



## **Ph.D. Program Offers New Opportunities in Engineering, Applied Sciences**

*by Osama Abudayyeh and Anthony Vizzini*

Emerging engineering challenges and research questions of national and international stature are requiring an interdisciplinary approach to finding solutions. The College of Engineering and Applied Sciences (CEAS) at Western Michigan University (WMU) currently offers five discipline-specific doctor of philosophy (Ph.D.) programs that provide opportunities for faculty to work on research problems in classical fields of engineering.

The new Ph.D. program in the engineering and applied sciences (EAS) provides the flexibility needed to address new and emerging interdisciplinary research areas that cut across several engineering and science disciplines. It also provides access to doctoral-level research activities to the 36% of our faculty in CEAS who did not have a mechanism to supervise Ph.D. students.

We strongly believe this program will provide the flexibility that can quickly and effectively respond to the current and future R&D needs of the state, region and nation by fully exploiting the expertise of all CEAS faculty. We expect graduates of this program to hold faculty and research positions appropriate to the field of study they pursued.

### **Program structure**

Several CEAS faculty and students are involved in research projects that are multidisciplinary in nature. Therefore, a flexible doctoral program in EAS is needed to allow enrolled Ph.D. students to choose dissertation-based doctoral programs that cut across disciplines to enable them to respond to new and emerging engineering and applied sciences research questions.

The program requires the selection of a Ph.D. champion before admission is granted. The role of the champion is to oversee the process from admissions to graduation to ensure compliance with all program requirements. This early intervention will serve to strengthen the



student's program and reduce the time to graduation. The champion provides guidance to the student throughout the program and serves as the Ph.D. dissertation committee chair.

### **Admission requirements**

The Ph.D. in EAS is offered in two tracks: engineering and applied sciences. In addition to the university's minimum Ph.D. requirements for admission, as outlined in the WMU graduate catalog, all applicants are expected to meet the following minimum requirements for admission to the Ph.D. in EAS:

1. The student must coordinate with a faculty member to agree to champion the application and to serve as the Ph.D. dissertation committee chair.
2. a) A minimum of a bachelor's degree (master's preferred) from an accredited institution in an engineering discipline relevant to the intended field of study, as determined by the Ph.D. champion, is required for admission to the engineering track.  
  
b. A minimum of a bachelor's degree (master's preferred) from an accredited institution in applied sciences or a closely related discipline relevant to the intended field of study, as determined by the Ph.D. champion, is required for admission to the applied sciences track.
3. Two official transcripts from each institution attended since high school.
4. An overall minimum grade point average of 3.25.
5. The general graduate record examination test scores.
6. Statement of purpose describing the applicant's research interests and professional goals.
7. Three letters of recommendation.

The admission process is competitive and is administered by the department of the champion.



## Program requirements

In addition to the minimum university requirements listed in the graduate catalog, the following must be fulfilled for the Ph.D. in EAS program:

1. **Minimum credit hours.** After admission into this Ph.D. program, the majority of credits taken at WMU must be from CEAS (excluding thesis and dissertation credits).
  - For students admitted after bachelor's degree, a minimum of 60 graduate-level credit hours, excluding the dissertation, beyond the bachelor's is required, of which 30 hours must be at WMU in an approved program of study. No more than 15 credit hours can be at the 5,000 level, and at least 30 credit hours of regularly offered courses is required, excluding independent study, independent research, seminars, doctoral research, professional field experience and internship courses.
  - For students admitted after master's degree, a minimum of 30 graduate-level credit hours, excluding the dissertation, beyond the master's is required at WMU in an approved program of study.
2. **Program of study.** A program of study in the student's field of interest must be completed in the first year of enrollment. This program of study is uniquely defined and approved by the Ph.D. dissertation committee chair; the student; the department chair of the Ph.D. committee chair; the Dean of CEAS or his or her designee; and the dean of the graduate college. The exact distribution of courses, seminar and research will depend on the program and may vary from one student to another. Each student is required to complete a dissertation.
3. **Doctoral dissertation.** Fifteen credit hours of doctoral dissertation are required.
4. **Research tools.** Two appropriate research tools courses are required. Such research tools may include, but are not limited to, statistics, numerical analysis, mathematics, research methods and computer programming. These are determined by the Ph.D. committee chair and the student.



5. **Candidacy and examination requirements.** Passing the following three examinations in the intended specialty area is required. These exams are designed and administered by the dissertation committee:

- a. **Qualifying exam.** Before admission to candidacy for the doctoral degree, the student must pass a written qualifying examination. The exam must be completed before the completion of 45 credit hours for students admitted after bachelor's degree and before the completion of 15 credit hours for students admitted after master's degree.
- b. **Comprehensive exam.** Each doctoral candidate must obtain approval from his or her dissertation committee for a dissertation topic and research plan through the comprehensive exam. The exam requires a written proposal and oral presentation, and is typically taken near the end of the course work outlined in the doctoral program of study. The comprehensive exam must be completed within one year after passing the qualifying exam. After passing the comprehensive exam, the student is advanced to the Ph.D. candidate status.
- c. **Dissertation defense.** The defense takes place at the conclusion of the dissertation research with the approval of the committee. After a successful defense outcome, as determined by the dissertation, the student earns the Ph.D. in EAS degree.

If a student fails any of the above exams, the student can apply to retake the exam in the next semester. A second failure will result in dismissal from the program.

### **Doctoral dissertation committee**

A doctoral dissertation committee shall be appointed for each student during the first year of enrollment. The purpose of the dissertation committee is:

1. Develop, with the student, the program of study for the intended specialty field under the Ph.D. in EAS program.
2. Design and administer the required Ph.D. examinations.



3. Provide the technical guidance to the student during the dissertation portion of the doctoral program.

The doctoral dissertation committee shall consist of at least three CEAS full members of the graduate faculty, including the Ph.D. dissertation committee chair. Additional members of the committee must be either full members or associate members of the graduate faculty.

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