

# MECHANICAL ENGINEERING: RESEARCH, M.S.

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

The Department of Mechanical Engineering offers a Master of Science (M.S.) Mechanical Engineering degree with a named option in Research. The M.S. Mechanical Engineering: Research degree program takes approximately two years to complete. This program has a significant research component giving students valuable hands-on research experience. Broad research themes within the department include: biomechanics, computational engineering and design, energy systems, advanced manufacturing, mechanics, and robotics, controls and sensing. Excellent research facilities are available for specialized research within these broad areas for studies in: biomechanics, combustion, computational design, controls, cryogenics, dynamics and vibrations, fluid dynamics, fluid power, geometric modeling and prototyping, heat and mass transfer, internal combustion engines, laser diagnostics, manufacturing processes, mechanics, mechatronics, polymer and composites processing, powertrain control, robotics, solar energy, and more.

All students are mentored by the world-class faculty in the mechanical engineering department at UW-Madison. For a list of mechanical engineering faculty along with faculty research interests, please visit our faculty directory (<https://directory.engr.wisc.edu/display.php/faculty/?page=me&search=faculty>). For more information on research areas see our page on research in Mechanical Engineering (<https://www.engr.wisc.edu/department/mechanical-engineering/research-in-mechanical-engineering/>).

## 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	September 1
Summer Deadline	December 15
GRE (Graduate Record Examinations)	Not 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 ( <a href="https://grad.wisc.edu/apply/requirements/#english-proficiency">https://grad.wisc.edu/apply/requirements/#english-proficiency</a> ).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

\* If GRE scores are submitted, they will not be used in admission decisions.

### 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.

**Advisor selection process:** Applicants are required to seek out and secure their own faculty advisor. International students must complete this process as part of the application process, before an offer of admission may be granted. To seek out a faculty advisor please review the department Research (<https://engineering.wisc.edu/departments/mechanical-engineering/research/>) and People (<https://directory.engr.wisc.edu/me/faculty/>) websites. Only those faculty listed with titles of Assistant Professor, Associate Professor, or Professor, can serve as graduate advisors. Do not contact Emeritus faculty, Lecturers, Research Scientists, or Faculty Associates. You are encouraged to inquire about possible funding opportunities. If a faculty member offers to be your advisor, ask them to email their acceptance to [megradadmission@engr.wisc.edu](mailto:megradadmission@engr.wisc.edu).

#### 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
- English Proficiency Score (*if required*)
- Application Fee

All applicants must satisfy requirements that are set forth by the Graduate School (<https://grad.wisc.edu/>). 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—September 1
- Summer Session—December 15

### ACADEMIC TRANSCRIPT

Within the online application, upload the undergraduate transcript(s) and, if applicable, the previous graduate transcript. 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 Department of Mechanical Engineering 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 and discuss which UW faculty members they would be interested in doing research with during their graduate study (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 RECOMMENDATIONS

These letters are required from people who can accurately judge the applicant's academic, research, 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. Letters of recommendation are due by the deadline listed above.

### 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 (MasterCard 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 available through the conditions outlined here by the Graduate School (<https://grad.wisc.edu/apply/fee-grant/>). Applicants who do not qualify for a fee grant as explained above, may seek out

a Mechanical Engineering faculty advisor and discuss the fee grant option with that individual. If the faculty advisor is able and willing to pay the application fee for the applicant, the faculty advisor should contact the ME Associate Chair for Graduate Studies or the ME Graduate Admissions Team ([megradadmission@engr.wisc.edu](mailto:megradadmission@engr.wisc.edu)) for assistance.

### QUESTIONS:

If you have questions, please contact [megradadmission@engr.wisc.edu](mailto:megradadmission@engr.wisc.edu).

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### 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](mailto: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](mailto: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

There are three mechanisms for Graduate Student funding through the university for M.S. Mechanical Engineering: Research students:

1. Fellowships
2. Graduate assistantships: project assistantships, teaching assistantships, and research assistantships
3. Traineeships

Funding is awarded based on the qualifications of the student, the number of applicants, the amount of available funding, the number of continuing students receiving support, and the degree program a student is enrolled in. Fellowship and research assistantship funding is only considered for thesis-based M.S. students. You can apply for funding for research assistantships by contacting individual faculty members directly. Please check our website (<https://engineering.wisc.edu/departments/mechanical-engineering/research/>) to look for faculty (only those listed with titles of assistant professor, associate professor, or professor can serve as graduate student advisors). Search for faculty who have research interests that align closely with your own by viewing faculty directory entries, visiting the faculty's website (linked from the directory page), and reviewing publications by the faculty member. Once you have identified faculty with interests close to your own, you are encouraged to contact them by email to inquire regarding available research assistant positions. The admissions office does not know if a particular professor has research assistant positions available.

Students who apply to the M.S. Research program will be automatically considered for fellowship opportunities within the department. Admitted students will be eligible to apply for Teaching Assistantship positions. More information, including the application, will be available to students after admission is complete.

More information on graduate student funding is available from the UW-Madison Graduate School (<https://grad.wisc.edu/funding/>).

## ADDITIONAL RESOURCES

### 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	No

#### Mode of Instruction Definitions

**Accelerated:** Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

**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

Requirement Detail	
Minimum Credit Requirement	30 credits
Minimum Residence Credit Requirement	21 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%) Requirement Policy: <a href="https://policy.wisc.edu/library/UW-1244">https://policy.wisc.edu/library/UW-1244</a> ( <a href="https://policy.wisc.edu/library/UW-1244/">https://policy.wisc.edu/library/UW-1244/</a> )
Overall Graduate GPA Requirement	3.00 GPA required. This program follows the Graduate School's GPA Requirement policy ( <a href="https://policy.wisc.edu/library/UW-1203">https://policy.wisc.edu/library/UW-1203</a> ( <a href="https://policy.wisc.edu/library/UW-1203/">https://policy.wisc.edu/library/UW-1203/</a> )).
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	The M.S. Mechanical Engineering: Research requires the student pass a formal thesis defense.
Language Requirements	No language requirements.

### REQUIRED COURSES

Two semesters of M E 903 Graduate Seminar are required. These should be taken the first two semesters the student is in residence.

A minimum of 18 formal course credits are required. Within these 18 credits, a minimum of 9 formal course credits in Mechanical Engineering (M E) and/or Engineering Mechanics (E M A), taken at UW–Madison, and at least 3 formal credits numbered 700 or higher, are required.

A minimum of 9 thesis credits (M E 790 Master's Research and Thesis) are required.

### 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 advisor 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 up to 9 credits of previously earned graduate coursework from other institutions. Approved credits will be allowed to count toward the minimum graduate degree credit requirement and the minimum graduate coursework requirement, but will not count toward the minimum graduate residence credit requirement.

Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

##### UW–Madison Undergraduate

Up to 7 credits numbered 400 or above can be counted toward the minimum graduate degree credit requirement. These credits may be counted toward the minimum graduate coursework (50%) requirement if they are from courses numbered 700 or above. No credits can 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 years or more prior to admission to a master's degree is not allowed to satisfy requirements.

##### UW–Madison University Special

With program approval, 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 years or more prior to admission to a master's degree 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 are required to obtain a mechanical engineering faculty advisor who assists them in planning a course sequence that meets degrees requirements, mentors and supervises thesis research, and who will discuss career objectives with the students. The advisor should be a faculty member whose expertise and project/research interests match closely with those that the student intends to acquire.

A final thesis defense must be presented to a thesis committee of at least three members (but no more than five) consisting of the student's advisor who is the committee chair (who must be a member of the Mechanical Engineering faculty), one other graduate faculty or former graduate faculty up to one year after resignation or retirement, and one of the following: a third graduate faculty member, a retired faculty member with emeritus status, or a UW–Madison academic staff member who has been approved by the Mechanical Engineering executive committee.

### 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](mailto: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 Associate Chair for Graduate Studies 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 Associate Chair for Graduate Studies 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 Associate Chair for Graduate Studies 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 Associate Chair for Graduate Studies 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

n/a

## 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)  
 Peter Adamczyk  
 Mark Anderson  
 Riccardo Bonazza  
 Curt Bronkhorst  
 Wendy Crone  
 Christian Franck  
 Jaal Ghandhi  
 Sage Kokjohn  
 Dan Negrut  
 Gregory F. Nellis  
 Tim Osswald  
 Frank Pfefferkorn  
 Xiaoping Qian  
 Douglas Reindl  
 David Rothamer  
 Scott T. Sanders  
 Krishnan Suresh  
 Mario F. Trujillo  
 Lih-sheng Turng  
 Fabian Waleffe

### ASSOCIATE PROFESSORS

Lianyi Chen  
 Melih Eriten  
 Katherine Fu  
 Tom N. Krupenkin  
 Ying Li  
 Franklin Miller  
 Sangkee Min  
 Wenxiao Pan  
 James Pikul  
 Pavana Prabhakar  
 Alejandro Roldan-Alzate  
 Michael Zinn

### ASSISTANT PROFESSORS

Joseph Andrews  
 Jennifer Franck  
 Corinne Henak  
 Eric Kazyak  
 Allison Mahvi  
 Luca Mastropasqua  
 Jacob Notbohm

Josh Roth  
Shiva Rudraraju  
Stephan Rudykh  
Eric Tervo  
Ramathasan Thevamaran  
Dakotah Thompson  
Michael Wagner  
Wei Wang  
Michael Wehner  
Jinlong Wu  
Xiaobin Xiong  
Xiangru Xu  
Lei Zhou

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