

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/>).

Requirements	Detail
Fall Deadline	December 15
Spring Deadline	October 1
Summer Deadline	December 15
GRE (Graduate Record Examinations)	Required.*
English Proficiency Test	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 (https://grad.wisc.edu/apply/requirements/#english-proficiency).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3**

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1) Due to COVID-19, GRE scores will not be required for applications to Mechanical Engineering graduate programs for admission to the Spring 2023, Summer 2023, and Fall 2023 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.

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Applicants earning a degree from the following UW-Madison B.S. programs are not required to obtain any letters of recommendation: any program in the College of Engineering, Computer Sciences, Department of Biological Systems Engineering, or the Applied Mathematics, Engineering and Physics program. *Within the Graduate School application, in the letters of recommendation section, you will need to enter at least one contact. Enter your name, your email address and then select to send the request later. This will allow you to get past this section of the application.*

APPLICATION REQUIREMENTS and PROCESS

Degree: Most applicants have a Bachelor of Science in Mechanical Engineering. Students with a Bachelor of Science in other engineering or physical and natural science disciplines will be considered for admission. International applicants must have a degree comparable to a regionally accredited U.S. bachelor's degree.

GPA: The Department of Mechanical Engineering prefers a 3.2/4.0 GPA. The minimum GPA to be reviewed by the admission committee is 3.0/4.0.

GRE: The GRE requirement is waived for applications to the Spring 2023, Summer 2023, and Fall 2023 terms. Any scores submitted will not be reviewed.

Each application must include the following:

- Graduate School Application (<https://grad.wisc.edu/apply/>)
- Academic transcripts
- Statement of purpose
- Resume/CV
- Three letters of recommendation (*see below for exception*)
- English Proficiency Score (*if required*)
- Application Fee

All applicants must satisfy requirements that are set forth by the Graduate School (<https://grad.wisc.edu/apply/requirements/>). Upon acceptance, students without Mechanical Engineering Bachelor of Science degrees may be required to complete one or more courses in addition to degree requirements to satisfy any deficiencies (this requirement cannot be determined prior to admission).

DEADLINES

To apply to the Mechanical Engineering program, complete applications (<https://grad.wisc.edu/apply/>), including supportive materials, must be submitted as described below and received by the following deadline dates:

- Fall Semester—December 15
- Spring Semester—October 1
- Summer Session—December 15

ACADEMIC TRANSCRIPT

Electronically submit one copy of your transcript of all undergraduate and previous graduate work along with your online application to the Graduate School. Unofficial copies of transcripts will be accepted for review, but official copies are required for admitted students. Please do not send transcripts or any other application materials to the Graduate School or the Mechanical Engineering department unless requested. Please review the requirements set by the Graduate School (<https://grad.wisc.edu/apply/requirements/>) for additional information about degrees/transcripts.

STATEMENT OF PURPOSE

In this document, applicants should explain why they want to pursue further education in Mechanical Engineering (see the Graduate School for more advice on how to structure a personal statement (<https://grad.wisc.edu/apply/prepare/>)).

RESUME

Upload your resume in your application.

THREE LETTERS OF RECOMMENDATION

These letters are required from people who can accurately judge the applicant's academic and/or work performance. Letters of recommendation are submitted electronically to graduate programs through the online application. See the Graduate School for FAQs (<https://grad.wisc.edu/apply/>) regarding letters of recommendation.

Exception: Applicants earning a degree from the following UW-Madison B.S. programs are not required to obtain any letters of recommendation: any program in the College of Engineering, Computer Sciences, Department of Biological Systems Engineering, or the Applied Mathematics, Engineering and Physics program. *Within the Graduate School application, in the letters of recommendation section, you will need to enter at least one contact. Enter your name, your email address and then select to send the request later. This will allow you to get past this section of the application.*

GRE SCORES

The GRE requirement is waived for applications to the Spring 2023, Summer 2023, and Fall 2023 terms. Any scores submitted will not be reviewed.

ENGLISH PROFICIENCY SCORE

Every applicant whose native language is not English, or whose undergraduate instruction was not in English, must provide an English proficiency test score. The UW-Madison Graduate School accepts TOEFL or IELTS scores. Your score will not be accepted if it is more than two years old from the start of your admission term. Country of citizenship does not exempt applicants from this requirement. Language of instruction at the college or university level and how recent the language instruction was taken are the determining factors in meeting this requirement.

For more information regarding minimum score requirements and exemption policy, please see the Graduate School Requirements for Admission (<https://grad.wisc.edu/apply/requirements/>).

APPLICATION FEE

Submission must be accompanied by the one-time application fee. It is non-refundable and can be paid by credit card (Master Card or Visa) or debit/ATM. Information about the application fee may be found here (<https://grad.wisc.edu/apply/>) (scroll to the 'Frequently asked questions').

Fee grants are only available through the conditions outlined here by the Graduate School (<https://grad.wisc.edu/apply/fee-grant/>). The Department of Mechanical Engineering is unable to offer fee grants for applicants to this program.

QUESTIONS:

If you have questions, please contact megradadmission@engr.wisc.edu.

RE-ENTRY ADMISSIONS

If you were previously enrolled as a graduate student in the Department of Mechanical Engineering, have not earned your degree, but have had a break in enrollment for a minimum of a fall or spring term, you will need to re-apply to resume your studies. Please review the Graduate School requirements for previously enrolled students (<https://policy.wisc.edu/library/UW-1230/>). Your previous faculty advisor (or another ME faculty advisor) must be willing to supply advising support and should e-mail the ME Graduate Student Services Coordinator regarding next steps in the process.

If you were previously enrolled in a UW-Madison graduate degree, completed that degree, have had a break in enrollment since earning the degree and would now like to apply for another UW-Madison program; you are required to submit a new student application through the UW-Madison Graduate School online application. For ME graduate programs, you must follow the entire application process as described above.

CURRENTLY ENROLLED GRADUATE STUDENT ADMISSIONS

Students currently enrolled as a graduate student at UW-Madison, whether in ME or a non-ME graduate program, wishing to apply to this degree program should contact the ME Graduate Admissions Team (megradadmission@engr.wisc.edu) to inquire about the process and deadlines several months in advance of the anticipated enrollment term. Current students may apply to change or add programs for any term (fall, spring, or summer).

QUESTIONS:

If you have questions, please contact megradadmission@engr.wisc.edu.

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 enrolled in this program are not eligible to receive tuition remission from graduate assistantship appointments at this institution.

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/#policiesandrequirements>), in addition to the program requirements listed below.

NAMED OPTION REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	Yes

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
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Minimum Residence Credit Requirement	18 credits
Minimum Graduate Coursework Requirement	15 credits must be graduate-level coursework. Details can be found in the Graduate School's Minimum Graduate Coursework (50%) policy (https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/)).
Overall Graduate GPA Requirement	3.00 GPA required. This program follows the Graduate School's GPA Requirement policy (https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/)).
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

A minimum of 24 formal course credits are required (minimum of 15 credits in Mechanical Engineering (M E) taken at UW-Madison). Requirements in the course list below must be completed as indicated.

Acceptable courses are numbered 400 and above.

No thesis/research credits are permitted. Up to 3 credits of independent study are permitted but not required.

Code	Title	Credits
M E 903	Graduate Seminar (Two semesters are required and must be taken in the first two semesters.)	0

A minimum of 6 courses (18 credits total) must be taken from the courses listed:

M E 440	Intermediate Vibrations
M E 451	Kinematics and Dynamics of Machine Systems
M E 459	Computing Concepts for Applications in Engineering
M E 460	Applied Thermal / Structural Finite Element Analysis
M E 468	Computer Modeling and Simulation of Autonomous Vehicles and Robots
M E 531	Digital Design and Manufacturing
M E/COMP SCI/ E C E 532	Matrix Methods in Machine Learning
M E 535	Computer-Aided Geometric Design
M E 548	Introduction to Design Optimization
M E/COMP SCI/ I SY E 558	Introduction to Computational Geometry
M E 564	Heat Transfer
M E 573	Computational Fluid Dynamics

M E 601	Special Topics in Mechanical Engineering (Applied & Computational Math w/Engineering Apps)
M E/B M E 603	Topics in Bio-Medical Engineering (Finite Element Method for Biomechanics)
M E/E C E 739	Advanced Robotics
M E 748	Optimum Design of Mechanical Elements and Systems
M E 751	Advanced Computational Dynamics
M E/COMP SCI/ E C E/E M A/ E P 759	High Performance Computing for Applications in Engineering
M E 764	Advanced Heat Transfer I- Conduction
M E 964	Special Advanced Topics in Mechanical Engineering (Topic: "Sci Computing for Apps in Eng")
E M A 521	Aerodynamics
E M A 522	Aerodynamics Lab

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.

Other Policy

Students in this program may not take courses outside the prescribed curriculum without faculty advisor and program director approval. Students in this program cannot enroll concurrently in other undergraduate, graduate or certificate programs.

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 to a master's degree 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

This program follows the Graduate School's Probation policy. (<https://policy.wisc.edu/library/UW-1217/>)

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 LIMITS

This program follows the Graduate School's Time Limits policy. (<https://policy.wisc.edu/library/UW-1221/>)

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://employee disabilities.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://conduct.students.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 (enr-dean-graduateaffairs@enr.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 Associate Chair for Graduate Studies or the John Bollinger Chair of Mechanical Engineering (<https://engineering.wisc.edu/departments/mechanical-engineering/people/>) 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 are strongly discouraged to pursue positions as Project Assistants, Teaching Assistants or Research Assistants during their time in this program, as the rigor and accelerated nature of this program may not accommodate those work time commitments. Students in this program will not receive the tuition remission that is typically part of the compensation package for a graduate assistantship.

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)
 Christian Franck
 Jaal Ghandhi
 Dan Negrut
 Gregory F. Nellis
 Tim Osswald
 Frank Pfefferkorn
 John Pfothenauer
 Xiaoping Qian
 Douglas Reindl
 David Rothamer
 Scott T. Sanders
 Krishnan Suresh
 Lih-sheng Turng

ASSOCIATE PROFESSORS

Peter Adamczyk
 Mark Anderson
 Melih Eriten
 Katherine Fu
 Sage Kokjohn
 Tom N. Krupenkin
 Franklin Miller
 Sangkee Min
 Mario F. Trujillo

Michael Zinn

ASSISTANT PROFESSORS

Joseph Andrews
Lianyi Chen
Corinne Henak
Wenxiao Pan
Pavana Prabhakar
Alejandro Roldan-Alzate
Josh Roth
Shiva Rudraraju
Stephan Rudykh
Dakota Thompson
Mike Wagner
Michael Wehner
Xiangru Xu

LECTURERS AND TEACHING FACULTY/PROFESSORS

Argantheal Berson
Glenn Bower
Michael Cheadle
Michael De Cicco
Kristofer Dressler
Randy Jackson
Andrew Mikkelson
Jason Oakley
Erick L. Oberstar
Jeffrey Roessler

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