MECHANICAL ENGINEERING: MODELING AND SIMULATION IN MECHANICAL ENGINEERING, M.S.

This is a named option within the Mechanical Engineering M.S. (http://guide.wisc.edu/graduate/mechanical-engineering/mechanical-engineering-ms/#text)

The Department of Mechanical Engineering M.S. named option Modeling and Simulation in Mechanical Engineering is an accelerated, coursework only, on campus degree program (completed in 12 months) with a stated objective of endowing the student with computational engineering literacy and a strong modeling and simulation skillset. This degree program prepares individuals who are interested in mastering the use of computers for the end goal of solving challenging engineering problems via simulation.

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. Applicants must meet the minimum requirements (https://grad.wisc.edu/apply/requirements/) of the Graduate School as well as the program(s).

Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Deadline</td>
<td>December 15</td>
</tr>
<tr>
<td>Spring Deadline</td>
<td>This program does not admit in the spring.</td>
</tr>
<tr>
<td>Summer Deadline</td>
<td>This program does not admit in the summer.</td>
</tr>
<tr>
<td>GRE (Graduate Record Examinations)</td>
<td>Required.*</td>
</tr>
<tr>
<td>English Proficiency Test</td>
<td>Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (<a href="https://grad.wisc.edu/apply/requirements/#english-proficiency">https://grad.wisc.edu/apply/requirements/#english-proficiency</a>).</td>
</tr>
<tr>
<td>Other Test(s) (e.g., GMAT, MCAT)</td>
<td>n/a</td>
</tr>
<tr>
<td>Letters of Recommendation Required</td>
<td>3**</td>
</tr>
</tbody>
</table>

* 1) Due to COVID-19, GRE scores will not be required for applications to Mechanical Engineering graduate programs for admission to the Spring 2022, Summer 2022, and Fall 2022 terms.
2) Applicants earning a degree from the following UW-Madison B.S. programs are not required to submit GRE scores for the Master of Science in Mechanical Engineering, Modeling and Simulation in Mechanical Engineering application: (1) any program in the College of Engineering, (2) Computer Sciences, (3) Department of Biological Systems Engineering, or (4) the Applied Mathematics, Engineering and Physics program. All other applicants must submit GRE scores.

** Applicants earning a degree from the following UW-Madison B.S. programs are not required to obtain any letters of recommendation for the Master of Science in Mechanical Engineering, Modeling and Simulation in Mechanical Engineering application: (1) any program in the College of Engineering, (2) Computer Sciences, (3) Department of Biological Systems Engineering, or (4) the Applied Mathematics, Engineering and Physics program. To learn how to complete the "Recommendations" tab in the application, please review our webpage here: https://www.engr.wisc.edu/department/mechanical-engineering/academics/master-phd-degrees-mechanical-engineering/. All other applicants must submit a minimum of three letters of recommendation.

Students with a strong background in mechanical engineering or a related field with interest in furthering their education in mechanical engineering are encouraged to apply for admission to the department. Applicants accepted into the program generally have an undergraduate grade point average well above the graduate school minimum of 3.0 on a 4.0 scale. All applicants are required to take the Graduate Record Exam (GRE)*. Applications are evaluated on the basis of previous academic record, GRE scores, letters of recommendation, and a personal statement. For more information on admission requirements see the program's website (https://www.engr.wisc.edu/department/mechanical-engineering/academics/master-phd-degrees-mechanical-engineering/).

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding/) is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM RESOURCES

Students in this program are NOT eligible for teaching assistant, research assistant, or project assistant positions as this is an accelerated coursework ONLY degree.

FEDERAL LOANS

Students who are U.S. citizens or permanent residents may be eligible to receive some level of funding through the federal direct loan program. These loans are available to qualified graduate students who are taking at least 4 credits during the fall and spring semesters, and 2 credits during summer. Private loans are also available. Learn more about financial aid at their website (https://financialaid.wisc.edu/).

INTERNATIONAL STUDENT SERVICES FUNDING AND SCHOLARSHIPS

For information on International Student Funding and Scholarships visit the ISS website (https://iss.wisc.edu/students/new-students/funding-scholarships/).
REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

NAMED OPTION REQUIREMENTS

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students are able to complete a program with minimal disruptions to careers and other commitments.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirements | Detail
---|---
Minimum Credit Requirement | 30 credits
Minimum Residence Credit Requirement | 18 credits
Minimum Graduate Coursework Requirement | Half of degree coursework (15 credits out of 30 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide (https://registrar.wisc.edu/course-guide/).
Overall Graduate GPA Requirement | 3.00 GPA required.
Other Grade Requirements | Students must earn a C or above in all formal coursework. Students may not have more than two incompletes on their record at any one time.
Assessments and Examinations | None.

Language Requirements | No language requirements.

REQUIRED COURSES

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M E 903</td>
<td>Graduate Seminar (Two semesters are required and must be taken in the first two semesters.)</td>
<td>0</td>
</tr>
<tr>
<td>M E 459</td>
<td>Computing Concepts for Applications in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>M E/COMP SCI/ E C E/E M A/E P 759</td>
<td>High Performance Computing for Applications in Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

A minimum of 4 courses (12 credits total) must be taken from the courses listed:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M E 440</td>
<td>Intermediate Vibrations</td>
<td></td>
</tr>
<tr>
<td>M E 451</td>
<td>Kinematics and Dynamics of Machine Systems</td>
<td></td>
</tr>
<tr>
<td>M E 460</td>
<td>Applied Thermal / Structural Finite Element Analysis</td>
<td></td>
</tr>
<tr>
<td>M E 531</td>
<td>Digital Design and Manufacturing</td>
<td></td>
</tr>
<tr>
<td>M E/COMP SCI/ E C E 532</td>
<td>Matrix Methods in Machine Learning</td>
<td></td>
</tr>
<tr>
<td>M E 535</td>
<td>Computer-Aided Geometric Design</td>
<td></td>
</tr>
<tr>
<td>M E 548</td>
<td>Introduction to Design Optimization</td>
<td></td>
</tr>
<tr>
<td>M E/COMP SCI/ I SY E 558</td>
<td>Introduction to Computational Geometry</td>
<td></td>
</tr>
<tr>
<td>M E 564</td>
<td>Heat Transfer</td>
<td></td>
</tr>
<tr>
<td>M E 573</td>
<td>Computational Fluid Dynamics</td>
<td></td>
</tr>
<tr>
<td>M E 601</td>
<td>Special Topics in Mechanical Engineering (Medical Image Based Modeling)</td>
<td></td>
</tr>
<tr>
<td>M E 601</td>
<td>Special Topics in Mechanical Engineering (Applied &amp; Computational Math w/Engineering Apps)</td>
<td></td>
</tr>
<tr>
<td>M E/B M E 603</td>
<td>Topics in Bio-Medical Engineering (Finite Element Method for Biomechanics)</td>
<td></td>
</tr>
<tr>
<td>M E/E C E 739</td>
<td>Advanced Robotics</td>
<td></td>
</tr>
<tr>
<td>M E 748</td>
<td>Optimum Design of Mechanical Elements and Systems</td>
<td></td>
</tr>
<tr>
<td>M E 751</td>
<td>Advanced Computational Dynamics</td>
<td></td>
</tr>
<tr>
<td>M E 764</td>
<td>Advanced Heat Transfer I-Conduction</td>
<td></td>
</tr>
<tr>
<td>M E 964</td>
<td>Special Advanced Topics in Mechanical Engineering (Topic: “Two Phase Flow Theory and Computation”)</td>
<td></td>
</tr>
<tr>
<td>E M A 521</td>
<td>Aerodynamics</td>
<td></td>
</tr>
<tr>
<td>E M A 522</td>
<td>Aerodynamics Lab</td>
<td></td>
</tr>
</tbody>
</table>

Advisor Approval of Study Plan

The faculty advisor must always approve the courses a student takes in the MS program. Students should schedule an appointment with their adviser when selecting their courses. During the final semester, the
faculty advisor will review the courses taken again and if approved, sign the warrant request form.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School’s Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy/) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

NAMED OPTION-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Work from Other Institutions

With program approval, students are allowed to count graduate coursework from other institutions (up to 12 credits) toward the minimum graduate degree credit requirement and the minimum graduate coursework (50%) requirement. No credits from other institutions can be counted toward the minimum graduate residence credit requirement. Coursework earned five or more years prior to admission is not allowed to satisfy requirements.

UW–Madison Undergraduate

With advisor approval, up to 7 credits numbered 400 or above may be counted toward the minimum graduate degree credit requirement. These credits may be counted toward the minimum graduate coursework (50%) requirement if they are in courses numbered 700 or above. No credits may be counted toward the minimum graduate residence credit requirement. A course at the 300 level can only be transferred from a UW–Madison undergraduate program if it was taken as a technical elective (i.e., non-required course). Coursework earned five or more years prior to admission is not allowed to satisfy requirements.

UW–Madison University Special

With program approval, and payment of the difference in tuition, students are allowed to count up to 15 credits of coursework numbered 400 or above taken as a UW–Madison Special student toward the minimum graduate residence credit requirement and the minimum graduate degree credit requirement. These credits may be counted toward the minimum graduate coursework (50%) requirement if they are in courses numbered 700 or above. Coursework earned five or more years prior to admission is not allowed to satisfy requirements.

PROBATION

The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

1. Good standing (progressing according to standards; any funding guarantee remains in place).
2. Probation (not progressing according to standards but permitted to enroll; loss of funding guarantee; specific plan with dates and deadlines in place in regard to removal of probationary status).

3. Unsatisfactory progress (not progressing according to standards; not permitted to enroll, dismissal, leave of absence or change of advisor or program).

A semester GPA below 3.0 will result in the student being placed on academic probation. If a semester GPA of 3.0 is not attained during the subsequent semester of full time enrollment (or 12 credits of enrollment if enrolled part-time), this will be deemed unsatisfactory progress and the student may be dismissed from the program or allowed to continue for one additional semester based on advisor appeal to the Graduate School.

ADVISOR / COMMITTEE

All students will be assigned a mechanical engineering faculty advisor who assists them in planning a course sequence that meets degrees requirements and who will discuss career objectives with the students.

CREDITS PER TERM ALLOWED

15 credits

TIME CONSTRAINTS

Master’s degree students who have been absent for five or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)
- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
  - Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
  - Dean of Students Office (https://doso.students.wisc.edu/) (for all students to seek grievance assistance and support)
  - Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
  - Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
  - Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
  - Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
  - Office of Student Conduct and Community Standards (https://studentconduct.wisc.edu/) (for conflicts involving students)
  - Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
  - Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)
Mechanical Engineering Grievance Procedures

If a student feels unfairly treated or aggrieved by faculty, staff, or another student, the University offers several avenues to resolve the grievance. Students’ concerns about unfair treatment are best handled directly with the person responsible for the objectionable action. If the student is uncomfortable making direct contact with the individual(s) involved, they should contact the advisor or the person in charge of the unit where the action occurred (program or department chair, section chair, lab manager, etc.). Many departments and schools/colleges have established specific procedures for handling such situations; check their web pages and published handbooks for information. If such procedures exist at the local level, these should be investigated first. For more information see the Graduate School Academic Policies & Procedures: https://grad.wisc.edu/acadpolicy/?policy=grievancesandappeals. The Assistant Dean for Graduate Affairs (engr-dean-graduateaffairs@engr.wisc.edu) provides overall leadership for graduate education in the College of Engineering (CoE), and is a point of contact for graduate students who have concerns about education, mentoring, research, or other difficulties.

1. The student is encouraged to speak first with the person toward whom the grievance is directed to see if a situation can be resolved at this level.

2. Should a satisfactory resolution not be achieved, the student should contact the ME Graduate Committee Chair (https://docs.google.com/document/d/18F268f2Cq_CKwOaTcHKJu9RQA6i89xho/edit/#heading=h1fob9te) or Department Chair (https://docs.google.com/document/d/18F268f2Cq_CKwOaTcHKJu9RQA6i89xho/edit/#heading=h1fob9te) to discuss the grievance. The Graduate Committee Chair or Department Chair will facilitate problem resolution through informal channels and facilitate any complaints or issues of students. The first attempt is to help students informally address the grievance prior to any formal complaint. Students are also encouraged to talk with their faculty advisors regarding concerns or difficulties if necessary. University resources for sexual harassment, discrimination, disability accommodations, and other related concerns can be found on the UW Office of Compliance website (https://compliance.wisc.edu/). Other campus resources can be found above.

3. If the issue is not resolved to the student’s satisfaction the student can submit the grievance to the Graduate Committee Chair in writing, within 60 calendar days of the alleged unfair treatment.

4. On receipt of a written complaint, a faculty committee will be convened by the Graduate Committee Chair to manage the grievance. The faculty committee will obtain a written response from the person toward whom the complaint is directed. This response will be shared with the person filing the grievance.

5. The faculty committee will determine a decision regarding the grievance. The Graduate Committee Chair will report on the action taken by the committee in writing to both the student and the party toward whom the complaint was directed within 15 working days from the date the complaint was received.

6. At this point, if either party (the student or the person toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal. Either party has 10 working days to file a written appeal to the School/College.

7. Documentation of the grievance will be stored for at least 7 years. Significant grievances that set a precedent will be stored indefinitely.

The Graduate School has procedures for students wishing to appeal a grievance decision made at the school/college level. These policies are described in the Graduate School’s Academic Policies & Procedures: https://grad.wisc.edu/acadpolicy/?policy=grievancesandappeals.

OTHER

Students enrolled in this program are not permitted to accept teaching assistantships, project assistantships, research assistantships or other appointments that would result in a tuition waiver. Students in this program cannot enroll in other graduate programs nor take courses outside the prescribed curriculum.

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School’s professional development resources (https://grad.wisc.edu/pd/) to build skills, thrive academically, and launch your career.

PEOPLE

PROFESSORS

Darryl Thelen (Chair)
Jaal Ghandhi
Dan Negrut
Gregory F. Nellis
Tim Osswald
Frank Pfefferkorn
John Pfotenhauer
Xiaoping Qian
Douglas Reindl
David Rothamer
Scott T. Sanders
Vadim Shapiro
Krishnan Suresh
Lih-sheng Tung

ASSOCIATE PROFESSORS

Melih Eriten
Christian Franck
Sage Kokjohn
Tom N. Krupenkin
Franklin Miller
Mario F. Trujillo
Michael Zinn

ASSISTANT PROFESSORS

Peter Adamczyk
Mark Anderson
Joseph Andrews
Lianyi Chen
Corinne Henak
Sangkee Min
Wenxiao Pan
Alejandro Roldan-Alzate
Josh Roth
Shiva Rudraraju
Stephan Rudykh
Dakota Thompson
Mike Wagner
Xiangru Xu

See also Mechanical Engineering Faculty Directory (https://directory.engr.wisc.edu/me/faculty/).