

The University Senate of Michigan Technological University

PROPOSAL 5-98

MASTER OF ENGINEERING

Michigan Technological University will award the Master of Engineering Degree as described below.

1. RELATED PROGRAMS: Own/Other

The Master of Engineering Degree is a spin off from the Master of Science of Engineering 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 the ME degree.

2. RATIONALE

The Master of Engineering degree is intended to be a terminal professional degree where the candidate demonstrates advanced ability in course work and with advanced independent design. It meets 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 small- to medium-sized businesses, as well as other professional areas. The ME degree lends itself very well to distance education and is likely to create a market in this area. The Master of Engineering degree is a professional degree different from the Master of Science degree. It is 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 are 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 ME degree. It allows students to gain either a greater depth or more breadth in professional skills. Some students may elect to take additional coursework related to their baccalaureate degree (e.g., Master of Engineering - mechanical engineering emphasis). Others will want to take course work in a different specialty that complements their undergraduate degree (e.g., a BSME may take course work in electrical engineering with the goal of designing electromechanical controls ("mechatronics") - Master of Engineering - electrical emphasis). Yet other students may elect to take business courses, in addition to advanced engineering courses, that prepare them for entrepreneurial careers or careers with small- to medium-sized businesses (Master of Engineering).

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 (NSPE, "Income and Salary Survey", 1996). Although it is harder to document, there is also greater job satisfaction and career choice (e.g., faster movement to management positions). Next to the Ph.D., the master's degree is the fastest growing degree field (NSF, "Science and Engineering Degrees").

What is particularly attractive about the ME degree is that it is designed to be completed in one year of full-time study compared to the typical one and one half to two years of full-time study required for the MS. Although, not designed as a research-oriented degree, some students may ultimately use it as a path to the Ph.D. That is, once they start a graduate program, they may become attracted to research and switch to one of the traditional paths.

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

The ME program may require some additional resources, but they are anticipated to be small since the ME student population will be spread across the College of Engineering. It is difficult to predict how many students are likely to ultimately enroll in the ME program. If it is similar to existing programs at our peer institutions, we might expect about 50 ME students. In some ways there should be economies, since there will be more students enrolled in graduate and senior-level elective courses, which typically have low enrollments. An analysis of the enrollments in 400-, 500-, and 600-level engineering courses during the last academic year indicates that there is excess capacity, defined as an enrollment of less than 10 students, in most graduate-level courses. Two thirds of the 500-level classes offered last year had less than 10 students and a third had less than 5 students enrolled! Over a third of recitation-type, 400-level courses had less than 20 students enrolled. In addition, ME students will enroll in upper division classes in other schools and in the College of Science and Arts. Finally, it is the stated goal of the University to increase graduate tuition to be about 50 percent higher than undergraduate tuition. Once this occurs, the ME degree should increase revenue to the University.

Students pursuing the Master of Engineering degree are expected to be self-supported and should not be eligible for hire as graduate assistants. Scholarships could be available for some students, but, for the most part, the ME students will pay full tuition.

3. CURRICULUM DESIGN

Students electing the ME degree are expected to have a baccalaureate degree in engineering. Exceptional students with degrees in mathematics or science may be selected but are likely to be required to take additional course work for no credit.

Once the ME degree is established, individual degree programs will be established by 1) individual students in consultation with their advisor and advisory committee, 2) departments, or 3) interdisciplinary committees. In all cases, the College of Engineering and the Graduate School must approve the degree program. A ME degree oversight committee will be established to approve degree programs as they are proposed and to ensure quality of existing programs. Membership of the committee would include faculty within and outside the College. The minimum requirements for the ME degree are outlined below.

The Master of Engineering student must complete the following:

choose an advisory committee

file a Degree Schedule form

complete course work and practicum

fulfill a campus residency requirement

finish the degree within a prescribed time limit

Grades -- All grades must be B (3.0 on a 4.0 scale) or better in the major subject area. The student must maintain a cumulative grade point average of 3.0 or better.

Campus Residency Requirement -- A minimum of one-half of the course work and practicum/project credits must be taken in residence at Michigan Tech.

Time Limit -- All work required for the Master of Engineering degree 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.

In addition to College of Engineering requirements, which are described below, individual departments may have additional requirements for ME degrees with emphasis in their discipline. Students are expected to know their department's requirements.

Advisor -- Initially the advisor may be a department's graduate coordinator, but as soon as possible, and by the end of the first quarter in residence, a permanent advisor must be chosen. This Michigan Tech graduate faculty member advises the student on course selection and choice of advanced independent study along with an advisory committee composed of the advisor and at least two additional members, one or more of which should be from departments other than that of their advisor. The advisor is an important factor in the graduate student's timely and successful completion of his or her program of study.

Degree Schedule -- A Degree Schedule form designed especially for the Master of Engineering is used to list all courses that the student has taken or will take since entering Graduate School to be used toward the Master of Engineering degree. It also lists the student's advisory committee and proposed advanced study or design topic. The College of Engineering must approve the completed form before it is sent to the Graduate School. The Dean of Engineering and an ME oversight committee will monitor the quality and rigor of the Master of Engineering program.

The course work must meet certain requirements, described below, and the advisory committee, and the department chair or associate dean of engineering must approve them. Courses taken while an undergraduate at Michigan Tech may be used for graduate degree credits in accordance with the senior rule.

Changes in the Degree Schedule -- Any changes must be approved. The advisor must send a memo with amended degree schedule to the associate dean of the College of Engineering.

Distribution of course work and practicum credit --

500-600 series (minimum) 24 credits

300-400 level (maximum) 21 credits

45 credits

NEW COURSE DESCRIPTIONS

ENG 501 Engineering Design Practicum f,w,s,su (var 3 to 6 cr)

An advanced independent study for students in the Master of Engineering program. The student in consultation with his/her advisor develops and executes a project demonstrating capabilities in problem solving, communications, and decision making. The practicum can be done on campus or at the site of a Michigan Tech corporate partner. Students will be expected to make an oral presentation related to their project.

No other new courses will be required. It is expected that the ME student will take a coherent combination of senior- and graduate-level courses currently offered.

PLANNED IMPLEMENTATION DATE

Fall 1998

ACCREDITATION REQUIREMENTS

None

Adopted by Senate: February 18, 1998
Approved by Board of Control: March 20, 1998
Clarified in Proposal 16-01