

MANUFACTURING SYSTEMS ENGINEERING: MANUFACTURING SYSTEMS ENGINEERING, M.S.

This is a named option within the Manufacturing Systems Engineering M.S. (<http://guide.wisc.edu/graduate/engineering-college-wide/manufacturing-systems-engineering-ms/>)

Information about the requirements and policies for the Manufacturing Systems Engineering M.S. can be found on this page.

A named option in the MSE M.S. degree titled Engineering Management Specialization (<http://guide.wisc.edu/graduate/engineering-college-wide/manufacturing-systems-engineering-ms/manufacturing-systems-engineering-engineering-management-specialization-ms/>) is also offered, ideal for engineering students with a special interest in management issues pertaining to manufacturing.

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	The program does not admit in the spring.
Summer Deadline	The program does not admit in the summer.
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

* The GRE is not required for domestic U.S. students.

MSE ADMISSIONS PROFILE ([HTTPS://TOOLS.GRAD.WISC.EDU/MAS/DETAILS/VIEW/G624/](https://tools.grad.wisc.edu/mas/details/view/g624/)) ADMISSION INFORMATION FOR THE ON-CAMPUS MANUFACTURING SYSTEMS ENGINEERING M.S.

To be admitted to the M.S. program, applicants must satisfy the Graduate School’s minimum admission requirements as well as the following program requirements: undergraduate engineering degree from an ABET-accredited program or its equivalent (students with a physical sciences degree other than engineering and considerable industry experience are also eligible); an undergraduate grade point average of at least 3.0 on a 4.0 scale (exceptions may be made by the admissions committee in favor of applicants with significant industry experience); and at least two years of work experience in manufacturing.

Students who wish to pursue the Research Thesis track should contact faculty that they would like to conduct research with during the application process.

APPLICATION DEADLINE: DECEMBER 15

Students are only admitted in the Fall term.

Admission to the master’s program in manufacturing systems engineering (MSE) steps:

1. Please visit the UW–Madison Graduate School Admissions (<https://grad.wisc.edu/admissions/requirements/>) to review requirements for admission. Frequently Asked Questions. (<https://grad.wisc.edu/admissions/faq/>)
2. Apply at the UW–Madison Graduate School (<http://www.grad.wisc.edu/>).
3. Please submit the required application materials to the MSE program uploaded to the online application system including a statement of purpose, 3 letters of recommendation, current vitae/resume and transcript information for all post high school education. (Students applying from non-U.S. universities must supply GRE and either TOEFL, MELAB, or IELTS scores).

After you have submitted all the application materials to the MSE program as well as the graduate school, we will review your qualifications and check if everything is complete. The MSE program will then recommend qualified candidates for admission to the graduate school.

For further information, please contact msaegradadmission@engr.wisc.edu.

Costs of Graduate School/ Tuition Information (<https://grad.wisc.edu/admissions/cost/>)

International Applicant Financial Information

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

The Manufacturing Systems Engineering program does not offer Teaching Assistantships, Project Assistantships, or Research Assistantships. Students seeking Teaching Assistantships and Project Assistantships should directly contact academic departments that offer courses (e.g., Mechanical Engineering, Industrial and Systems Engineering). Research Assistantships are only available to students in the research thesis track. Students seeking Research Assistantships should directly contact faculty who they want to conduct thesis research with.

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 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 16 credits

Minimum Graduate Coursework Requirement Half of degree coursework (15 credits out of 30 total credits) must be completed in graduate-level coursework. The department recommends taking coursework in College of Engineering, the School of Business, the Department of Statistics, the Department of Biological Systems Engineering, or the Department of Computer Sciences.

Overall Graduate GPA Requirement 3.00 GPA required.

Other Grade Requirements The Graduate School requires an average grade of B or better in all coursework (300 or above, not including research credits) taken as a graduate student unless conditions for probationary status require higher grades. Grades of Incomplete are considered to be unsatisfactory if they are not removed during the next enrolled semester.

Grades of C or lower do not count toward the degree.

Assessments and Examinations The research-thesis track requires student to submit a thesis and defend to a committee of faculty. The industry-thesis track requires students to submit an industry thesis and defend it to a committee of faculty. The course-only track does not require a thesis.

Language Requirements No language requirements.

REQUIRED COURSES

The on-campus Manufacturing Systems Engineering M.S. program has three tracks: course only, industrial thesis, and research thesis. Students must take four courses from the core course areas with at least one course from each of the core course areas. All students are required to take the capstone course I SY E/M E 641 Design and Analysis of Manufacturing Systems. The remaining course requirements vary depending on the program track that is chosen and are described in the table below.

Course Only Track ¹

Code	Title	Credits
Four courses selected from the Core Course Areas ²		12
I SY E/M E 641	Design and Analysis of Manufacturing Systems (Offered in spring semester)	3
Elective Courses (400 level and above) ³		15
Total Credits		30

¹ These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

² At least one course must be selected from each of the three core areas.

³ Up to one credit of I SY E 702 or M E 702 for an internship may count as elective credit toward the degree. A written report must be approved by the advisor. This credit cannot be used toward fulfillment of the Thesis Requirement in the Industry Thesis or Research Thesis tracks.

Industry Thesis Track ¹

Code	Title	Credits
Four courses selected from the Core Course Areas ²		12
I SY E/M E 641	Design and Analysis of Manufacturing Systems (Offered in spring semester)	3
Industry Thesis		3
Elective Courses (400 level and above) ³		12
Total Credits		30

¹ These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

² At least one course must be selected from each of the three core areas.

³ Up to one credit of I SY E 702 or M E 702 for an internship may count as elective credit toward the degree. A written report must be approved by the advisor. This credit cannot be used toward fulfillment of the Thesis Requirement in the Industry Thesis or Research Thesis tracks.

Research Thesis Track ¹

Code	Title	Credits
Four courses selected from the Core Course Areas ²		12
I SY E/M E 641	Design and Analysis of Manufacturing Systems (Offered in spring semester)	3
Research Thesis		12
Elective Courses (400 level and above) ³		3
Total Credits		30

¹ These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

² At least one course must be selected from each of the three core areas.

³ Up to one credit of I SY E 702 or M E 702 for an internship may count as elective credit toward the degree. A written report must be approved by the advisor. This credit cannot be used toward fulfillment of the Thesis Requirement in the Industry Thesis or Research Thesis tracks.

Core Course Areas

Code	Title	Credits
Fundamentals of Process and Technology		
CBE 450	Process Design	3
CBE 470	Process Dynamics and Control	3
CBE 540	Polymer Science and Technology	3

CBE 541	Plastics and High Polymer Laboratory	1-3
CBE 770	Advanced Process Dynamics and Control ¹	3
E C E 412	Power Electronic Circuits	3
E C E 453	Embedded Microprocessor System Design	4
E C E/B M E 462	Medical Instrumentation	3
E C E/N E 528	Plasma Processing and Technology	3
E C E 549	Integrated Circuit Fabrication Laboratory	3
I SY E 415	Introduction to Manufacturing Systems, Design and Analysis	3
I SY E 605	Computer Integrated Manufacturing	3
M E 417	Transport Phenomena in Polymer Processing	3
M E 418	Engineering Design with Polymers	3
M E 419	Fundamentals of Injection Molding	3
M E 429	Metal Cutting	3
M E 437	Advanced Materials Selection	3
M E/E C E 439	Introduction to Robotics	3
M E 445	Mechatronics in Control & Product Realization	3
M E 446	Automatic Controls	3
M E 447	Computer Control of Machines and Processes	3
M E 449	Redesign and Prototype Fabrication	3
M E 469	Internal Combustion Engines	3
M E 514	Additive Manufacturing	3
M E/N E 565	Power Plant Technology	3
M E/CBE 567	Solar Energy Technology	3
M E/E C E 577	Automatic Controls Laboratory	4
M E 717	Advanced Polymer Processing ¹	3
M E/E C E 739	Advanced Robotics ¹	3
M E 747	Advanced Computer Control of Machines and Processes ¹	3
M S & E 434	Introduction to Thin-Film Deposition Processes	3
M S & E 461	Advanced Metal Casting	3
M S & E/M E 462	Welding Metallurgy	3
M S & E 465	Fundamentals of Heat Treatment	3
N E 405	Nuclear Reactor Theory	3
Fundamentals of Systems Engineering and Design		
CBE 430	Chemical Kinetics and Reactor Design	3
CIV ENGR 370	Transportation Engineering	3
CIV ENGR 498	Construction Project Management ²	3
COMP SCI/E C E 755	VLSI Systems Design	3
COMP SCI/E C E 756	Computer-Aided Design for VLSI ¹	3
E C E 427	Electric Power Systems	3
M E 418	Engineering Design with Polymers	3
M E 444	Design Problems in Elasticity	3
M E 535	Computer-Aided Geometric Design	3
M E 549	Product Design	3

M E 748	Optimum Design of Mechanical Elements and Systems ¹	3
MARKETNG/ OTM 427	Information Technology in Supply Chains	3
MARKETNG/ OTM 727	Information Technology in Supply Chains	3
I SY E 412	Fundamentals of Industrial Data Analytics	3
I SY E/M E 510	Facilities Planning	3
I SY E/M E 512	Inspection, Quality Control and Reliability	3
I SY E 515	Engineering Management of Continuous Process Improvement	3
I SY E 516	Introduction to Decision Analysis	3
I SY E 520	Quality Assurance Systems	3
I SY E/COMP SCI/ E C E 524	Introduction to Optimization	3
I SY E/B M E 564	Occupational Ergonomics and Biomechanics	3
I SY E 575	Introduction to Quality Engineering	3
I SY E 601	Special Topics in Industrial Engineering ²	1-3
I SY E 602	Special Topics in Human Factors ²	3
I SY E 603	Special Topics in Engineering Analytics and Operations Research ²	1-3
I SY E 612	Information Sensing and Analysis for Manufacturing Processes	3
I SY E 620	Simulation Modeling and Analysis	3
I SY E/M E 643	Performance Analysis of Manufacturing Systems	3
I SY E 645	Engineering Models for Supply Chains	3
OTM 654	Production Planning and Control ³	3
STAT/M E 424	Statistical Experimental Design	3
Fundamentals of Business and Management		
ACCT I S 300	Accounting Principles	3
ACCT I S 710	Managerial Accounting	3
FINANCE/ECON 300	Introduction to Finance	3
FINANCE 720	Investment Theory and Practice	3
FINANCE 757	Entrepreneurial Finance ^{1,3}	3
I SY E/PSYCH 653	Organization and Job Design	3
M H R 700	Organizational Behavior	3
M H R/ ENVIR ST 710	Challenges & Solutions in Business Sustainability	3
M H R 715	Strategic Management of Innovation ^{1,3}	3
M H R 722	Entrepreneurial Management ^{1,3}	3
M H R 723	Business Strategy ³	3
M H R 734	Venture Creation	3
M H R 741	Technology Entrepreneurship	3
MARKETNG 300	Marketing Management	3
MARKETNG/ OTM 421	Fundamentals of Supply Chain Management	3

MARKETNG/ OTM 722	Logistics Management ³	3
MARKETNG/ OTM 724	Strategic Global Sourcing	3
OTM 752	Project Management ³	3
OTM 758	Managing Technological and Organizational Change ¹	3

¹ Most 700-level courses are only taught every three or four semesters. Please check with instructor about the next offering before completing study plan.

² This course number is used for multiple seminar classes. Please talk to your advisor to confirm a specific topic will count.

³ This course is offered in variable credit versions. Manufacturing Systems Engineering students must register for a 3-credit section.

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 no more than 12 credits of graduate coursework from other institutions toward the minimum graduate degree requirement and toward 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 program approval, up to 7 credits from the UW–Madison Undergraduate career numbered 400 or above may be counted toward the minimum graduate degree credit requirement. No prior coursework from the UW–Madison undergraduate career may be counted toward the minimum graduate coursework (50%) requirement or the minimum graduate residence credit requirement. Coursework earned five or more years prior to admission 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; coursework numbered 700 or above may satisfy the minimum graduate coursework (50%) requirement. 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.

ADVISOR / COMMITTEE

Every graduate student is required to have an advisor. To ensure that students are making satisfactory progress toward a degree, the Graduate School expects them to meet with their advisor on a regular basis. Students can be suspended from the Graduate School if they do not have an advisor. See People section (<http://guide.wisc.edu/graduate/engineering-college-wide/manufacturing-systems-engineering-ms/#peopletext>) of this Guide for possible MSE advisors.

The director of the Manufacturing Systems Engineering Program (https://directory.engr.wisc.edu/me/Faculty/Pfefferkorn_Frank/) is assigned as the advisor to incoming students. Students in the research thesis track are expected to identify an advisor during the admission process. This advisor can be any faculty member affiliated with this program (<http://guide.wisc.edu/graduate/engineering-college-wide/manufacturing-systems-engineering-ms/#peopletext>).

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.

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://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)

Students should contact the department chair or program director with questions about grievances.

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.

PROGRAM RESOURCES

THE INDIVIDUAL DEVELOPMENT PLAN (HTTPS://GRAD.WISC.EDU/PD/IDP/)

An Individual Development Plan helps with self-assessment, planning, and communication:

- An IDP can help you communicate your professional development and career planning needs and intentions to others including your mentor, which can lead to helpful advice and resources.
- You can use the IDP to make sure you and your mentor's expectations are clearly outlined and in agreement so that there are no big surprises, particularly at the end of your training.
- The current job market is challenging and research has shown that individuals who perform structured career planning achieve greater career success and satisfaction.

The onus to engage in the IDP process is your responsibility—although your mentor, PI, or others may encourage and support you in doing so. The IDP itself remains private to you, and you choose which parts to share with which mentors. Through the IDP process, you may decide to identify various mentors to whom you can go for expertise and advice.

ENGINEERING CAREER SERVICES (HTTPS://ECS.WISC.EDU/)

Julie Rae, *Assistant Director for Graduate Student Career Services*, **graduate** students in all engineering programs

- Resumes and Cover Letters (<https://ecs.wisc.edu/students/resumes-and-cover-letters/>)
- Job Search Strategies
- Job Offers and Negotiation (<https://ecs.wisc.edu/students/offers-and-negotiation/>)
- CPT for Graduate Students (<https://ecs.wisc.edu/students/co-op-and-internship/>)
- Student Appointments: Schedule Here (<http://go.wisc.edu/ecs-grad-appt/>)
- Employer Recruitment List for Industrial Engineering Students (<https://ecs.wiscweb.wisc.edu/wp-content/uploads/sites/86/2017/03/IE-Employer-Recruitment-List.pdf>)

UW WRITING CENTER (HTTP://WRITING.WISC.EDU/)

6171 Helen C. White Hall

608-263-1992

The UW Writing Center provides free of charge face-to-face and online consultations that focus on a number of different writing scenarios (i.e. drafts of course papers, resumes, reports, application essays, cover letters, theses, etc). Writing Center instructors will not edit or proofread papers. Instead, their goal is to teach students to edit and proofread on their own in order to become a better, more confident writers.

- Xin Wang (Industrial and Systems Engineering) (https://directory.engr.wisc.edu/ie/Faculty/Wang_Xin/)
- Michael R. Zinn (Mechanical Engineering) (https://directory.engr.wisc.edu/me/Faculty/Zinn_Michael/)
- Shiyu Zhou (Industrial and Systems Engineering) (https://directory.engr.wisc.edu/ie/Faculty/Zhou_Shiyu/)

PEOPLE

PROFESSORS

- Frank Pfefferkorn (MSE Director; Mechanical Engineering) (https://directory.engr.wisc.edu/me/Faculty/Pfefferkorn_Frank/)
- Gregory A. DeCroix (School of Business) (https://directory.engr.wisc.edu/ie/Faculty/Decroix_Gregory/)
- Rafael Lazimy (School of Business) (<https://bus.wisc.edu/faculty/rafi-lazimy/>)
- Jingshan Li (Industrial and Systems Engineering) (https://directory.engr.wisc.edu/ie/Faculty/Li_Jingshan/)
- Kaibo Liu ((https://directory.engr.wisc.edu/ie/Faculty/Liu_Kaibo/)Industrial and Systems Engineering (https://directory.engr.wisc.edu/ie/Faculty/Li_Jingshan/)) (https://directory.engr.wisc.edu/ie/Faculty/Liu_Kaibo/)
- Miron Livny (Computer Science) (<http://www.cs.wisc.edu/people/miron/>)
- Sangkee Min (Mechanical Engineering) (https://directory.engr.wisc.edu/me/Faculty/Min_Sangkee/)
- Tim Osswald (Mechanical Engineering) (https://directory.engr.wisc.edu/me/Faculty/Osswald_Tim/)
- Robert Radwin (Industrial and Systems Engineering) (https://directory.engr.wisc.edu/ie/Faculty/Radwin_Robert/)
- Bin Ran (Civil and Environmental Engineering) (https://directory.engr.wisc.edu/cee/faculty/ran_bin/)
- Jeffrey S. Russell (Vice Provost for Lifelong Learning/ Dean of Continuing Studies) (<https://continuingstudies.wisc.edu/bios/russell-jeffrey.html>)
- Leyuan Shi (Industrial and Systems Engineering) (https://directory.engr.wisc.edu/ie/Faculty/Shi_Leyuan/)
- Kumar Sridharan (Engineering Physics) (https://directory.engr.wisc.edu/ep/faculty/sridharan_kumar/)
- Donald S. Stone (Material Science and Engineering) (https://directory.engr.wisc.edu/mse/Faculty/Stone_Donald/)
- Krishnan Suresh (Mechanical Engineering) (https://directory.engr.wisc.edu/me/faculty/suresh_krishnan/)
- Lih-Sheng (Tom) Turng (Mechanical Engineering) (https://directory.engr.wisc.edu/me/Faculty/Turng_Lih-sheng/)
- Raj Veeramani (Industrial and Systems Engineering) (https://directory.engr.wisc.edu/ie/Faculty/Veeramani_Raj/)