Graduate Handbook

Master of Science in Manufacturing Engineering

Michigan Technological University

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Introduction

The purpose of this handbook is to provide students pursuing the MS Manufacturing Engineering degree at Michigan Tech with an overview of the rules governing this program. Students should also familiarize themselves with the degree requirements set forth by the Graduate School. The requirements set by the Graduate School supersede any policies contained in this handbook. The Graduate School requirements are given at

https://www.mtu.edu/gradschool/policies-procedures/requirements/.

Note that the rules and procedures contained in this handbook are subject to change. Please see the MMET Graduate Program Director for updates.

Program Requirements

All students must satisfy core and area requirements. The core requirement is satisfied by successful completion of the six courses listed below.

- MA 5701 - Statistical Methods (3 credits) [f,s,su]
- MFGE 5010 Professional Engineering Communication (3 credits) [su] (course only option) OR

  MFGE 6010 - Engineering Research Communications (3 credits) (Report & Thesis option)
- MFGE 5000 - Organizational Leadership (3 credits) [f]
- MFGE 5100 - Tolerance Analysis with Geometric Dimensioning & Tolerancing (3 credits) [f]
- MFGE 5200 - Industry 4.0 Concepts (3 credits) [s]
- MFGE 5500 - Industrial Safety (1 credit) [s]

Students complete the emphasis requirement by completing 14 credits from the course options given below. Maximum 12 credits are allowed at the 3000/4000 level.

List course numbers – Additive Manufacturing	**Credits**
MEEM 5695 - Additive Manufacturing	3
MFGE 5300 - Design for Additive Manufacturing	3
MFGE 5400 - Additive Manufacturing Lab	3
MET 5990 - Special Topics in Mechanical Engineering Technology	2

List course numbers - Manufacturing Systems and Operations	Credits
BA 5610 - Operations Management	3
EET 5373 - Advanced Programmable Controllers	3
MEEM 5656 - Advanced Production Planning	3
MET 4355 - Industrial Systems Simulation	3
MET 4510 - Lean Manufacturing and Production Planning	3
MET 4585 - Facilities Layout and Safety Design	3
SAT 4343 - Network Engineering	3
MET 5990 - Special Topics in Mechanical Engineering Technology	2

List course numbers - Advanced Materials and Manufacturing Processes	Credits
EET 5144 - Real-Time Robotics Systems	4
EET 5147 - Industrial Robotic Vision System and Advanced Teach Pendant Programming	4
MET 4377/5377 - Applied Fluid Power	3
MET 4378/5378 - Advanced Hydraulics: Electro-hydraulic Components and Systems	3
MET 4780 - Advanced Manufacturing	3

MSE 5100 - Introduction to Materials Science and Engineering with Advanced Topics	3
MSE 5400 - Statistical Quality Control in Materials Manufacturing	3
MET 5990 - Special Topics in Mechanical Engineering Technology	2

List course numbers – Quality Engineering	**Credits**
MEEM 5650 - Advanced Quality Engineering	3
MEEM 5655 - Introduction to Lean Manufacturing	3
MEEM 5670 - Experimental Design in Engineering	3
MET 5990 - Special Topics in Mechanical Engineering Technology	2

Course Descriptions

Graduate Classes (5000+)
https://www.banweb.mtu.edu/pls/owa/stu_ctg_utils.p_online_all_courses_gr

Undergraduate Classes (1000 - 4999)
https://www.mtu.edu/catalog/courses/

Grade Standards

One grade of BC may be applied toward the degree. All other courses must be completed with a grade of B or better.

Credit Transfer

A maximum of six course credits taken as a student at other colleges or universities may be accepted for credit towards the MS Manufacturing Engineering degree at Michigan Tech. A transferred course cannot be applied toward any other degree (at Michigan Tech or elsewhere) except under the policies for Michigan Tech's accelerated MS program. If these credits were taken before enrollment at Michigan Tech, a request for transfer credit should be made during the student's first semester on campus.

Transfer credits must be:

- approved by a faculty member who teaches an equivalent course at Michigan Tech and by the graduate program director, or by the student's advisory committee,
- within 10 years of the student's first semester at Michigan Tech; and
- completed with a grade of B or better.

Credit Requirements

Students must earn a total of thirty (30) credits to complete the MS degree. Students may choose from the elective courses given in Table 1 and available special courses such as: MET 5990, MET 5999, and MFGE 5999.

MFGE 5999 is only available to students completing the degree under the thesis or report options. The Graduate Program Director may allow other classes to apply to the MS Manufacturing Engineering degree with prior approval.

Degree Options

Students may select from among three options for completion of the MS degree: the Coursework Only option (Plan A), the Report option (Plan B) and the Thesis option (Plan C). All three options require 30 credits. The options are described in detail below.

All students enter the University with a coursework degree option designated. Students wishing to remain in that option do not need to make any changes. Students wishing to pursue the report or thesis option must complete the Advisor and Committee Recommendation Form. This form requires the signature of an advisor and must be emailed to the Graduate School.

Coursework Only Option (Plan A)

The coursework option requires 30 hours of graded course work. None of the 30 hours of credit required for graduation may be in MFGE 5999.

A student in the coursework option may take up to three credits of MET 5990 or MET 5999.

The Graduate Assistant is available to assist with course planning and other advising functions.

Report Option (Plan B)

Under the Project option, 2-6 of the 30 hours of credit required for graduation must be in the research course: MFGE 5999. In addition to completing the required coursework, the student is expected to:

1. Prepare a written project plan which describes any background necessary for completion of the project and a project plan.
2. Present the project plan to the advisory committee.
3. Prepare a final report at the conclusion of the project.
4. Defend the project report in a public oral seminar presentation.
5. Maintain a system that provides feedback to the advisor in a timely manner.

The final oral defense must be announced to the College of Engineering faculty and graduate students at least two weeks prior to the defense. The written report must also be distributed two weeks in advance of the oral defense. A defense may be canceled if these requirements are not met.

The department recommends the following timetable for successful completion of a MS report degree.

- Find a major advisor during the first two semesters in the program.
- Present a project plan to the advisory committee during the 3rd term in residence (not counting summers).
- Provide a "defendable" project report to the entire committee no later than two weeks prior to the oral defense.
- Defend the report in a public forum. This includes two question and answer sessions: the first consists of both students and faculty; the second being closed to the general audience consists of faculty only.

Oral Presentation Scheduling

Following are the steps for scheduling an oral presentation.

1. Reserve a room through the site:

   `https://www.mtu.edu/registrar/students/room-schedule/`.
2. Create a Google Calendar invitation including the presentation location, an abstract and a link or copy of the report, proposal, thesis, or dissertation. Send the invitation to the Graduate Assistant. Note that the Graduate Assistant should be able to invite others.
3. The Graduate Assistant will distribute the invitation to the College of Engineering faculty and graduate students.

Thesis Option (Plan C)

Under the thesis option, 6-10 of the 30 hours of credit required for graduation must be in the research course: MFGE 5999.

In addition to the coursework, a student following the thesis option is expected to:

1. Prepare a written plan describing the thesis research.
2. Defend the research plan in an oral seminar presentation or meet with the advisory committee to discuss the research plan. The student and her/his advisor will determine whether the plan is to be presented in a department-wide seminar or will be presented to faculty members individually.
3. Prepare a final thesis.
4. Defend the thesis in an oral seminar presentation.
5. Maintain a system that provides feedback to the advisor in a timely manner.

Oral defenses (research plan and thesis defense) must be announced to the College of Engineering faculty and graduate students at least two weeks prior to the defense. The written plan and thesis must also be distributed two weeks in advance of the oral defense. A defense may be cancelled if these requirements are not met.

The department recommends the following timetable for the milestones along the way to a thesis masters.

- Find a thesis advisor during the first, or no later than the second, semester in the program.
- Present a thesis plan during the second or third semester in residence (not counting summers).
- Provide a defendable thesis to the entire committee no later than two weeks prior to the thesis defense. Make the thesis available to the College of Engineering faculty and graduate students.
- Defend the thesis in a public forum. This includes two question and answer sessions: the first consists of both students and faculty; the second being closed to the general audience consists of faculty only.

Oral Presentation Scheduling

To schedule an oral presentation:

1. Reserve a room through the site:

   `https://www.mtu.edu/registrar/students/room-schedule/`.
2. Create a Google Calendar invitation including the presentation location, an abstract and a link or copy of the report, proposal, thesis, or dissertation. Send the invitation to the Graduate Assistant. Note that the Graduate Assistant should be able to invite others.
3. The Graduate Assistant will distribute the invitation to the College of Engineering faculty and graduate students.

Policies and Procedures

Admission Requirements

Applicants should have a BS in Mechanical Engineering Technology or a related field. Exceptions may be made for well-qualified applicants from other disciplines.

A TOEFL score of at least 79 (IBT) or 6.5 (IELTS) is required for international applicants whose native language is not English. Successful applicants typically have an undergraduate GPA of 3.0 or better on a 4.0-point scale.

Choosing an Advisor

Students pursuing a thesis or report degree option will have an advisor with full Graduate Faculty Status and a full-time faculty appointment or affiliated appointment in the MMET Department. Students will be advised by the Graduate Program Director until they choose an advisor. Coursework option students may retain the Graduate Program Director as their advisor through graduation.

Students in the thesis and report options will have an advisory committee consisting of the student's advisor and at least two additional members. Members of the committee must have Associate or full Graduate Faculty Status and a full-time faculty appointment or affiliated appointment in the MMET Department.

The advisory committee members will be selected by the advisor in consultation with the student. An advisor should be chosen during the first two semesters.

Change of Advisor

Report and thesis students may change advisors if their research interests diverge or if difficulties arise in the relationship. Students interested in initiating the process to change their graduate advisor should consider all the options listed on the Graduate School's website for how to address difficulties in the student-advisor relationship. In certain other situations, a change of advisor may also be considered.

https://www.mtu.edu/gradschool/resources-for/students/academic/succeeding/

Once you have decided to change your graduate advisor, you must follow the steps listed below.

1. Meet with your graduate program director to initiate the process to change advisor. If meeting with the graduate program director is not feasible or appropriate, meet with the department chair.
2. Discuss the following with the graduate program director (or chair) and, if appropriate, the current advisor:
    a. Whether additional resources within or outside the department (such as the Ombuds) could help resolve the situation.
    b. The impact of the change of advisor on your time to complete the degree.
    c. Your current and future funding.
    d. Research already conducted. Whether this will be incorporated into the dissertation, thesis, or report, and if so, how.
    e. Impact on immigration status (if any). Consult International Programs and Services (IPS), if necessary.
    f. Record the agreement from the discussions in writing, including indications of agreement from all affected faculty advisors, and provide copies to the student, the graduate program director, and all affected faculty advisors.

3. File an updated Advisor and Committee Recommendation Form for approval by the Graduate School https://www.mtu.edu/gradschool/documents/policies-procedures/forms/advisor-committee.pdf
4. If the student and the graduate program director are unable to reach agreement on the advisor change, contact the Assistant Dean of the Graduate School to determine additional steps to resolve the situation.

Professional Development

Success in Graduate School and in a career depends on factors outside of coursework. The following link identifies a range of resources available to help students succeed in Graduate School and beyond.

https://www.mtu.edu/gradschool/resources-for/students/professional/.

Career Counseling

Career Services (https://www.mtu.edu/career/) is available to help craft and review resumes, prepare you for interviewing and provide career coaching services.

In addition to the resources identified above, it can be helpful to get advice on professional development specific to a career area. Students are encouraged to contact a faculty advisor in their chosen area to help with coursework selection and career advice.

Individual Development Plan

An Individual Development Plan encourages a student to reflect on career goals and how best to use the resources and time available during graduate study to meet those goals. Students pursuing the Report and Thesis options are especially encouraged to complete an Individual Development Plan.

Many IDP forms are available online. Michigan Tech has created the form linked here

https://www.google.com/url?q=https://www.mtu.edu/gradschool/resources-for/students/professional/documents/mtu-gs-idp.docx&sa=D&source=docs&ust=1678123521736097&usg=AOvVaw03OMZX6DkBCQ4zPdeXhptE

for this purpose. Students are encouraged to use any form they find useful. More information on IDPs is available from the Graduate School at:

https://www.mtu.edu/gradschool/resources-for/students/professional/idp/

Additional Requirements

Forms and Deadlines

Forms and Deadlines for the Graduate School are available at:
https://www.mtu.edu/gradschool/policies-procedures/forms-deadlines/

Personalized requirements for each student are maintained at https://mymichigantech.mtu.edu.

Students are responsible for keeping track of form requirements and ensuring the required forms are submitted on time.

Table 1: Other Approved Elective Courses

- MEEM 4430 – Advanced Computer Aided Design and Manufacturing Methods
- MEEM 4640 – Micromanufacturing Processes
- MEEM 4655 – Production Planning
- MEEM 4695 – Additive Manufacturing
- MEEM 4705 – Robotics and Mechatronics
- MEEM 4707 – Autonomous Systems
- MEEM 5680 – Optimization I

Abbreviations

[f] - Fall semester; late August to early December

[s] - spring semester; early January to late April

[su] - Summer semester; early May to early August

(x) - numbers appearing in parentheses indicate credit level for a course