in residence.

**Requirements include those listed under the thesis option for the major in Consumer Studies and Housing. Public Policy except that 21 hours are needed in consumer studies or housing to include Home Economics 5060 (6 hours), or Child and Family Studies 5060 or Interior Design and Housing 5060.
DOCTORAL PROGRAMS

The doctoral program in Home Economics provides three options for study: interdisciplinary, food science, and nutrition. The interdisciplinary option is available in all departments in the College. The doctoral program with a major in Home Economics requires:

1. A minimum of 96 quarter hours in courses beyond the bachelor's degree, exclusive of credit hours for the Master's thesis to include a minimum of 12 quarter hours of 6000-level courses.
2. Selection of an option and fulfillment of the requirements as supervised by the faculty committee.
3. The faculty committee for each doctoral student shall determine whether a reading knowledge of a foreign language is required.
4. Doctoral research and dissertation (minimum 36 hours; maximum 48 hours) may be included in the 96 hours presented for the degree.
5. A final examination.

Option Requirements

Interdisciplinary option: 1. Home Economics 6110-20, 6210. 2. Twenty-four to 36 hours from at least two departments in the College of Home Economics representing one of the following concentrations:
   - Individual and Family Behavior as related to development and change throughout the human life cycle: Emphasis may be on: normal developmental processes, in individuals and families; socialization through childhood, adolescence, and adulthood; interpersonal relationships; environmental and cultural settings; interaction processes within families; community services and planning to meet development needs of individuals and families.
   - Physiological Development and Well-being in humans throughout the life cycle. Emphasis for particular age groups may be on: physiological response to nutrient intake, improvement of nutritional status through informed consumer action; cultural, economic, and technological influences on food selection.
   - Environmental Factors in design, space planning, housing, food service systems, clothing, and textile materials; they relate to human needs. Emphasis may be on the impact of: cultural, sociological, psychological, and economic change; technological developments; aesthetics in improving the quality of the environment.
   - Consumers' Economic and Social Well-being throughout the life cycle. Emphasis may be on: the relationship between family structure and decision-making processes in the use of human resources; the effects of social, macro- and microeconomics and political development on consumption patterns and other behavior; community programs to meet the socioeconomic needs of consumers.
3. Fifteen to 24 hours in cognitive or supporting courses (mainly from departments in other colleges in the University) including courses to give sufficient competence in statistics or research methods needed for dissertation research. Additional courses will complement the option emphasis and dissertation research area.
4. Doctoral research and dissertation will be based on a problem within the interdisciplinary option concentration.

Food Science and Nutrition with concentration in food systems administration:

1. Three hours in research methods from Food Science 5510 or 5520 or Food Systems Administration 5210; 6 hours from Food Science 5610-20-30-40, 6110, Food Systems Administration 6110; and Zoology 5350 or equivalent.
2. Twenty-four hours in 5000- and 6000-level courses in food science or in food systems administration.
3. Nine hours in a collateral area (upon approval of student's faculty committee.
4. Doctoral research and dissertation will be based on a problem within the interdisciplinary option concentration.

Nutrition option:

1. Thirty hours of 5000 or 6000 courses in nutrition exclusive of research and Zoology 5350 or equivalent.
2. Nine hours in a collateral area (upon approval of student's faculty committee.
3. Twenty-four hours in 5000- and 6000-level courses in nutrition exclusive of research and Zoology 5350 or equivalent.
4. Minimum of 4 hours of credit in doctoral seminar.

SPECIAL WORKSHOPS

Workshops on special topics of current interest are offered periodically by the different departments in the College of Home Economics. These are of special interest to those desiring to work for advanced degrees. Announcements are sent upon request.

GRADUATE PROGRAMS FOR HOME ECONOMICS EXTENSION

Graduate programs at both the doctoral and Master's levels are available for students interested in home economics extension. At the doctoral degree level, programs of study may be planned in the interdisciplinary option or in the food science or the nutrition options. A Master's degree in Consumer Studies and Housing: Public Policy is particularly suitable for students interested in home economics extension, although Master's programs may be planned in any subject matter area of home economics with agricultural extension education as a collateral area. Additionally, four-week courses are offered in February each year for work in the field of meeting financial problems encountered during life cycle of family.

DEGREES

MAJORS

Child and Family Studies
Consumer Studies and Housing
Public Policy
Home Economics

DEGREES

M.S.
Ph.D.

Professors:
N. H. Belick, Ph.D., Michigan State; R. L. Higbarger, Ph.D., Iowa.

Associate Professors:
R. L. Cromwell, Ph.D., Minnesota; J. L. Cunningham, Ph.D., Michigan State; D. Eastwood, Ph.D., Tufts; V. M. Nordquist, Ph.D., Tennessee; R. M. Swagler, (Acting Head) Ph.D., Ohio State; P. White, E.D.D., Tennessee.

Assistant Professors:
M. F. Kalinowski, Ed.D., Massachusetts; P. Nowicki, M.S.M., need for international; G. Peterson, Ph.D., Brigham Young; L. Southworth, Ed.D., Tennessee; S. Twardosz, Ph.D., Kansas.

4110 Student Teaching in Preschool Settings (6) Increasing responsibility for planning and guiding groups of very young children under supervision of head teacher includes 2 hr weekly seminar. Prereq: 1500, 3210, 3300, 3350, 3360 recommended. E

4120 Family Finance (3) Analysis of alternative ways of meeting financial problems encountered during life cycle of family. E

4220 Conserving Time and Energy in the Home (3) Application of management principles to homemaking activities; evaluation of equipment, work centers and work procedure plans and energy demands. Adaptations for the handicapped.

4260 Adult Development and Aging (3) Adult life in our society. Adjustment to internal and environmental changes throughout the life cycle. Emphasis on research literature and research methodology. Prereq: 4 hrs psychology and 6 hrs child development or equivalent. W

4270 Learning Experiences with Parents (3) Dynamics of parent-teacher interaction. Emphasis on a variety of techniques for developing communication and working relationships between parents and teachers through experiences in a variety of settings. Prereq: 4110, 4120. W

4430 Family Relationships (3) Interpersonal relationships among family members and societal roles. Prereq: 3510 or 3515. Sp

4510 Child in the Community (3) Needs of children; community agencies meeting these needs; visits to agencies contributing to the welfare of children. Prereq: 2110 or Home Economics 1510 or equivalent. W

4620 Administration of Programs for Young Children (3) Planning, budgeting, raising, feeding, scheduling, and financing for day care of infants and young children, nursery school programs, and special education programs for deprived preschool children. Prereq: 3350 or 4110.

4630 Field Work in Child, Family and Consumer Studies (3-15) Opportunity for students to work in nursery schools or community agencies; focus on children, families, and/or consumer concerns. Hrs arranged. Prereq: Consent of instructor. May be repeated. Maximum 15 hrs. S/NC only. E

4710 Contemporary Developments (1-3) Student or staff-initiated course for study of special topic(s) pertinent to the field; topics selected to be determined by students and instructor with departmental approval. Elective credit only. Prereq: Consent of instructor. May be repeated with departmental approval. Maximum 9 hrs.

4810 Afro-American Families (3) Historical background, contemporary family structure and relationships; emerging needs and programs. Prereq: 4 hrs social sciences.

4830 Consumers and the Market (3) Analysis of elements in marketplace which create problems for consumers. Special attention is given to consumer decision making, marketing techniques, and constraints and opportunities associated with government protection of consumers. Prereq: Economics 2110. W. Sp

5000 Thesis (1-15) E

Departments of Instruction

Child and Family Studies

MAJORS

Child and Family Studies
Consumer Studies and Housing
Public Policy
Home Economics

DEGREES

M.S.
Ph.D.
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. S/C only. E, F

5003 Practicum (1-12) Field experience in selected agencies and organizations that focus on solutions to problems in consumer studies. Prereq: Consent of instructor. May be repeated. S/C only. E, F

5110 Field Work in Family Life (3) School and community programs concerned with education for family living. Prereq: Consent of instructor. May be repeated. S/C only. E, F

5140 Consumption and Standards of Living (3) Economic and welfare aspects of consumption. Analysis of factors associated with changes in the standard of living. Review of major consumption studies. Prereq: 4830 or 5170 or consent of instructor.

5150 Assessment of Family Behavior (3) Methods of measurement related to study of family. Current methodological issues. Prereq: 5410 or 5530 or consent of instructor.


5170 Consumer Economics (3) Consumer functions in economy; structure of consumer markets; government action relating to consumers; factors affecting price of consumer goods.

5180 Family Financial Consultation (3) Analysis of family expenditure patterns, common financial difficulties, avenues by which families are assisted. Field experiences with consumer consultation services. Prereq: 4210, 4830 or 5170. Sp.

5190 Standards in Consumer Protection (3) Product and performance standards in consumer protection. Theoretical and operational questions relating to standards; analysis of costs and benefits to consumers. Prereq: 4830, 5170 or consent of instructor.

5210 Theories of Child Development (3) Prereq: 4350 or equivalent. W

5220 Family Life Programs (3) School and community programs in family life; survey and evaluation; students concentrate on type best suited to their experience and future professional orientation. Prereq: 3 hrs child development, 3 hrs family relationships, 3 hrs sociology. 2 hrs and 1 lab.

5310 Theory and Research on Human Sexuality (3) Theory and research about how children change parents and influence marital relationships. Prereq: 4430 or consent of instructor.

5350 Supervision in Preschool Programs (3) Seminar and practicum in techniques for teaching child development and family relationships. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5400 Origins of Food and Foodwayds (3) Food origin and development of individual and group foodways. Prereq: 8 hrs social science or humanities. F, W

5410 Introductory Experimental Food Science (3) Physical and sensory evaluation in experimentation with fats, high protein foods, and batter and dough systems. Prereq: 3510. 2 hrs and 1 lab. W, Sp.

5420 Experimental Food Science (3) Individual experimentation and research relating to food supply. Prereq: 4010. Nutrition 3320 recommended. 1 hr and 2 labs. Su, A

5430 Food in Contemporary Society (3) Consumer's responsibility and potential influence with respect to food supply. F, W

5470 Elements of Consumer Choice (3) Analysis of consumer decision making, theory of consumer behavior, impact of affluence on consumption, consideration of dynamic aspects of consumer behavior, including roles of aspirations, expectations, unemployment and information. Prereq: 5170 or consent of instructor.

5720 Consumer Protection (3) Consumer protection, regulatory agencies, standards, information and consumer confusion and protection legislation. Assumptions involved in these efforts and relative success of different strategies. Prereq: 5170, 5180 or consent of instructor.

5750 Children's Effects on Parents and Marriage (3) Theory and research relating to children and families. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5760 Counseling Children and Families (3-6) Environment of children and families; individual counseling. Prereq: 5420 or consent of instructor. May be repeated. Maximum 9 hrs.


5790 Elements of Consumer Choice (3) Analysis of consumer decision making, theory of consumer behavior, impact of affluence on consumption, consideration of dynamic aspects of consumer behavior, including roles of aspirations, expectations, unemployment and information. Prereq: 5170 or consent of instructor.

5790 Food Science, Nutrition, and Food Systems Administration

MAJORS

Food Science

DEGREES

M.S.

M.N.

M.S.

Ph.D.

Food Science

Nutrition

Food Systems Administration

Food Science

Nutrition

Food Systems Administration

MAJORS

DEGREES

M.S.

M.S.

Ph.D.

Food Science

Nutrition

Food Systems Administration

MAJORS

DEGREES

M.S.

M.S.

Ph.D.

Food Science

Nutrition

Food Systems Administration

MAJORS

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M.S.

M.S.

Ph.D.

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Food Systems Administration

MAJORS

DEGREES

M.S.

M.S.

Ph.D.

Food Science

Nutrition

Food Systems Administration

MAJORS

DEGREES

M.S.
5410-20 Human Nutrition (3) Functions of carbohyd rate, proteins, lipids, minerals and vitamins. Nutritional requirements of humans throughout life and practical problems in meeting require ments. Prereq: 5410 or consent of instructor. W, Su.

5430 Physiological Bases for Diets in Disease (3) Developments in dietary treatment of disease in which nutrition plays a major role. Prereq: 5210 or equivalent. Su.


5450 Survey Methods in Human Nutrition (3) Food consumption, food practices and nutritional status of population groups. Prereq: 5210 or 5410-20. 2 hrs and 1 lab.

5460 World Food Supply and Human Nutrition (3) Food supplies and food practices as related to human nutrition throughout world. Regional, national and international agencies concerned with food and nutrition problems. Prereq: 5210 or 5410-20. W.

5470 Nutrition and Aging (3) Nutritional problems of aging individual, nutritional requirements, dietary intakes and effect of nutrition on rate of biological aging. Prereq: 5210 or consent of instructor. W.

5510 Nutrition in Mental Retardation and Developmental Disorders (1-12) Interdisciplinary diagnosis and treatment of developmentally handicapped children. Prereq: 5231 or equivalent. Clinical experience and lectures at Child Development Center, Center for the Health Sciences, Memphis. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs.

5520 Problems in Nutrition (1-3) Advanced study selected from field of nutrition. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 3 hrs. S/NC only.

6000 Doctoral Research and Dissertation (3-15) E Theses and dissertations leading to the degree requirements. May be repeated. Maximum 9 hrs.

6000 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.

6480 Nutrition (3) Physical and chemical characteristics of the proteins of milk, eggs, flour, and meat with emphasis on their behavior in food. Prereq: 4010; Nutrition 3320-30 or equivalent.

6500 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.

6600 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.

6700 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.

6800 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.

6900 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.

7000 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.

7100 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.

7200 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.

7300 Seminar (1-3) May be repeated. Maximum 3 hrs. S/NC only.
physical plant and maintenance. Electrical, mechanical, heating, plumbing, air conditioning and ventilation and illumination systems. Types of building materials and their functions. Prereq: 4130, 4150 or consent of instructor. 3 hrs and 1 lab. W. A.

4270 Tourism, Food and Lodging Information Systems (3) Qualitative and quantitative analysis of information systems for decision making in food and lodging operations or other operations related to tourist industry. Prereq: 4130, 4280. Computer Science 1410 or 1410. Sp.

5000 Thesis (1-15) E.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only; E.

5110-20 Experimental Quantity Food Study (3, 3) Analysis of food production, holds and service problems related to quality of food prepared in volume. Management resources. Prereq: 4130, 3110, or consent of instructor. Su, A.

5210 Methods of Food Systems Research (3) Research methods applicable to food systems administration. Prereq: 4130, Statistics 2511 or equivalent. W.

5220 Experimental Design of Food System Facilities (3) Environment in which food is prepared, held, and served in volume. Prereq: 4150. Su.

5230 Food Systems Evaluation (3) Management research on food systems. Standards for control. Prereq: 4130, or consent of instructor. F.


5310 Administration of Food Service Delivery Systems (3) Role and responsibilities of administrator in maintaining desired qualitative and quantitative standards in food system. Prereq: 3110 or consent of instructor. W, A.

5500 Clinical Training in Health Care Agencies (3) Instructional and supervisory techniques in clinical settings for dietitians and other personnel of entry-level health care providers. Prereq: Nursing 4760 or consent of instructor.

5700 Current Programs and Trends in Food Systems Administration (1-3) Recent advances in food system administration and implications for dietitians, school food service directors, and others in related fields. Prereq: Consent of instructor. May be repeated.

5800 Problems in Food Systems Administration (1-3) May be repeated.

5850 Field Experience (3-9) Planned administrative experiences in food service system. Prereq: Consent of instructor.

5900 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.

6110 Advanced Topics in Food Systems Administration (3) Comprehensive individual study and group discussion of current problems in food systems administration. Prereq: Consent of instructor.

6210 Manpower Planning and Training for the Food Service Industry (3) Identification of manpower needs by skill level; programs for personnel in food service industry. Prereq: 4140, 5210 or consent of instructor. Sp.

6310 Quantitative Methods to Control Resources in Food Service Systems (3) Interrelationships of resources and evaluation of efficiency and effectiveness in food service systems. Prereq: 5230 or consent of instructor. Taken in sequence. Credit for 6310 contingent upon completion of 6320. Su, A.

6900 Seminar (1-3) May be repeated. S/NC only. E.

Home Economics

MAJOR Home Economics

DEGREE Bachelor of Science in Home Economics

Graduate study in home economics education provides for an M.S. in Vocational-Technical Education (concentration in home economics education) and opportunity for participation in the Ed.D. program in Vocational-Technical Education in the College of Education. (See page 61 for staff and course offerings.)
90
College of Home Economics
rial; search for aesthetic potential in depth.
5060 Practicum (1-12) Field experience in selected agencies and organizations that focus on solutions to problems in housing.
5120 Historic Interior Design (3) Research studies of historical interior design. Variable course content, emphasis on interior design, furniture and/or accessories for England, Scandinavia, Mediterraneum, and South America. May be repeated. Maximum 18 hrs.
5210 Furniture Appreciation (3) Aesthetic qualities of past and present styles. Significant structural and functional changes.
5310 Interior Design (3) Advanced problems in planning and design of interior spaces; application of research information in making design decisions. Prereq: Consent of instructor.
5410 Advanced Problems (3) Individual development of techniques and appreciation. Prereq: 9 hrs related or equivalent.
5510 Environmental Factors in Interior Design (3) Human factors and associated research techniques related to design of interior architectural environments - derivation of design implications from research-oriented interior design projects. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.
5520 Environmental Factors in Interior Design (3) Synthesis of design methodology as applied to design of microenvironments using human factors information. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.
5530 Environmental Factors in Interior Design (3) Human factors and systematic design methodology applied to analysis, synthesis, and evaluation of research-oriented interior design projects. Comprehensive design research project by 2-3 member teams. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.
5610 Furniture Design (3) Analysis of human factors data in design of body support, task support, and storage furniture pieces and systems; production of computer designs and scale models. Prereq: Consent of instructor. Sp
5613 Housing Management (3) Role and functions of housing management specialist in problems of private and assisted housing management. Prereq: 4320 or consent of instructor.
5614 Housing Regulations and Controls (3) Functions of regulations and other control practices and mechanisms as determinants of nature, availability, and accessibility of housing in local communities by various user groups. Prereq: 4320 or consent of instructor.
5615 Housing Programs and Policies (3) Analysis of private and public programs and policies related to housing and urban renewal. Impact of such programs on homes and living environments for families. Economic and social problems related to national housing objectives. Prereq: 4320 or consent of instructor.
5620 Experimental Methods in Household Equipment (3) Research methods and techniques in determining performance of household equipment. Prereq: 2430 or consent of instructor. 1 hr and 2 labs.
5630 Environmental Requirements for Family Work Centers (3) Trend in planning work center areas such as kitchens and laundry; adequacy, convenience, surface treatment, facilities and costs; problems of installation and remodeling.
5619 Environmental Design Research (1-3) Evaluation and application of research methodologies to interior design problems. Hours and credit arranged. Prereq: 5610-20-30 or equivalent and consent of instructor and professor in charge of investigation. May be repeated. Maximum 9 hrs.
5620 Interior Design (1-3) Advanced study in interior design. Hours and credit arranged. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs. E
5630 Problems in Housing (1-3) Advanced study in housing. Hours and credit arranged. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs. E
5910-20-30 Seminar (1-4, 1-4, 1-4) Hours and credit arranged. Prereq: Consent of instructor.
6110 Contemporary Housing Issues and Problems (3) Individual study and group discussion of current issues and problems related to housing. Prereq: Consent of instructor.
6120 Advanced Topics in Housing Research (3) Various concepts, theories and methodologies of social science in housing research. Prereq: Consent of instructor.
6210 Environmental Design Analysis (3) Advanced methodology in psychobiology of environmental factors in design, multidisciplinary analysis of research data and methods. Prereq: 5510-20-30.
6420 Perspectives in Interior Design (3) Historical influences related to contemporary concepts in interior design. Prereq: 5040, 6 hrs of graduate level interior history, or consent of instructor.

Textiles and Clothing

MAJORS

Textiles and Clothing

Associate Professors:
Faculty Associate:
I. M. Ford, Ph.D. Tulane.
Assistant Professors:
T. L. Vigo, Ph.D. Tulane.
Assistant Professors:
C. E. Cox, Ph.D. Tennessee; L. A. Kocher, Ph.D. California (Davis).

4210 Elementary Textile Microscopy (3) Microscopic techniques as applied to the study of textile fibers and fabrics. Prereq: 4040. 1 hr and 2 labs. W, A
4240 Design Analysis II (3) Interpretation of dress design terminating in finished garments developed through the media of draping.
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
5110 Textiles Testing and Methods of Research in Textiles (3) Physical and chemical testing. Research methods. 3 labs.
5120 Advanced Problems in Textiles and Clothing (3) Refresher course; new developments in textiles. 3 labs.
5130 Advanced Tailoring (3) Comparison of hand coat techniques, or costumes. 3 labs.
5260- Emphasis on fabric characterization of fibers. 5260-5270 need not be taken in sequence. 5250-5260-5270 emphasis on structure; property-relationships and reactions of fibers. 5250-5260 emphasis on fabric finishes. 5270-emphasis on dyes and dyeing. Prereq: 3420 or equivalent; 1 qtr organic chemistry. 2 hrs and 2 labs.
5310 Fashion Analysis (3) Fashion as social and economic force; evolutionary theories of fashion operation. Prereq: 6 hrs each of sociology and economics.
5320 Problems in Historic Costumes (3) Variable flow of styles in relation to cultural determinants. Prereq: 3480 or consent of instructor. May be repeated. Maximum 9 hrs.
5700 Current Programs and Trends in Textiles and Clothing (1-3) Pertinent developments and trends in textiles and/or clothing and implications for new types of programs, techniques and/or curricula approaches. Content and emphasis vary according to changes in field and needs of groups serviced. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
5800 Problems in Textiles and Clothing (1-3) Advanced study selected from field of textiles and clothing. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs.
6030 Practicum (1-6) Off-campus experience with business, industry, governmental agencies and civic groups; preplanned; supervised. Prereq: Consent of major advisor and department head. May be repeated. Maximum 9 hrs. S/NC only.
6250-60-70 Problems in Textile Chemistry (4, 4, 4) Theoretical and experimental study of chemistry of textile fibers including polymerization, reactions, dyeing, and finishing. Prereq: 5260 and 5270 must be taken first. 5260 and 5270 must be taken in sequence. Emphasis on structure; property-relationships and reactions of fibers. 5250-emphasis on structure; property-relationships and reactions of fibers. 5250-emphasis on fabric finishes. 5270-emphasis on dyes and dyeing. Prereq: 3420 or equivalent; 1 qtr organic chemistry. 2 hrs and 2 labs.
6410 Advanced Topics in Textiles and Clothing (3) Pertinent developments and trends in textiles and clothing. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. W
6410 Selected Issues in Textiles and Clothing (3) Advanced topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
6410 Selected Behavioral Theories in Clothing (3) Role of clothing in functioning of people, utilizing behavioral theories. Prereq: 5170, 6 hrs of graduate level sociology or psychology, or consent of instructor.
6150 Social-Psychological Theories of Clothing Consumption (3) Analysis and evaluation of social science theories of consumer behavior in relation to textiles and apparel. Prereq: Child and Family Studies 5170, 6 hrs of graduate level sociology or psychology, or consent of instructor.
6160 Textile Flammability (3) Factors affecting textile flammability as consumer issue. Standards, regulations, test methods, economic impact. Prereq: 5120, 5150, 5250, or consent of instructor.
6170 Physical Performance Behavior of Textile Structures I (3) Fundamentals of yarns and fabric structures; relationship of structure to physical characteristics of textile materials. Prereq: 5120, or consent of instructor.
6910 Seminar in Textiles and Clothing (1-3) May be repeated. Maximum 6 hrs.
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.
5110 Textiles Testing and Methods of Research in Textiles (3) Physical and chemical testing. Research methods. 3 labs.
5120 Advanced Problems in Textiles and Clothing (3) Refresher course; new developments in textiles. Selecting fabrics, agencies aiding consumer, and individual problems in textile field. 2 hrs and 1 lab. F
5130 Advanced Tailoring (3) Comparison of hand tailoring and trade methods used in making suits, coats, or costumes. 3 labs.
5150 Principles of Design Analysis (3) Application of flat pattern theory to garment design incorporating relationships of fabric geometry, texture, hand, and surface ornamentation to design. Prereq: Consent of instructor. 1 hr and 2 labs. W
5160 Review of Literature (3) Intensive survey and evaluation of recent literature; implications for further research. F
5170 Social, Psychological and Economic Aspects of Clothing (3) Clothing as it relates to human behavior. Prereq: 6 hrs or equivalent from each of following areas: sociology, psychology, economics. W
5180 Advanced Textile Economics (3) Economic problems or problem areas of current importance in textile and apparel industries - production, consumption, and governmental policy. Prereq: 3420, 6 hrs economics or consent of instructor. W
5210 Evaluation of Instructional Materials in the Field of Textiles and Clothing (3) Evaluating instructional and communicating information in various areas of textiles and clothing. 1 hr and 2 labs.
5220 Historic Textiles (3) Development of textile industry in world; fibers used, design, and color. F
Aviation Systems

MAJOR
Aviation Systems

DEGREE
M.S.

Lead Professor:
M. A. Wright, Ph.D. Wales.

Professors:
W. Frost, Ph.D. Washington; W. F. Jacobs, Ph.D. Boeblingen (Germany); A. A. Mason, Ph.D. Tennessee; J. M. Wu, Ph.D. California Institute of Technology; R. L. Young, Ph.D. Northwestern.

Associate Professors:
F. G. Collins, Ph.D. California (Berkeley); R. D. Kimberlin, M.S. Tennessee; J. R. Maus, Ph.D. North Carolina State.

Assistant Professors:
W. B. Baker, Jr., Ph.D. Tennessee; W. J. Boaz, M.S. Florida State; V. K. Smith, III, Ph.D. Georgia Institute of Technology.

The University of Tennessee Space Institute offers a program leading to the Master of Science with a major in Aviation Systems. The Aviation Systems program is designed for those who possess a Bachelor's degree in engineering or science and who wish to study under a "systems philosophy" toward careers in research and development or administration in various phases pertinent to aviation. The program features 18 quarter hours major field credit in various aspects of aviation systems, or more quarter hours credit in each of the areas of research, development and administration, and electives which permit further specialization to either area.

To qualify for admission to this program, the applicant must possess a Bachelor's degree in engineering or science from a recognized institution, show evidence of ability to pursue and benefit from the program, and fulfill the University of Tennessee Graduate School admission procedures and grade point standards. Subject matter prerequisite to the program includes basic knowledge of computer utilization as represented by Computer Science 3150 or equivalent, a background in accounting as represented by Accounting 5030 or equivalent basic accounting courses, a basic knowledge of economics as represented by introductory economics or equivalent.

Both thesis and non-thesis programs are available. The thesis program involves satisfactory completion of the following minimum requirements:
1. 18 hours in the major field of aviation systems.
2. For the research and development area, 6 quarter hours in Industrial Engineering 5700 and 5710; for the administration area, 6 quarter hours in Economics 5030 and Accounting 5810, for a total of 12 quarter hours.
3. 6 hours of electives selected from the major field, engineering and/or the areas in item 2.
4. 9 hours in Aviation Systems 5000, Thesis, hence demonstrating the ability to conduct and report on an independent investigation.

The non-thesis program will be permitted in special circumstances and involves satisfactory completion of the following minimum requirements:
1. 18 hours in the major field of aviation systems.
2. For the research and development area, 9 quarter hours in Industrial Engineering 5700, 5710, and 5720; for the administration area, 9 quarter hours in Economics 5030, Accounting 5810 and Finance 5010-20, for a total of 18 quarter hours.
3. 6 hours of electives in one of the areas in item 2.
4. 6 hours of electives in the major field, engineering and/or the areas of item 2.
5. Satisfactory completion of 3 quarter hours in Aviation Systems 5100, Project in Aviation Systems.
6. Satisfactory completion of a comprehensive final written examination on all course work submitted for the degree and defense of the project course paper.

The thesis program involves 51 quarter-hour credits minimum while the non-thesis program involves 51 quarter-hour credits minimum.

Courses suitable for credit in the major field include:
- Aerospace Engineering 5810 and 5820, Industrial Engineering 5840; Aviation Systems 5070, 5080, 5090, 5210, 5220, and 5910.

Electives typical of those suitable for credit in the area of aviation systems, research and development include:
- Aerospace Engineering 5150-60-70; Computer Science 3510-20, 4550 and 5855-65-75; Industrial Engineering 4060, 4150, 4230, 5720, 5730, 6700, 6730; Mathematics 4225-35-45, 4510-20-30; Metallurgical Engineering 5810-20-30; and Statistics 3450.

Electives typical of those suitable for credit in the area of aviation systems, administration include:
- Accounting 5020; Business Law 5010; Economics 5020; Management 5130; Marketing 5010-20; Transportation 5050, 5130, 5210-20, and 5910.

5000 Thesis (1-15) E

5070 Airports and the Community (3) Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling. Airport management, economics and logistics. Interfaces with the community, collection and distribution, demand requirement analyses, types of developments and their projections. Prereq: Aerospace Engineering 5810.

5080 Collection and Distribution (3) Capabilities, technology, plans, programs and developments for collecting and distributing passengers and freight to and from various types of airports. Ground, water, air and mixed transportation modes, present and future; requirements analysis, and model analysis of the system. Prereq: Aerospace Engineering 5810.

5090 Governmental Policies for Aviation (3) Theoretical and legal basis for economic and governmental regulation of aviation. Historical and legislative development of aviation regulatory agencies, organizational structure and administrative and enforcement procedures. Prereq: Aerospace Engineering 5810.

5100 Project in Aviation Systems (3) In-depth study and formal report on aviation systems topic, normally performed during last quarter of work toward degree in non-thesis program. For aviation systems degree candidates only.

5210-20 Experimental Flight Mechanics (3, 3) Flight mechanics, experimental techniques. Specialized-equipped airborne laboratory allows active student
participation in series of experiments demonstrating acquisition of flight test data. Tests conducted covering broad range of aircraft performance, stability, and control characteristics. Development of theory necessary to support class experiments, test techniques, and course reduction methods. 5210 emphasizes performance; 5220 emphasizes stability and control. Prereq: Aerospace Engineering 4820.

5970 Special Topics in Aviation Systems (3) Current problems in aviation systems. Prereq: Consent of instructor. May be repeated with consent.

5970 Human Paleontology (4) 5970 Primate Paleontology (3) 4960 Zoarchaeology (3)

5970 Emergence and Early Evolution of Man (3) 4970 Human Paleontology (4) 4960 Primate Paleontology (3) 4970 Human Paleontology (4)

5970 Emergence and Early Evolution of Man (3) Botany 4510 Plant Ecology (4) 5340 Plant Geography (4) 5350 Analysis of Plant Communities (4)

5120-20-30 Systems Ecology (3, 3, 3) 5830 Field Methods in Plant Ecology (4) 6320 Ecosystems of the World (3) 5000 Thesis (1-15) E 5100 Special Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. 3 hrs. 5210-20-30 Principles of Ecology (2, 2, 2) Theories and problems in ecology. Comparisons between land, freshwater, and marine environments, including humanity's role in the world's ecosystems. Must be taken in sequence. Prereq: 4 hrs of ecology at the upper division level.

5310 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. For students in Graduate School of Planning and Environmental Engineering.

5320 Implementation of Environmental Policy (3) Goals and problems of environmental legislation, especially National Environmental Policy Act; purpose, preparation, and evaluation of environmental impact statements and similar multidisciplinary studies. Prereq: 5210 or 5310, or Environmental Engineering 4820.

5610 Environmental Toxicology (3) (Same as Biochemistry 5610)

5640 Techniques in Environmental Toxicology (2) (Same as Biochemistry 5640)

6000 Doctoral Research and Dissertation (3-15) E 6110 Seminar in Animal Behavior (2)

6100 Seminar in Aquatic Ecology (2) 6120 Seminar in Aquatic Ecology (2) 6130 Seminar in Physiological Ecology (2)

6140 Seminar in Community Ecology (2) 6150 Seminar in Radiation Ecology (2) 6160 Seminar in Systems Ecology (2) 6431 Current Topics in Environmental Toxicology (1) (Same as Biochemistry 6431)

Economics 4260 Economics of Resources and Environmental Policies (3) 4530 Sanitary Engineering Laboratory (3) 4600 Solid Waste Management (3)

4700 Air Pollution-Air Resources Management (3) 5593 Advanced Sanitary Engineering Laboratory (3) 5700 Planning and Air Pollution Control (3)

5700 Air Pollution Control Engineering (3) 5710 Air Pollution Control Engineering (3)
The Master's and doctoral programs are offered jointly by the Department of Psychology and the Department of Management. They are designed to prepare students for personnel, managerial, and organizational research, for university teaching, and for consulting relationships with industry. The emphasis is upon applied research utilizing a thorough theoretical background, including classical and modern organization theory, organizational behavior, psychology, and management. The programs are administered by a joint committee of the two departments, appointed by the Vice Chancellor for Graduate Studies and Research on recommendations from the two department heads.

It is intended that students entering the program will represent widely different undergraduate and graduate backgrounds including psychology, business administration, engineering, science, and liberal arts. The first-year program provides the opportunity to take courses which will assist the student to attain a reasonable level of sophistication in areas of deficiency.

ADMISSION PROCEDURE

Applicants for admission should request forms and materials from both the Graduate Office and the Chairperson, Industrial and Organizational Psychology Program, 413 Stokely Center for Management Studies. Two separate applications must be completed: one application for admission to the Graduate School and one application for admission to the Industrial and Organizational Psychology program.

Deadline: For fall entrance, all materials should be received by the Vice Chancellor for Graduate Studies and Research no later than March 1 if you wish financial assistantship consideration. Standards: At least 9 quarter hours of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade-point average of 2.5 or above is required, with no evidence of special weakness in mathematics and physical sciences.

Test scores on the Graduate Management Admission Test or on each section of the GRE are preferred. Admission Test or on each section of the GRE are preferred. Admissions are administered by a joint committee of the two departments, appointed by the Vice Chancellor for Graduate Studies and Research on recommendations from the two department heads.

THE MASTER'S PROGRAM

I. Course Requirements

A. Minimum course requirements:

1. Management or Psychology 5170, 5180, 5190.


3. Minimum of three 6000-level seminars to be selected from Psychology or Management 6250, 6260, 6270, and Management or Psychology 5380.

4. 36 hours of Psychology or Management 5000.

B. Recommended electives:

1. For preparation for advanced section (81) GRE: Psychology courses as appropriate.

2. For students who require preparation in psychometrics: Applied psychometrics.

3. For students who require preparation in management: Management 5110, 5120, 5220, 5230.

4. For students who wish to pursue special research interests aside from their dissertation: Management 5250, 5260, 5270, Management or Psychology 5900.

5. Courses available in areas related to industrial and organizational psychology:

a. Through College of Business Administration;

b. Through College of Liberal Arts;

c. Others as approved by advisor.

II. Program Requirements

A. Attainment of a B average in Management or Psychology 5170, 5180, 5190.

B. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 650 on the GRE Advanced Test in Psychology.

C. Completion of a general preliminary examination in scientific methodology before beginning the third year of study. This examination covers the following specific areas: statistics, psychometrics, experimental design.

D. Completion of a special preliminary examination in the area of the student's major research and professional interest. A student is expected to take this examination by the end of twelve quarters. This examination may be repeated once, normally no later than six months after the first attempt, at the discretion of the student's doctoral committee.

E. By the end of nine quarters a student is expected to choose a major advisor (Chairperson of Doctoral Committee).

F. Completion of an oral examination following the preparation of a doctoral dissertation. This examination covers the field of doctoral research and related topics, and must be passed at least four weeks prior to the awarding of the degree.

G. Maintenance of at least 3.0 grade point average.

THE DOCTORAL PROGRAM

I. Course Requirements

A. Minimum course requirements:

1. Management or Psychology 5170, 5180, 5190.

2. Statistics 5050-60-70 and 3 hours of applied psychometrics.

C. Eighteen hours of additional course work to be selected primarily from among the 5000-level course offerings in management and psychology (e.g., Management 5110, 5120, 5220, 5230).

D. Nine hours of Psychology or Management 5000 (Master's Thesis).

II. Program Requirements

The Ph.D. program requirements described below in sections II A, II B, and II G comprise the major requirements for a Master's degree.

An oral examination covering the thesis and related topics must also be completed.

*May be repeated for additional credit.

**Any student in the doctoral program may be required to prepare a Master's thesis by the Industrial and Organizational Psychology Committee. This policy will be implemented by the committee at such time as a review of the student's record suggests that additional data on the qualifications for pursuing a Ph.D. are required.

***See program handbook for definition of a B average.
Management Science

MAJOR DEGREE
Management Science M.S.

Committee:
C. E. Bell (Chairperson), Management Science; R. W. Bolding, Management; J. S. Bradley, Mathematics; R. L. Church, Civil Engineering; R. S. Garfinkel, Management Science; E. Glustoff, Economics; R. E. Rosenthal, Management Science; S. Selkow, Computer Science; R. E. Shrieves, Finance; C. C. Thigpen, Statistics.

THE MASTER'S PROGRAM

The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of management problems in large organizations. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science course work will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program allows concentrated study in an area of application within the College of Business Administration. With the widespread application of management science technology, the student may (with the approval of the Management Science Committee) choose an applied concentration in a field outside the College of Business Administration.

Applications are encouraged from all majors, but mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language (e.g. Computer Science 3150) is required. The program is designed to be completed in one calendar year of full-time study, but applications are also encouraged from prospective part-time students.

Course Requirements

<table>
<thead>
<tr>
<th>Course Area</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Science 5310-20-30-35-40</td>
<td>14</td>
</tr>
<tr>
<td>Applied concentration area (approved by advisor)</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 5110</td>
<td>3</td>
</tr>
<tr>
<td>Statistics elective (5000 level or above)</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (4000 level or above)</td>
<td>6</td>
</tr>
<tr>
<td>Electives selected from mathematics, statistics, computer science, and/or management science</td>
<td>6</td>
</tr>
<tr>
<td>Electives in any area approved by advisor</td>
<td>6</td>
</tr>
</tbody>
</table>

Total 50

A thesis option is available which substitutes 9 hours of thesis credit for the following 14 hours of course work: Management Science 5335-40, and one 3-hour course in the applied concentration area and 6 hours of electives in any area. The Management Science Committee will work closely with the student in tailoring a program to his/her needs. The committee must approve a tentative overall program during the student's first quarter and must approve all courses on a quarter-by-quarter basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. For example, an undergraduate mathematics major with a strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirements. On the other hand, a student lacking experience in rigorous senior-level mathematics courses will be asked to take such courses to fulfill the 6-hour mathematics requirement. The total course load will remain 50 hours for all non-thesis students and 45 hours for all thesis students; however, the number of hours of electives can be reasonably expected to vary between 6 and 18 as a function of prior background.

For course listings and description of the Ph.D. program in Management Science, refer to the Department of Management Science, College of Business Administration.

Water Resources Development

William F. Brandes, Director, Water Resources Research Center

3410 Principles of Ground Water Geology (3) (Same as Geology 3410.)
3565 Introduction to Public Administrative Organization and Management (4) (Same as Political Science 3565.)
4110 Managerial Economics (3) (Same as Economics 4110.)
4810 Water Law (3) (Same as Environmental Engineering 4810.)
5000 Thesis (1-15) E
5130 Planning Research Methods I (2) (Same as Planning 5130.)
5160 Planning and Utilities (3) (Same as Environmental Engineering 5160 and Planning 5160.)
5340 Hydrology of Agricultural and Forest Lands (3) (Same as Agricultural Engineering 5340.)
5410-20-30 Interdisciplinary Seminars (3, 3, 3) Problems relating to comprehensive water resource development; flood management, hydroelectric power, navigation, recreation, alternatives in water resource planning, tomorrow in today's planning, project formulation and justification, direct and indirect economic consequences, state and local participation, and municipal and industrial uses of water developments.
INDEPENDENT STUDY

Certain educational goals may best be met through independent study done by an individual under the direction of a faculty member. Students who wish to do such independent work should obtain the approval of the faculty members and the departments concerned prior to embarking upon their study. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

FOREIGN STUDY COURSES

Foreign study courses offered in some departments of the College provide an opportunity to undertake independent study outside the United States. Prior to departure the student must have a plan of study approved by the department head and a supervising faculty member of the department concerned. Credit will be given only upon fulfilling all requirements set by the department and may vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

OFF-CAMPUS STUDY

Recognizing that learning is not restricted to formal classroom situations, the College provides for students to earn credit toward graduation for approved off-campus study. Such study may be undertaken only with prior approval of the faculty member and the department concerned. It may include certain kinds of work experiences, community involvement, working in political campaigns, etc. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

The formal requirements for the Master's degree include:
1. A minimum of three quarters of residence at The University of Tennessee, Knoxville.
2. A minimum of 45 quarter hours for graduate credit, including preparation of thesis. Thirty-six of these 45 hours must be in anthropology, 9 hours may be taken in closely related disciplines (at least one-half of the courses must be at the 5000 level).
4. A thesis. In addition to the two (2) copies required by the Graduate School, one bound copy of the thesis is to be presented to the department and one bound copy to the student's thesis advisor.

THE DOCTORAL PROGRAM

Although there is no minimum credit hour requirement for the Ph.D. degree, students in this program should plan to devote to its attainment no less than 3 years beyond the B.A. level and to complete the following requirements:
1. Admission to Ph.D. program through passing Graduate Evaluation Examination at completion of first year of study, or through departmental acceptance of a previously earned M.A. degree in Anthropology.
2. Formation of an advisory committee and establishment in consultation with that committee of a program of study. Delineation of field(s) of competence by the student and committee and subsequent presentation to graduate advisor.
3. Demonstration of competence in a foreign language as determined by the student's committee.
4. Successful completion of oral and written comprehensive examinations and admission to candidacy.
5. Successful completion of the dissertation and final oral examination.

3070 Genetics and Society (3) (Same as Botany 3070)
3410 Principles of Cultural Anthropology (3) Basic concept and objectives in study of culture. Range of cultural phenomena and approaches to its study. Recommended prerequisite: 2530. F or W
3440 Religion of Primitive Peoples (3) Religions of nonliterate peoples. Place of religion in their social and cultural systems. Recommended prerequisite: 2530. (Same as Religious Studies 3440) F or Sp
3450 Community Studies in Complex Culture (3) Review of cross-cultural comparative urban and village communities and methodologies used in community studies. Recommended prerequisite: 2530. A

2530 Peoples and Cultures of Africa (3) Ethnographic survey of the aboriginal cultures of sub-Saharan Africa. Cultural diversity and human ecology. Course area perspective. Recommended prereq: 2530. F

3540 North American Indian (3) An ethnographic survey of cultures of Arctic, Southwest, Plains and Eastern Areas. Emphasis on cultural differences of peoples occupying these areas during precolonial periods. Prereq: 2530. F

3555 Cherokee Ethnohistory (3) Survey of sociopolitical aspects of internal affairs and external relationships from first European contact to present. Emphasis on eighteenth and nineteenth centuries. F

3560 Peoples and Cultures of Mesoamerica (3) Ethnographic survey of aboriginal peoples and post-conquest changes in Indian cultures. Emphasis upon analysis of small rural communities using modern village studies as source material. Recommended prereq: 2530. A

3570 Archaeology of United States and Canada (3) Survey of prehistoric peoples north of Mexico from initial occupation to European contact. Recommended prereq: 2530. F

3620 European Prehistory I (3) Cultural development during Old and Middle Paleolithic and Neolithic. Recommended prereq: 2520. W, A

3630 European Prehistory II (3) Cultural developments during the Metal Ages. From the close of Neolithic to Iron Age. Recommended prereq: 2520. 3630 and 3830 should be taken in sequence. W, A

3640 Ancient Civilization of Mesoamerica (3) Introduction to archaeology of areas of advanced Indian culture in Mexico and Central America beginning with earliest cultures and proceeding to contact with European missions. Recommended prereq: 2520.

3660 Prehistory of Tennessee (3) History of archaeological research in Tennessee and survey of prehistoric American Indian cultures identified through research. Sp

3670 Principles of Archaeology (3) Research strategies in archaeological excavation, interpretation, and explanation. Prereq: 2520 or consent of instructor. A

3700 Forms of Folklore (4) Introduction to the anthropological study of folklore. Spring

3710 Survey of European Folk Cultures (3) Material and other aspects of folk life as expressed in beliefs, art, and folklore, under changing historical and social conditions. Fall

3800 Language and Culture (3) Relationship between linguistic categories and patterns of culture. Prereq: 2540 or consent of instructor. Recommended: 2530.

3811 Introduction to Musology (3) (Same as Art 3811.)

3900 Human Osteology (4) Intensive examination of the human skeleton. Prereq: 2510 and consent of instructor. 3 hrs. and 1 lab. F

3920 Principles of Physical Anthropology (3) Survey of materials and methods in physical anthropology. Recommended prereq: 2510.

3930 The Biology of Races of Man (3) Processes of racial evolution; criteria of significant differences among existing stocks; influence of biology and culture in race formation; analysis of studies concerning blood groups, race mixture, constitution growth and nutrition. Recommended prereq: 2510. Sp

3950 Human Identification (3) Introduction to technigues of identification of the human skeletal material in forensic medicine. Sp, A

4110 Education in Cultural Perspective (3) (Same as Curriculum and Instruction 4110.) Fall

4111 Non-Western Education: Anthropological Approaches (3) Analysis of traditional educational practices among non-Western peoples and problems encountered from application of Western models of education among those peoples. Particular attention is given to unique aspects of African, Asian, and American Indian cultures. (Same as Curriculum and Instruction 4111.) W

4200 Contemporary North American Indian (3) Survey of Indian cultures from initial Euro-American contact to present; emphasis on culture change, U.S. Government Indian policy, reservation life. Prereq: 2530 or consent of instructor. F

4210 Ethnographic Research Techniques (3) Methods of collecting, ordering, and utilizing data. Prereq: Consent of instructor. A

4240 Applied Cultural Anthropology (3) Applications of anthropological theory, methods and findings in programs of community and national development, public health, international aid, and military assistance. Examination of the roles of anthropologists, questions of values and ethics in intervention schemes, and of organization of planned changes in applied programs. Intensive analysis of selected case studies. Prereq: 2520. A

4250 Medical Anthropology: Lecture (3) A survey of medical anthropology. Emphasis on Western and non-Western cultural aspects of health, disease, treatment, death, and related concepts. Focus on analyses and descriptions of anthropological fieldwork. Sp

4258 Medical Anthropology: Laboratory (3) Fieldwork in medical anthropology. Emphasis on cultural aspects of health, disease, and death in industrial societies and folk medicine systems which coexist with Western, technical medicine. Coreq or prereq: 4250. A


4340 Field Work in Archaeology (3-9) Practicum work surveying, excavating, processing, and analyzing of data; intensive reading. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4400 Cultural Ecology (3) Survey of concepts and processes of human population-environment interrelationships and adaptations from selected case studies. Prereq: 2530 or consent of instructor. A


4420 Dynamics of Culture (3) Culture change: innovation, diffusion and acculturation; cultural continuity and stability. Prereq: 2530 or consent of instructor. A

4430 Personality and Culture (3) Analysis of relation among individual, society and culture. Application of psychological and sociological perspective to cross-cultural studies. Cultural differences and their influence on group behavior. Prereq: 2530 or consent of instructor. A

4440 Urban Anthropology (3) Survey of theoretical and methodological issues anthropologists encounter researching cross-cultural urban settlements. Focus on anthropological theory and urban problems and planning. Prereq: 3450 or consent of instructor. A

4460 Current Trends in Anthropology (3) Analytical integration of new symposia positions in contemporary debate, research directions, theories, fieldwork methods, and general assumptions of the four subfields of anthropology: archaeology, physical anthropology, linguistics, and cultural anthropology. Sp

4490 Cross-Cultural Survey of Sex Roles and Behavior (3) Forty sex and sexual behavior of cross-cultural and diachronic viewpoints. Draws disparate and scattered studies together and attempts to arrive at conclusions on questions as how sex roles are learned, the parameters of acceptable sexual behavior and degrees of tolerance for sexual deviation in various cultures. Fall

4510 Peoples of China II: Chinese Society After 1839 (3) Anthropological survey of Chinese society and culture in the period of intense Western contact, recent development of modern, communist Chinese society and culture. Prereq: 2530 or consent of instructor. Recommended pre req: East Asian course.

4550 Indians of the Southeastern United States (3) Survey of Southeastern Indian cultures; emphasis on aboriginal adjustment to environment; lifeways of the southeastern American and Euro-American contact. Prereq: 2530, 3450 or consent of instructor.

4560 Cherokee Ethnology (3) Intensive survey of ideology and material aspects of Cherokee culture existing at time of first European contact.

4570 Peoples of Southeast Asia (3) Survey of representative ethnic groups and indigenous cultures of mainland and island Southeast Asia. Problems of contemporary culture changes. Prereq: 2530, consent of instructor or an East Asian course.

4580 Asians in the Americas Since 1800: Anthropological Perspectives (3) Character, factors, and motivations in Asian immigration to North, Central and South America. Assimilation pattern and ethnic changes in American and Asian cultures are major topics. Major focus on United States.

4590 Peoples of Japan (3) Analysis of the culture diversity and unity of peoples of Japan. Prereq: 2530 or consent of instructor. Recommended: 3510 or an East Asian course.

4600 Method and Theory in American Archaeology (3) Historical development of New World archaeology with emphasis on theory and field techniques. Prereq: 2520 or consent of instructor.

4610 African Prehistory (3) Survey of cultural history in Africa, south of the Sahara, from earliest evidence of human activity to time of European contact. Prereq: 2520 or consent of instructor.

4640 Zoolo anthropeology (3) Basic osteological studies of vertebrate classes; emphasis on aboriginal human’s utilization of native animals in subsistence and culture. Identification, analysis, and interpretation of archaeologically derived molluscan and vertebrate remains.

4650 Archaeology of Southeastern United States (3) Intensive study of prehistoric American Indian. Special emphasis on Tennessee prehistory. Prereq: 3610 or consent of instructor. W, A


4720 American Folklore (3) Anthropological perspectives of folklore of geographical regions and ethnic groups of the United States. Prereq: 3700 or consent of instructor.

4740 Southern Appalachian Folk Culture (4) Research-oriented course dealing with wide range of traditional culture in Southern Appalachia: settlement patterns, folk housing, economy, clothing, belief, speech, art, song, dance, and oral traditions and customs. Prereq: Consent of instructor. May be repeated.

4750 Mexican Folklore (3) Anthropological perspectives on folklore of Mexico and Spanish speaking southwestern United States. Prereq: 3700 or consent of instructor and a reading knowledge of Spanish.

4870 Cherokee Language (3) Linguistic survey of structure of the Cherokee language.

4930 Physical Growth and Constitution (3) Comparative growth patterns throughout the human life cycle, skeletal and dental maturation; sex differences in growth; human constitutional types. Prereq: 2510 or consent of instructor. A

4950 Primate Studies (3) Survey of field and laboratory investigations of comparative anatomy and non-human primate behavior. Prereq: 2510 or consent of instructor. F

4960 Primate Paleontology (3) Survey of fossil primate forms; origin and evolution of major primate
5460 Quantitative Methods in Anthropology (3) Applications between individuals and groups. Prereq: At 5450 Comparative Social Organization (3) Social representation of instructor. A polarities, interactions, and different cultural man-
tor. May be repeated. Maximum 9 hrs.

5470 Human Paleontology (4) Survey of human fos-

5475 Human Paleontology Laboratory (1) Detailed examination of casts and other materials pertinent to study of human paleontology. Prereq or coreq: 4970. Sp

5000 Thesis (1-15) E

5100 Graduate Research (1-9) Independent investigation of special problems in anthropology. E

5102 Off-campus Study (1-12) See page 95.

5103 Independent Study (1-12) See page 95.

5140 Laboratory Studies of the Vertebrate Skele-
ton (4) Examination and comparison of skeletons of mammals, birds, reptiles, amphibians, and fish. Prereq: Consent of instructor. Maximum 9 hrs. A

5159 Laboratory Study of the Mollusca (4) Examination and identification of terrestrial and freshwater mollusks of eastern U.S. Emphasis on living and archaeologically derived pelecypods. Prereq: Consent of instructor. Maximum 1 hr and 3 tabs. Sp, A

5160 Seminar in Archaeology (3-9) Theoretical and practical issues central to contemporary archaeology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5200 Special Topics in Anthropology (3) Lecture and/or seminar course for advanced students on selected topics of current interest to field of archaeology as a whole. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5210 Community Anthropology: The Local Com-
munity (3) Ethical issues, researcher models and research methods on local community. Prereq: 4440 or consent of instructor. A

5340 Fieldwork in Archaeology (3-9) Practicum work, surveying, excavating, processing, and analyzing of archaeological data. Prereq: 9 hours of introductory anthropology and consent of instructor. May be repeated. Maximum 9 hrs.

5400 History of Anthropological Theory (3) Theoretical contributions of more influential anthropologists. Prereq: Consent of instructor. A

5440 Peasant Societies (3) Critical analysis of existing literature and theories regarding rural-urban polarities, interactions, and different cultural mani-

5450 Comparative Social Organization (3) Theoretical and applied studies of societies. Kinship, age, sex, locality, and other factors in determining rela-
tions between individuals and groups. Prereq: At least one area course. A

5460 Quantitative Methods in Anthropology (3) Application of quantitative methods to anthropological data. Correlation and derivative procedures, dis-
tance analysis, discriminant analysis, and im-
plementation of computer routines. Prereq: Statist-
cs 2100 or equivalent. F

5470 The Healer in Cross-cultural Perspective (3) Group activity dealing with socialization, methods of diagnosis, and therapeutic modes of healers in predominantly non-Euro-American milieu. Prereq: 4250. W

5600 Theory in Archaeology (3) Review of develop-
ment of archaeological theory. Coverage up to and including recent systems approaches. F

5610 Problems in North American Archaeology (3) Seminar to explore specific research problems in North American archaeology. Research topics on prehistoric ecology and settlement patterns in North America. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. A

5620 Problems in Old World Archaeology (3) Selected topics and research problems in Euro-
pean, Asian, and African prehistory investigated in depth. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. (Same as Classics 5620.)

5630 The Maya (3) Intensive survey of Mayan culture from pre-Columbian times to the present. Prereq: 3560. A

5640 Archaeological Resource Management (3) Theory and practice—public, conservation, con-
tract, and salvage/research archaeology. Legisla-
tion, contracts, responsibilities, and certification; agencies and policies; project design, administra-
tion, and logistics; standards of field work, analysis and publication; archaeology and public conserva-
tion archaeology as career. May be repeated. Maximum 6 hrs. W

5660 Seminar in Prehistoric Lithic Technology (3) Analysis of techniques employed in production of prehistoric stone industries; raw materials em-
ployed; resultant implements, morphology and function; and the technological constructs utilized in chaeological analysis. Prereq: Consent of instruc-
tor.

5670 Seminar on Aboriginal Lithic Resources (3) Trajectories of development of stone tools utilized by prehistoric populations—properties, natural oc-
currence and geological context, relative abun-
dance and quality extraction and distribution, pro-
cessing and ultimate forms and functions. Theory and implementation of regional resource surveys, discrete resources in terms of lithology and cultural homogeneity, particularly East and Middle Tennes-
see. Input from professional geologists, and field reseachers. Prereq: Consent of instructor. A

5700 Theory in Folk Culture Studies (3) Seminar analyzing major theoretical viewpoints of European and American folklore and folk life studies trends from inception to present. Prereq: Consent of instructor. A

5710 Problems in Folk Culture Studies (3) Topical seminar dealing with selected problems and aspects of traditional behavior in Euro-American culture. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5900 Dental Anthropology (3) Dental anatomy, theories of dental evolution, genetic and environ-
mental influences controlling dental morphology, comparative primate dental morphology, dental trait analysis, use of dentition for skeletal aging, and dentcasting.

5910 Measurement of Man (3) Techniques of mea-
suring and describing skeletal material and human subject with emphasis upon particular applications to growth, nutrition and human engineering. Prereq: Consent of instructor. A

5920 Advanced Physical Anthropology (3) Intensive investigation of theory and problems in physical an-
thropology.

5930 The Human Skeleton in Forensic Medicine (3) Application of physical anthropology to problems in human identification. Determination of age, race, sex of skeleton and preparation of reports for legal and administrative agencies. Prereq: 3900. Sp

5940 Skeletal Biology of Early Human Population (3) Practical and theoretical approaches to analysis of prehistoric human skeletal populations. Demog-
raphy, variation in stature, nutrition, and indica-
tions of biological relationships as they relate to population as adaptive unit. Prereq: 3900. F

5945 Comparative Primate Anatomy (4) Laboratory and field course dealing with functional and an-
tomy of primates. Musculoskeletal system and evolution of various primate adaptive patterns. Prereq: Osteology and one dissection course in zoology.

5950 Paleopathology (4) Identification and descrip-
tive analysis of pathological conditions affecting human skeletal. Roentgenological, histological, and gross visual examination of skeletal material. Prereq: 3900 and/or consent of instructor. Lecture tends.

5960 Dermatoglyphics (3) Methods of dermatog-
lyphic analysis; genetics and population variation of various dermatoglyphic elements. Forensic appli-
cations: relationships to various genetic and chromosomal abnormalities. Prereq: Consent of in-
structor.

5970 Emergence and Early Evolution of Man (3) Ancestry and evolutionary significance of Au-
stralopithecines. Prereq: 4970 or consent of instruc-
tor.

5980 Neanderthal Man and Human Evolution (3) Morphology, distribution, and evolutionary rela-
tionships of Neanderthals. Prereq: 4970 or consent of instructor.

5990 Human Variation (3) Nature of human biologi-

cal variation with emphasis on microevolutionary processes responsible for establishing and main-
taining variation and relationship of variation to popula-
tion structure. Prereq: 3930 or consent of instructor. A

6000 Doctoral Research and Dissertation (3-15) E

6410-23-30 Seminar in Cultural Anthropology (3, 3, 9) Offered each quarter primarily for doc-
toral candidates.

6610 Selected Topics in Archaeology (3) May be repeated. Maximum 9 hrs.

6910 Selected Topics in Physical Anthropology (3) May be repeated. Maximum 9 hrs.

6970 Seminar in Human Paleontology (3) Prereq: 4970 or consent of instructor.

Greek and Roman

See Classics.

Art

MAJOR

DEGREES

M.A., M.F.A.

Professors:

D. F. Kurita (Head) Ph.D. New York;
R. A. Clarke, M.S. Wisconsin; D. G. Cleaver,
Ph.D. Chicago; J. S. Falsetti, M.S. Ohio State;
P. R. Livingston, M.F.A. Wisconsin; W. F. Loy,
M.F.A. Wichita; B. G. McKeoby, M.F.A. Tulane;
P. G. Nichols, M.F.A. Michigan; W. H. Stevens,
M.F.A. Illinois; C. S. Sublett

Associate Professors:

S. J. Blain, M.F.A. Wisconsin; R. H. Daehnert, M.F.A. Wisconsin;
W. C. Kennedy, M.F.A. Wisconsin; R. LeFevre,
M.F.A. Rochester Institute of Technology;
W. E. Leland, M.F.A. Tennessee; D. Morrisson,
Ph.D. Chicago; F. Moffat, Ph.D. Chicago;
D. Peacock, M.F.A. Chicago; W. F. Nichols,
M.F.A. Claremont; L. D. Wiesner, M.F.A.
Florida State; R. P. Young, M.A. Columbia.

Assistant Professors:

M. C. Clauser, M.F.A. Michigan;
J. F. Darrow, Ed.D. Illinois State;
M. S. Goldenberg, M.F.A. Nebraska;
W. C. Jackson, M.F.A. Tennessee; A. New,
Ph.D. Pennsylvania; T. J. Riesing, M.F.A.
Nebraska; B. R. Wells, M.F.A. Indiana.

Instructor:

F. Bahou, M.F.A. California (Los Angeles).

The Art Department offers two graduate degrees: Master of Arts and Master of Fine Arts. In order to become a candidate, the applicant must be admitted by the Graduate School and approved by the Department of Art. In addition to the admission requirements of the Graduate School, the Department of Art specifically requires the following:

1. A detailed letter of intent.

2. Three letters of recommendation from former professors or professionals in the field.

3. An undergraduate major in art or evidence of equivalent proficiency.
4. A portfolio to be evaluated by the faculty. Application forms and further information are available by writing to the Department of Art.

MASTER OF ARTS

Areas of concentration consist of ceramics, communication design, drawing, fiber-fabrics, painting, printmaking, sculpture, and watercolor. One year of residence is required.

Curriculum:

Quarter

<table>
<thead>
<tr>
<th>hours</th>
<th>Course</th>
</tr>
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<tbody>
<tr>
<td>Thesis</td>
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<td>Drawing and composition</td>
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<tr>
<td>Electives</td>
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<tr>
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The thesis is a critical essay relevant to the area of concentration. The M.A. thesis may not be used to fulfill the project in lieu of thesis requirements for the M.F.A. A graduate exhibition is required. Final examination is oral.

MASTER OF FINE ARTS

The Master of Fine Arts is the terminal degree in studio art. It is offered with concentrations in ceramics, communication design, drawing, fiber-fabrics, painting, printmaking, sculpture, and watercolor.

Inter-area concentrations are available with consent of the faculty. Six quarters beyond the baccalaureate degree are required in residence. Residence is defined by the Department of Art as (1) a minimum enrollment of 6 hours per quarter, and (2) use of Department of Art facilities so that students are available for discussion and criticism. Final examinations are oral, concurrent with project exhibition.

Curriculum:

Quarter

<table>
<thead>
<tr>
<th>hours</th>
<th>Course</th>
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<tbody>
<tr>
<td>Project in Lieu of Thesis</td>
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<td>Major area</td>
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<tr>
<td>Seminar in Art Criticism</td>
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<tr>
<td>Seminar in Art History</td>
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<td>Total</td>
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</tbody>
</table>

DEGREE REQUIREMENTS FOR M.F.A.

1. Successful completion of 30 hours of studio in concentration area. Inter-area studies must normally be approved by the faculty no later than the third quarter in residence. Fifteen hours of the major must be in second year courses.
2. Twelve hours of art history for graduate credit.
3. Seminar in Art History (4 hours) and Seminar in Art Criticism (4 hours).
4. Ten hours of electives which may consist of any committee-approved combination of graduate credit courses outside the student's departmental concentration.
5. First year evaluation: At the end of the three quarters in residence the student must present work for evaluation by the faculty and receive permission to continue in the program.
6. Second year evaluation: With completion of all course work the student must present work for evaluation by the faculty and receive permission to register for Projects in Lieu of Thesis (Art 5999).
7. Art 5999, Projects in Lieu of Thesis (30 hours) is a third year of semi-independent study.
8. Exhibition and oral examination: With the completion of all requirements for the M.F.A. the student must produce an exhibition, and, in the presence of the work, must satisfactorily complete an oral examination.

GRADUATE MINOR IN THE HISTORY OF ART

A graduate minor in Art History may be arranged with the consent of the student's committee, the instructors involved, and the Graduate School. Prerequisite is an undergraduate Art History minor, or its equivalent, and reading knowledge of French, German, or Italian, unless waived by the art history faculty.

3516 Typography (4) Techniques and theories of typesetting and printing as fine art medium. Creative problems using type and printing press. May be repeated. Maximum 12 hrs.
3517 Airbrush (4) Technique of airbrush. Emphasis on skill and creative applications. For art majors only. F, Sp.
3704 Medieval Art (4) Byzantine and western art of Middle Ages: manuscript illumination, mosaic, Romanesque pilgrimage church, Gothic cathedral. F.
3705 Northern European Painting: 1350-1600 (4) From courtly art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, Bosch, and Durer. Early printmakers, A.
3726 The Art of Northern Europe, 1550-1675 (4) Concentrated study of Bruegel, Rubens, Rembrandt, Georges de La Tour, Vermeer, Poussin and Hals. W.
3730 History of Nineteenth-Century Painting in Europe and America (4) Emphasis on France, Neo-classicism, Romanticism, Friedrich, Constable, Turner, Corot and Barbizon landscapeists, Hudson River Group, Group of Seven, Symbolists, Modernist. Courbet, Impressionism, Eakins, Homer, Seurat through Cézanne. W.
3731 History of Twentieth-Century Painting in Europe and America (4) Fauvism, Die Brücke, Cubism, Der Blaue Reiter, Futurism, Dada and Surrealism, geometric abstraction, social commentary painting, Abstract Expressionism in the U.S.A. and parallels in Europe: Pop, Op, Minimal and Concept Art. F.
3745 History of Modern Architecture in Europe and America (4) Survey of nineteenth-century styles, Sullivan and skyscraper, Twentieth century: Viennese leaders, the Bauhaus, Gropius, Van der Rohe, Le Corbusier, Wright, Aalto to Kahn, Tange and Metabolism, Archigram, Soleri, and Venturi. F, W.
3746 History of Modern Sculpture in Europe and America (4) From 1800 to 1900, Neoclassicism to Rodin. From Rodin to contemporary; emphasis on Cubism, Constructivism, Expressionism, Assemblage, Pop, Primary Forms, Environments, and Earthworks. Sp.
3753 Crafts in America (4) Craft movement: growth and development, traditional and contemporary, commercial and aesthetic values. Role of designer in society as producer and teacher.
3765 History of North American Art (4) Survey of landmarks in painting, architecture, sculpture, and design from prehistory to 1900. F.
5616 Graduate Printmaking-Intaglio I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp
*5627 Graduate Printmaking-Screen Printing II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp
5755 Reading and Research in Art History (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
5770 Seminar in Art History (4) A
5900 Seminar in Art Criticism (4) Theory and practice. Intended for majors in studio art. A
5915 Graduate Sculpture I (2-6) May be repeated. Maximum 12 hrs. F, W, Sp
5955 Graduate Ceramics I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp
*5975 Graduate Ceramics II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp
5999 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by the graduate faculty. May be repeated. Maximum 30 hrs. E
*Graduate II courses must be preceded by successful first year evaluation by the faculty.

**Audiology and Speech Pathology**

**MAJORS**

DEGREES

Audiology  M.A.
Speech and Hearing Science  Ph.D.
Speech Pathology  M.A.

**Professors:**

H. L. Custer (Head), Ph.D. Ohio State; S. Adler, Ph.D. Ohio State; C. W. Asp, Ph.D. Ohio State; P. J. Carney, Ph.D. Iowa; D. M. LeCompte, Ph.D. Washington; I. Nabelek, Sc.D. Prague; H. A. Peterson, Ph.D. Illinois; B. Silverstein, Ph.D. Purdue.

**Associate Professors:**

S. B. Burchfield, Ph.D. Michigan State; C. G. Maisel, M.Ed. Texas.

**Assistant Professors:**

A. O. Dietsch, Ph.D. Washington; E. Ireland, Ph.D. Iowa; C. J. Ferrell, M. A. Tennessee.

**THE MASTER'S PROGRAM**

A major is offered in Audiology or in Speech Pathology. A minor is offered in each of the two areas when approved by the department. The intent of each major program is to provide the student with the scholarly and professional skills necessary for functioning as an independent professional clinician in any clinical environment. Within this broad coverage of the major(s) in Audiology or Speech Pathology, it is possible for a student to specialize to some extent. For example, in the M.A. in Audiology program, a student may emphasize audiological assessment, aural habilitation-rehabilitation, medical or pediatric, or industrial audiology. Within the M.A. in the Speech Pathology program, a student may emphasize language disorders, cultural language differences, or speech disorders such as aphasia or stuttering. Students interested in specializing beyond the typical broad M.A. program should consult the department office or their advisor for lists of specific course offerings, practice and independent studies.

Students majoring in the two areas are expected to complete the academic requirements for clinical certification from the American Speech and Hearing Association, including the required number of clock hours of clinical practicum. An exception to this rule must be approved by the Department Curriculum Committee. Enrollment in the clinical practicum courses is required for all clinical practice experiences. If the undergraduate preparation does not include sufficient course work in speech pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

Students may elect either the thesis program or the non-thesis option. Students in both programs are required to take 5110 and 5119. The Master's program with the thesis will include a minimum of 45 quarter hours of approved graduate credit, including 9 quarter hours of 5000 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least one-half of these total courses must be at the 5000 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 48 quarter hours of approved graduate credit and pass a final written examination. A minimum of 24 quarter hours must be at the 5000 or 6000 level. The decision as to choice of the thesis or non-thesis program is normally made following completion of 5110 and a conference with the student's advisor.

**THE DOCTORAL PROGRAM**

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for research or college teaching careers in the field of speech and language pathology, audiology, or speech and hearing science. The degree program is designed to give students with primary emphasis upon developing the scientific and cognitive skills which allow individuals to identify and independently study important questions concerning the human act of oral and aural communication. Students will be expected to master the accumulated knowledge in the area of:

1. Basic speech, hearing and language processes.
2. Speech, hearing and language disorders.
3. Related disciplines providing insight into human communication processes.
4. Technical skills in instrumentation and experimental design which enable the student to investigate problems pertaining to speech and hearing processes.

The program will normally consist of three or more calendar years of graduate study beyond the Master's degree with the first year being devoted primarily to formal course work and the last year to full-time research culminating in the doctoral dissertation. Specific programs of study will be determined by the student in consultation with his/her faculty committee. In addition to the general Graduate School requirements, specific requirements for the degree of Doctor of Philoposophy in Speech and Hearing Science will include:

1. Successful completion of course work in the study of one or more research tools, or other specific sociological, historical, or other vehicles pertinent to the research interests of the candidate. The choice of research tool(s) is subject to departmental approval.
2. A minimum of 9 quarter hours of graduate credit in course work in a cognate field outside the Department of Audiology and Speech Pathology. These hours are in addition to those required in item 1 above.
3. Sufficient course work within the department but outside the area of specialization to give a broad foundation and understanding.
100 College of Liberal Arts

4. A comprehensive examination to demonstrate a general knowledge of the basis of audiology, speech and language pathology, and speech and hearing science; advanced knowledge of the specifics of the area of specialization.

5. Research and dissertation to give at least 36 hours of graduate credit (6000 level).

6. Final examination.

4040 Appraisal of Speech and Language Disorders (4) Diagnostic procedures for children and adults with speech and language problems including observation and psychological testing. Prereq: 3050. (Same as Special Education 4040). F, Sp

4070 Free Association (4) Oral and written free association as process for diagnosing and treating communication disorders. Includes didactic self-analysis. W

4190 Speech Development of the Hearing Impaired (3) (Same as Special Education 4190).

4200 Practicum in Speech Development of the Hearing Impaired (3) (Same as Special Education 4200).

4210-20 Language Development of the Hearing Impaired I, II (3, 3) (Same as Special Education 4210-20).

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) (Same as Special Education 4250).

4310 Stuttering (3) Nature and treatment. Review and integration of various theories. (Same as Special Education 4310). F, Su

4320 Clinical Practice in Speech Pathology I (3) Prereq: 3040, 3050, 3310, 4040, and consent of instructor. (Same as Special Education 4320). S/NC only.

4330 Clinical Practice in Speech Pathology II (3) Prereq: 4320 and consent of instructor. (Same as Special Education 4330). S/NC only.

4340 Clinical Practice in Speech Pathology III (4) Prereq: 3030 and consent of instructor. (Same as Special Education 4340). May be repeated. S/NC only.


4450 Clinical Audiology in the Clinical Laboratory (1-6) Prereq: 4720 and 4930. (Same as Special Education 4450). E

4460 Clinical Audiology in the Clinical Laboratory I (3) Prereq: 4450, 4720, and 4930. (Same as Special Education 4460). E

4470 Clinical Audiology in the Clinical Laboratory II (3) Prereq: 4460, 4720, and 4930. May be repeated. Maximum 9 hrs. (Same as Special Education 4470). E

4500 Speech Pathology (3) Independent study of special problems in speech pathology. Prereq: Consent of instructor.

4550 Problems in Speech Pathology (1-6) Prereq: Consent of instructor. E

4560 Problems in Audiology (1-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E


4620 Birth Defect Syndromes and Language Retardation (3) Examination of research literature relevant to birth defects and language retardation including clinical, educational and socioemotional implications of such disorders. Prereq: 4610 or consent of instructor. F

4630 Pragmatic Applications of Language Habilitation Techniques (3) Discussion and demonstration of various methods and procedures used in treating language retarded children. Prereq: 4610 or consent of instructor. W

4640 Parent Participation in Language Habilitation Programs (3) Nature of counselling and educational relationships with parents of exceptional children including emotional support for families, behavior management strategies, home training methods. Prereq: 4610 or consent of instructor. W

4650 Speech and Language of the Culturally Different Child (3) Discussion of speech and language differences of children of different ethnic groups and from different geographic regions; their causes, and their effects upon educational programs. F, W, Su

4660 Topics in Language Retardation and its Rehabilitation (3) Prereq: 4610 or consent of a number of selected topics by representatives of such fields as special education, early childhood education, educational psychology, genetics, and psychology. Prereq: 4610 or consent of instructor. Su

4720 Audiology II (4) Basic principles of clinical audiology; pure-tone, speech, masking and overview of special auditory testing methods. Prereq: 3710. (Same as Special Education 4720). W, Su


4930 Aural Rehabilitation: Speechreading and Auditory Training (3) Rehabilitation of acoustically impaired by maximizing use of residual hearing and utilizing appropriate speech perceptive and process. Prereq: 4720. (Same as Special Education 4930). F, W, Su

4940 Introduction to the Verbo-Tonal System (4) Prereq: 3710 or 4930. Prereq: 4200 and 3050. (Same as Special Education 4940). F, W, Su

5000 Thesis (1-15) E

5022 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. Prereq: 5022. May be repeated. S/NC only.

5040 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 12 hrs. (Same as Special Education 5040). E

5045 Practicum in Hearing Aid Orientation and Communication Counseling (1-6) Practical exposure to counseling hard of hearing and family members concerning, use and expectations of hearing aids, suggestions for better use of communication skills. Prereq: 4720, 4930, and consent of instructor. May be repeated. Maximum 12 hrs. E

5050 Practicum in Verbo-Tonal Habilitation (1-6) Prereq: 4940, 5950, or consent of instructor. May be repeated. Maximum 9 hrs. E

5011 Practicum in Aural Rehabilitation (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 9 hrs. E

5080 Anatomy and Physiology of Speech (3) Structure and function of neuromuscular system involved in breathing, phonation, resonation, and articulation. Prereq: 3985. W, F

5070 Anatomy and Physiology of Hearing (3) Structure of human ear, pathology of hearing impairment, and psychoacoustics of audition. Prereq: 3710. F

5071 Physiological Acoustics and Electrophysiology (3) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission in bone and air, distortion of ear, and ear as analytic mechanism. Prereq: 4720, 5070 or consent of instructor. Sp, Su

5100 Comparative Anatomy of the Peripheral Auditory Structures (3) Tutorial laboratory course in comparative anatomy of temporal bone employing comparative anatomy techniques. Prereq: 5070 or consent of instructor. E

5110 Introduction to Research in Speech and Hearing (3) Analysis of research design, application of statistics, and completion of pilot research project. Prereq: Elementary statistics. F, W, Su

5117 Instrumentation in Audiology and Speech Pathology (2) Principles of instrumentation utilized in audiology and speech pathology. Prereq: 3010. W, Sp

5119 Laboratory in Instrumentation in Audiology and Speech Pathology (1) Laboratory assignments designed to familiarize student with instruments used for measuring speech and hearing processes. Prereq: 5117. E

5200 Seminar on Stuttering (3) Current significant research in problem of stuttering. Prereq: 4310 or consent of instructor. W, Su

5201 Aphasia (3) Historical review of aphasia literature; theories of brain functioning, aphasic classification and terminology, tests and rationale for testing, etiology, therapy considerations and prognosis for recovery. Prereq: 5060 or equivalent or consent of instructor. W, Su

5230-30-40 Advanced Clinical Practice in Speech Disorders I-III, (1-6, 1-6, 1-6) Prereq: Consent of Instructor: 5340 may be repeated. Maximum 9 hrs. S/NC only.

5250-50-70 Advanced Clinical Practice in Speech Diagnosis I-III, (1-6, 1-6, 1-6) Prereq: 4040, 4340 or equivalent. 5370 may be repeated. Maximum 9 hrs. S/NC only.

5300 Cleft Palate (3) Etiology, diagnosis and clinical management of cleft palate speakers, emphasis on speech. Prereq: 3310. (Same as Special Education 5390). W, Su


5450 Sound Measurement and Audiometer Calibration (3) Noise measuring systems and techniques; factors in military and industrial audiology, role of audiologist in industry, Basic Acoustics or consent of instructor. W

5460 Advanced Audiology (3) Theory and practice of advanced pure tone and speech audiometry; instrumentation and interpretation of audiometric findings with differential diagnosis. Prereq: 4720. F

5470 Impedance Measurement in Audiology (3) Theoretical considerations behind emergence of impedance measurement in clinical measurement of hearing. Practical experience in using several impedance measuring devices. Prereq: 4720 and 5070. W

5490 Practicum in Hearing Conservation (1-6) Supervised on-site experience in hearing conservation. Prereq: 4720. May be repeated. Maximum 6 hrs. E

5500 Seminar in Audiology (3) Significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 16 hrs. F, Sp

5503 Special Auditory Tests (3) Theoretical and practical considerations of auditory procedures used for differentiating between cochlear vs. retrocerebral auditory lesions, identifying central auditory lesions and nonorganic hearing loss. Prereq: 5460.

5505 Special Problems in Audiology (1-6) Prereq: 4720 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs. E

5520 Seminar in Speech Pathology (3) Current significant research in speech pathology. Topics vary from quarter to quarter. Prereq: 12 hrs in speech pathology. May be repeated with consent of department. Maximum 12 hrs.

5540 Seminar in Language Pathology (3) Nature, etiology and treatment of retarded language development in children. Prereq: 4610 (Same as Special Education 4610). W

5560 Special Problems in Speech Pathology I-III (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5560 Independent Study in Speech Pathology (1-3)