PhD in Engineering with concentration in Engineering Education

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An Interdisciplinary Curriculum

The Ph.D. in Engineering with concentration in Engineering Education (ENE) incorporates theory and practice so that its students are prepared to be teachers and scholars in the emerging field of engineering education. Engineering education incorporates theory with applied practice to prepare its graduates for a wide range of careers:

- Engineering policy
- Corporate training management
- Educational technology development
- University assessment
- University administration
- Academia
- Research and scholarship

Graduates of the doctoral program will be able to conduct and direct research in engineering education, develop, review, and critique effective research designs, effectively teach engineering subjects, design and assess engineering programs, and address critical issues facing engineering education.

The Engineering Education graduate program is interdisciplinary, with faculty drawn from the academic departments of the Bagley College of Engineering and the College of Education. The program of study and research leads to the Doctor of Philosophy in Engineering degree with concentration in Engineering Education, and is offered on the Starkville campus.

Admission Criteria

An applicant for admission to graduate study must hold a bachelor's degree from a fully recognized four-year educational institution that has unconditional accreditation with appropriate accreditation agencies. He/she must meet the admission requirements of the Graduate School and receive a positive recommendation by the Engineering Education Program Committee. Admission is based primarily on past performance, letters of recommendation, Graduate Record Examination (GRE) scores, and the applicant's demonstrated ability to be successful in the ENE Ph.D. program. Applicants with a bachelor's or master's degree from a program accredited by the Engineering Accreditation Commission (EAC) of ABET are preferred.

Regular admission to graduate study in the ENE Ph.D. program for students entering with only a Bachelors degree requires a minimum grade point average (last four semesters of undergraduate work) of 3.50/4.00. Regular admission to graduate study in the ENE Ph.D. program for students entering with a Masters degree requires a minimum grade point average of 3.30/4.00 in the student's graduate work. When a student is deficient in one of the criteria cited, the student's application,

nevertheless, may be considered for admission based on the strength of other materials contained in the student's application. However, reasonable minimum levels of performance must be achieved in both the applicant's GPA and GRE scores. International applicants not holding degrees from U.S. institutions must submit a Test of English as a Foreign Language (TOEFL) report of 575 PBT (84 iBT on the internet-based test or an International English Language Testing Systems (IELTS) score of 7.0 or higher to be considered for admission.

Provisional Admission

An applicant who has not fully met the GPA requirement stipulated by the University may be admitted on a provisional basis. The provisionally-admitted student is eligible for a change to regular status after receiving a 3.50 GPA on the first 9 hours of graduate courses at Mississippi State University (with no grade lower than a B). The first 9 hours of graduate courses must be within the student's program of study. Courses with an S grade, transfer credits, or credits earned while in Unclassified status cannot be used to satisfy this requirement. If a 3.50 GPA is not attained on the first 9 hours of graduate courses, the provisional student shall be dismissed from the graduate program. While in the provisional status, a student is not eligible to hold a graduate assistantship. The minimum acceptable undergraduate grade point average for admission as a provisional student is 3.0/4.0 for the junior and senior years.

Contingent Admission

A student not possessing a B.S. or M.S. degree in an engineering or computer science discipline may be granted contingent admission, depending on qualifications and experience. A plan of action toward regular admission is formed by the ENE Graduate Coordinator and ENE Program Committee on a case-by-case basis. Typically, contingency is removed by completing undergraduate prerequisite courses in the first few terms after admission. Contingency admitted students must maintain at least a 3.50/4.00 GPA on all undergraduate prerequisite courses prescribed by their contingency plan of action. For more information, please contact the ENE Graduate Coordinator.

Program of Study

The specific requirements for the Ph.D. in Engineering with concentration in Engineering Education degree are governed by the requirements of the Graduate School, the Bagley College of Engineering, and by the student's graduate committee. The ENE PhD student's graduate committee must include at least two Engineering Education faculty members, one College of Education faculty member, and one faculty member from their engineering technical subject area. The graduate committee will ensure that the student's program of study adequately addresses each of the three primary cross-disciplinary areas: engineering education, educational theory/cognitive science/psychology, and an engineering technical area. The Engineering Education Graduate Coordinator must approve the composition of the graduate committee.

The Ph.D. program in Engineering with concentration in Engineering Education will contain at a minimum 48 hours of formal course work at the 6000-level or higher (beyond the bachelor's degree), and 20 hours of dissertation credit. At least 24 hours of course work should be at the full graduate level (8000-level or higher). As part of their program of study, all ENE PhD students will be required to take

- ENE 8003 Foundations in Engineering Education
- ENE 8303 Pedagogy & Assessment in Engineering Education
- EDF 8363 Functions & Methods of Research in Education, and
- EDF 9373 Education Research Design.

The Engineering Education Graduate Coordinator and the student's graduate committee must approve the student's program of study.

The Doctor of Philosophy in Engineering with concentration in Engineering Education, in addition to the coursework and research hours, includes an oral preliminary examination, a dissertation, and dissertation defense. Each candidate for the doctoral degree must conduct research and in their dissertation defense on that research

- demonstrate a mastery of the techniques of research and
- make a distinct contribution to the field of Engineering Education

The dissertation must conform to the rules of the Graduate School.

Students in the ENE PhD program are required to pass the oral comprehensive examination in accordance with the program requirements and all Graduate School policies. The student must have completed, or be within 6 hours of completing, their program of study coursework. The comprehensive exam consists of topics from the student's completed program of study, a presentation of current research activities toward the student's dissertation, and a detailed plan/proposal of dissertation research to be done. Upon successful completion of the comprehensive exam and all coursework on the student's program of study, the student advances to PhD candidacy.

PhD candidates are required to pass a public dissertation defense to graduate. The Graduate Catalog lists dissertation defense requirements. Additionally, PhD candidates must submit 2 journal papers from their dissertation prior to graduation. To receive the ENE Graduate Coordinator's signature on the signature page, a PhD candidate must provide proof of two journal submission from the dissertation work; otherwise the PhD candidate will not be allowed to graduate. Journal paper submissions from work not a part of the dissertation, while strongly encouraged, cannot be used to satisfy this requirement.

Academic Performance

In addition to the criteria defined in the current Graduate Catalog, unsatisfactory performance in the PhD program Engineering with concentration in Engineering Education is defined as any of the following.

- Failure to maintain a 3.50/4.00 or better GPA on all prerequisite undergraduate courses taken while in the ENE PhD program,
- Failure to maintain a 3.30/4.00 or better GPA on all graduate courses attempted,
- Failure to maintain a 3.30/4.00 or better GPA on all courses on the student's program of study
- Earning two or more grades of C in prerequisite undergraduate courses taken while in the ENE PhD program and courses listed on the student's program of study
- Earning a grade of U, D, or F in any course while enrolled in the ENE PhD program,
- Failure of the comprehensive exam,
- Failure of the preliminary exam, or
- Unsatisfactory evaluation of dissertation

Any one of the conditions above will constitute the basis for review for possible **immediate** dismissal from the program.

If the student's GPA drops below the required average 3.30/4.00, the graduate coordinator will review the record along with the student's graduate committee and will recommend a final course of action, which will be immediate dismissal or the establishment of a probationary period in which corrective action must take place.

While on probation, the student is not eligible to receive an assistantship and is required to raise his/her cumulative GPA to 3.30/4.00 or better by the end of the following semester of enrollment. Directed Individual Study courses are excluded.

In case of a dismissal from the graduate program, a student may appeal his/her academic dismissal in accordance with policy in the MSU Graduate Catalog.

Graduate Courses

Because of the interdisciplinary nature of the Engineering Education program, courses listed under the "Courses" below are typical of those used to assemble a program of study. Courses not listed can be used for graduate credit with the approval of the student's graduate committee and the Engineering Education Program Coordinator. The program of study must demonstrate the student has achieved a working knowledge of

- engineering education theory and practice
- education theory, and
- an engineering technical area

No program of study can contain more than six credit hours of Directed Individual Study courses.

Credit from Previous Graduate Work

Students entering the PhD program in Engineering with concentration in Engineering Education with prior graduate course work may apply up to 24 hours toward their program of study. Prior graduate degree courses applied toward the ENE PhD program of study must be approved by the ENE Graduate Coordinator.

For the Ph.D. in Engineering with concentration in Engineering Education, a minimum of 68 credit hours beyond the B.S. are required (48 credit hours of graduate coursework and 20 credit hours of dissertation research).

Program of Study

ENE 8003	Foundation in Engineering Education	3
ENE 8303	Pedagogy & Assessment in Engineering Education	3
EDF 8363	Functions & Methods of Research in Education	3
EDF 9373	Education Research Design	3

Education Foundations and Educational Psychology

6h selected from the list below with course codes EDF and EPY 6

Statistics

ST8114 + ST8253, or IE6623 + ST8603	6 or 7
Graduate engineering courses	
Graduate-level courses with a non-ENE BCoE prefix pertinent to the student's research plan/area (at least 9h of 8xxx courses)	18
Electives supporting research plan/area selected from the following areas: Engineering Education (ENE prefix), education courses (EDF, EPY, EDS), engineering technical area courses (non-ENE BCoE prefix), cognitive science, psychology, mathematics, or statistics selected from the lists below. Courses from other areas of study are allowed with permission of the ENE graduate coordinator, dissertation advisor, and committee	6
ENE 9000 Dissertation	20
MINIMUM REQUIRED HOURS (beyond Bachelors)	68

Elective Course Lists

Engineering Education

ENE 8703 Design in Engineering Education & Practice

Education Foundations & Educational Psychology Courses

EDF 9313 Philosophy of Education
EDF 9453 Introduction to Qualitative Research in Education
EDF 9463 Qualitative Data Collection in Education
EDF 9473 Qualitative Data Analysis and Presentation
EPY 8223 Psychological Foundations of Education
EPY 8293 Cognitive Development
EPY 9213 Advanced Analysis in Educational Research
EPY 9313 Education Evaluation Methods
PSY 6653 Cognitive Science

Other Education Courses

EDS 8103 Advanced Methods in Middle/Secondary Education
EDS 8613 Middle & Secondary School Curricula
EDS 8623 Effective Instruction
EDS 8633 Problems Of Secondary Education
EDS 8653 Issues of Accountability
EDS 8683 Disposition & Reflection
HED 8133 University and Community College Instruction
HED 8523 Student Development Theory
HED 8673 Planning & Institutional Research in Higher Education
HED 8683 Policy Issues in Higher Education

Approved Statistics Courses

ST 6232 Data Analysis I (same as MA 6243)
ST 6253 Data Analysis II (same as MA 6253)
ST 8214 Design & Analysis of Experiments
ST 8263 Advanced Regression Analysis
ST 8313 Introduction to Survey Sampling
ST 8353 Statistical Computations
ST 8413 Multivariate Statistical Methods
ST 8433 Multivariate Statistical Analysis
ST 8733 Advanced Statistical Inference I
ST 8743 Advanced Statistical Inference II
ST 8863 Advanced Design of Experiments I
ST 8863 Advanced Design of Experiments II

Mathematics Courses

Any 6xxx and 8xxx math course except for the following:

MA 6523 Introduction to Probability
MA 6533 Probability & Random Processes
MA 6543 Introduction to Mathematical Statistics I
MA 6573 Introduction to Mathematical Statistics II

Psychology

PSY 6523 Industrial Psychology
PSY 6653 Cognitive Science
PSY 6713 Language & Thought
PSY 6733 Memory
PSY 6743 Psychology of Human-Computer Interface
PSY 6753 Applied Cognitive Psychology
PSY 8214 Quantitative Methods in Psychology II
PSY 8354 Intelligence Testing
PSY 8723 Cognitive Skills Models
PSY 8743 Perception & Attention
PSY 8753 Advanced Human Memory
PSY 8763 Expertise & Cognitive Skill