

The University Senate of Michigan Technological University

PROPOSAL 15-04

MASTER OF ENGINEERING - CIVIL ENGINEERING

and

MASTER OF ENGINEERING - ENVIRONMENTAL ENGINEERING

The Senate approves the programs as described below.

RELATED PROGRAMS: Own/Other

The Master of Engineering - Civil Engineering (MEng-Civil) and Master of Engineering - Environmental Engineering (MEng-Env) degrees are spin offs from the Master of Engineering (MEng) at Michigan Technological University. It appears that only the University of Michigan currently offers a Masters of Engineering degree within the State of Michigan. About half of our peer and benchmark universities, however, offer some type of MEng degree.

RATIONALE

The MEng-Civil and MEng-Env degrees are intended to be terminal professional degrees where the candidate demonstrates advanced ability in course work and advanced independent design. They meet the need for flexibility for students who want to expand their knowledge in a specific discipline or to change disciplines as they plan careers in industrial markets, in business, as well as other professional areas. The degrees are intended for students wishing to work in the areas of consulting engineering, industry, and/or government. The MEng-Civil and MEng-Env degrees are professional degrees different from the Master of Science (MS) degree. They are capped with an advanced engineering design project or practicum as opposed to a research thesis. Based on 1995-96 ASEE data, almost 90 percent of our MS graduates in engineering wrote MS theses, whereas the average for our peer and benchmark universities was less than 50 percent. Students not interested in advanced research may therefore be less likely to attend graduate school at Michigan Tech.

Students not interested in doing advanced research yet wishing to enhance their educational background will be attracted to the MEng degree. It allows students to gain either a greater depth or more breadth in professional skills. Some students may elect to take additional course work related to their baccalaureate degree (e.g., construction, environmental, water resources, transportation, structural, geotechnical). Others will want to take course work in a different specialty that complements their undergraduate degree (e.g., course work in environmentally conscious manufacturing, graphical information systems/remote sensing, or computer science). Yet other students may elect to take course work in business or environmental policy, in addition to advanced engineering courses, that prepare them for entrepreneurial careers, careers with small- to medium-sized businesses, or government.

There are financial and career path benefits of the master's degree. In 1996, the median annual salary of engineers with a master's degree was \$70,000 compared to \$61,800 for engineers with a BS degree (NSPE, "Income and Salary Survey", 1996). Although it is harder to document, there may also be greater job satisfaction and career choice (e.g., faster movement to management positions). Next to the PhD, the master's degree is the fastest growing degree field (NSF, "Science and Engineering Degrees").

What is particularly attractive about the MEng-Civil and MEng-Env degrees are that they are designed to be completed with two semesters of full-time study, plus a one-term practicum that can be performed off campus. This is less than the typical one and one half to two years of full-time study required for the MS. However, MEng candidates lacking significant engineering work experience will be required to demonstrate in their practicum a level of independent learning, problem-solving, and project management skills as is expected of an MS student.

It is anticipated that the MEng degree program will promote stronger industrial partnerships by the development of applied design projects for MEng candidates. The practicum could be done either on-campus or off-campus, typically at the site of one of our department's corporate partners. The MEng degree particularly lends itself to short-term projects that often are required by industry.

The MEng-Civil and MEng-Env programs will not require additional resources. It is difficult to predict how many students are likely to ultimately enroll in these programs. However, the table below shows enrollment (since inception in summer, 1999) in the MEng program by students emphasizing civil and/or environmental engineering.

Table showing MEng students (since summer, 1999) advised by faculty in civil & environmental engineering.

Name	Emphasis	Graduated/Currently Enrolled	Employer
Heidi McKenzie	Environmental	Graduated	Ford
Steve Loveland	Civil (transportation)	Graduated	Consulting Engrg
Martin Stevenson	Environmental	Graduated	Consulting Engrg
Ryan Klug	Civil (transportation)	Graduated	Consulting Engrg
Todd Rouse	Environmental	Graduated	GM
Charles Ramos	Civil (construction, water resources)	Graduated	Consulting Engrg
David Koppana	Civil/Environmental (municipal engineering)	Graduated	Consulting Engrg
Paul Shapter	Civil (transportation)	Graduated	Consulting Engrg
Greg Hoffman	Environmental & water resources	Graduated	Consulting Engrg
Scott Arnold	Civil (transportation)	Graduated	Consulting Engrg
Tessa Pernsteiner	Civil (construction, transportation)	Graduated	Consulting Engrg
Matt Parks	Civil (construction, transportation)	Graduated	Consulting Engrg
Norma Boersma	Environmental	Graduated	Michigan Tech
Crystal Payment	Civil (construction, water resources)	Switched to MS Civil Engrg program	Graduating with MS, fall, 2002
Steve Bodnar	Civil (construction)	Left program without finishing	
Pete Koepfgen	Environmental	Switched to MS Env Engrg	

Students pursuing the MEng degree are expected to be self-supported and are not eligible for hire as graduate teaching or research assistants. Scholarships could be available for some students, but, for the most part, the MEng-Civil and MEng-Env students will pay full tuition. In addition, because the program is designed for the students to perform a 2-4 credit practicum and two semesters of coursework, most students will need to enroll for 13-14 credits during each of the two semesters that they are taking course work.

CURRICULUM DESIGN

Students electing the MEng-Civil and MEng-Env degrees must have a baccalaureate degree in engineering.

The Master of Engineering student must complete the following: 1) choose an advisory committee; 2) file a Degree Schedule form; 3) complete course work and practicum and obtain graduate committee approval of a presentation related to their course work and practicum; 4) fulfill a campus residency requirement; 5) file an approved MEng-3 Form, and 6) finish the degree within a prescribed time limit.

Administrative Structure

Applicants must possess a first degree in engineering. Applicants who apply to the MEng-Env program will have their graduate application reviewed by the same department faculty members who review the MS Environmental Engineering applications. Applicants who apply to the MEng-Civil program will have their applications reviewed by all department faculty involved in the following graduate areas: structural, geotechnical, water resources, construction, and transportation. All MEng-Civil and MEng-Env applications must be approved by the department chair. The Civil & Environmental Engineering Graduate and Research Committee will have primary responsibility for review of the degree program.

Accepted students will be assigned a faculty advisor within 2 weeks of acceptance into the program. Students are expected to submit a draft degree schedule (MEng-1 Form), define their graduate committee, and define their practicum during their first month in residence (except in the case of the practicum being conducted prior to beginning course work).

The graduate committee shall consist of an advisor and at least two additional faculty members. A three-person graduate committee can consist of either three faculty members from Civil & Environmental Engineering or two faculty members from Civil & Environmental Engineering and one faculty member from outside the department. The advisor and department committee member(s) can consist of faculty from the following ranks: Professor, Associate Professor, Assistant Professor, Lecturer. At least two committee members must be members of the graduate faculty.

Students will be strongly discouraged from switching from the MS program to the Masters of Engineering program. Students first accepted into the MS Civil Engineering or MS Environmental Engineering program that wish to switch into the MEng-Civil or MEng-Env programs must reapply through the graduate school for the MEng-Civil and MEng-Env programs. A student's application will then be reviewed by the appropriate MS faculty review committee. Students switching from an MS program can not apply any research credits (CE5999 or equivalent) to an MEng degree in either Civil Engineering or Environmental Engineering. Students who wish to switch from the Masters of Engineering program to an MS program are encouraged to do so but must also reapply to the appropriate MS program.

Specific Degree Requirements for Master of Engineering - Civil Engineering

Students must take 30 semester credits for the degree of Master of Engineering - Civil Engineering. Of those, 26-28 credits are for course work (a maximum of 14 credits can be at the 3000-4000-level and the remainder of the credits must be at the 5000 level); and, students must complete a 2-4 credit engineering design practicum (CE5998). Students can obtain up to 1

credit of course work for the Civil Engineering (CE5990) graduate seminar but are expected to attend seminar during all semesters they are enrolled and on campus.

Course work must be approved by a student's graduate advisor(s) and committee. There will be no required course(s) that all students in the Master of Engineering - Civil Engineering must take. Rather, the individual areas (construction, geotechnical, structures, transportation, environmental, water resources) will determine, based upon the student's background and experience, an appropriate course plan. However, a minimum of 9 credits (can be CE courses or courses from another department) are recommended to be related to one of 6 focus areas (construction, geotechnical, structures, transportation, environmental, or water resources) and a minimum of 3 courses must be CE5XXX designated courses (excluding CE5990 and CE5998). The Final Degree Schedule (Meng-2 Form) must be submitted at least one month before graduation.

Specific Degree Requirements for Master of Engineering - Environmental Engineering

Students must take 30 semester credits for the degree of Master of Engineering - Environmental Engineering. Of those, 26-28 credits are for course work (a maximum of 14 credits can be at the 3000-4000-level and the remainder of the credits must be at the 5000 level); and, students must complete a 2-4 credit engineering design practicum (CE5998). Students can obtain up to 1 credit of course work for the Environmental Engineering (CE5991 or CE5992) graduate seminar but are expected to attend seminar during all semesters they are enrolled and on campus.

Course work must be approved by a student's graduate advisor(s) and committee. Students are required to take CE5501 (Environmental Process Engineering, 3 credits) and are also required to select 15 of their 30 total credits from engineering courses. The Final Degree Schedule (MEng-2 Form) must be submitted at least one month before graduation.

Requirements for the Engineering Design Practicum

For the degree of Master of Engineering - Civil Engineering and Master of Engineering - Environmental Engineering, the student must set up a professional internship design practicum, with the assistance of their advisor(s), whose length and scope will vary inversely with the prior work experience of the MEng candidate. Credit is only provided for a practicum that is for work conducted after a student has been accepted into the MEng-Civil and MEng-Env programs. Ideally the practicum would be conducted in the semester prior to initiating course work (for May graduates this would occur during the summer prior to beginning course work in fall semester). The design practicum can also be taken after course work requirements are completed.

This design practicum must be unanimously approved by the student's primary advisor(s), the student's graduate committee, and the department chair. It is required that students obtain this approval prior to beginning a practicum. Students must provide an oral presentation and written record of their practicum to their advisor(s) and committee in order to obtain credit for CE5998. A combination of the oral presentation and written record must include the following components, each of which must be adequately addressed to pass the oral practicum defense: a description of the student's engineering work experience, a description of their practicum, a description of a significant independent engineering project (which may be part of the practicum or may be part of prior work experience), and a description of their MEng course work with a demonstration of how that course work fits into the student's professional goals. This presentation must be observed by all committee members and approved by at least a majority of committee members, as indicated on the MEng 3 form.

Cases in which the design practicum is performed at Michigan Tech will be considered on a case-by-case basis. These case-by-case situations must be approved by the students' primary advisor(s), committee, and the department chair and detailed in a written memo to the department chair. Such practicums could consist of an experience dealing with one or more of

these suggested topics: advanced participation in the engineering enterprise program, an advanced engineering design project, and work on a project involving operation, testing and/or analysis of the units operation/pilot plant laboratory.

OTHER INFORMATION

Grades -- All grades must be B (3.0 on a 4.0 scale) or better in the major subject area. The department chair can approve no more than 6 credits of BC (2.5) or C (2.0) in a cognate department. The student must maintain a cumulative GPA of 3.0 or better in all courses taken as a graduate student.

Campus Residency Requirement -- A minimum of one-half of the total degree credits (includes course work and practicum credits) must be taken in residence at Michigan Tech.

Time Limit -- All work required for the MEng-Civil and MEng-Env degrees must be completed within five calendar years of the first enrollment in the degree program. It is expected, however, that most students will complete the requirements in one year of full-time work.

PLANNED IMPLEMENTATION DATE

Summer 2004

ACCREDITATION REQUIREMENTS

None

Adopted by Senate: 11 February 2004

Approved by President: 29 February 2004