

# MATERIALS SCIENCE AND ENGINEERING: MATERIALS ENGINEERING, MS

## 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 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 16 credits

Minimum Graduate Coursework Requirement 15 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: <https://policy.wisc.edu/library/UW-1244> (<https://policy.wisc.edu/library/UW-1244/>).

Overall 3.00 GPA required.  
Graduate GPA Requirement Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: <https://policy.wisc.edu/library/UW-1203> (<https://policy.wisc.edu/library/UW-1203/>).

Other Grade Requirements n/a

Assessments and Examinations No formal examination is required.

Language Requirements None.

### REQUIRED COURSES

Code	Title	Credits
<b>General Requirements</b>		
M S & E 900	Materials Research Seminar (2 semesters)	2
M S & E 350 or M S & E 550	Introduction to Materials Science Materials Fundamentals	3
M S & E 530	Thermodynamics of Solids	3
Courses within focus area (see below)		22
<b>Total Credits</b>		<b>30</b>

Students choose one of the following pathways:

#### Nanomaterials and Nanoengineering<sup>1</sup>

Code	Title	Credits
<b>Required course:</b>		
M S & E 553	Nanomaterials & Nanotechnology	3
<b>Electives:</b>		
M S & E 401	Special Topics in Materials Science and Engineering (Energy Storage Materials)	3
M S & E 401	Special Topics in Materials Science and Engineering (Inorganic Organic Hybrid Materials)	3
M S & E/CHEM 421	Polymeric Materials	3
M S & E 434	Introduction to Thin-Film Deposition Processes	3
M S & E 448	Crystallography and X-Ray Diffraction	3
M S & E 456	Electronic, Optical, and Magnetic Properties of Materials	3
M S & E 460	Introduction to Computational Materials Science and Engineering	3
M S & E 521	Advanced Polymeric Materials	3
M S & E 551	Structure of Materials	3
M S & E 570	Properties of Solid Surfaces	3
M S & E 648	Advanced X-ray Scattering Methods in Materials Science and Engineering	3
M S & E 660	Mesoscale Modeling of Materials	3
M S & E 748	Structural Analysis of Materials	3
M S & E 752	Advanced Materials Science: Phase Transformations	3
M S & E 760	Molecular Modeling of Materials	3

M S & E 699	Independent Study <sup>2</sup>	1-4
M S & E 803	Special Topics in Materials Science (with advisor approval)	1-3

### Engineering Materials and Processes<sup>1</sup>

Code	Title	Credits
<b>Required Course:</b>		
M S & E 752	Advanced Materials Science: Phase Transformations	3
<b>Electives:</b>		
M S & E/N E 433	Principles of Corrosion	3
M S & E 441	Deformation of Solids	3
M S & E 461	Advanced Metal Casting	3
M S & E/M E 462	Welding Metallurgy	3
M S & E 463	Materials for Elevated Temperature Service	3
M S & E 465	Fundamentals of Heat Treatment	3
M S & E 551	Structure of Materials	3
M S & E 560	Fundamentals of Atomistic Modeling	3
M S & E 648	Advanced X-ray Scattering Methods in Materials Science and Engineering	3
M S & E 660	Mesoscale Modeling of Materials	3
M S & E 699	Independent Study <sup>2</sup>	1-4
M S & E 748	Structural Analysis of Materials	3
M S & E 760	Molecular Modeling of Materials	3
E P D 605	Fundamentals of Technical Project Management	1
E P D 701	Writing for Professionals	1
E P D 702	Professional Presentations	1
E P D 704	Organizational Communication and Problem Solving	1
E P D 706	Change Management	1
E P D 708	Creating Breakthrough Innovations	1
E P D 712	Ethics for Professionals	1
E P D/GEN BUS/MARKETNG 782	Marketing for Non-Marketing Professionals	1
E P D/GEN BUS/M H R 783	Leading Teams	1
or E P D 606	Leading and Managing Technical Teams	

### Semiconductor Materials and Manufacturing for Microelectronics<sup>1</sup>

Code	Title	Credits
<b>Required courses:</b>		
M S & E 434	Introduction to Thin-Film Deposition Processes	3
M S & E 570	Properties of Solid Surfaces	3
At least one course from the following three: <sup>3</sup>		
M S & E 456	Electronic, Optical, and Magnetic Properties of Materials	
M S & E 756	Structure and Properties of Advanced Electronic Materials	
M S & E 760	Molecular Modeling of Materials	

#### Electives:

M S & E 401	Special Topics in Materials Science and Engineering (Quantum Materials)	3
M S & E 448	Crystallography and X-Ray Diffraction	3
M S & E 456	Electronic, Optical, and Magnetic Properties of Materials <sup>3</sup>	3
M S & E 551	Structure of Materials	3
M S & E 648	Advanced X-ray Scattering Methods in Materials Science and Engineering	3
M S & E 660	Mesoscale Modeling of Materials	3
M S & E 748	Structural Analysis of Materials	3
M S & E 756	Structure and Properties of Advanced Electronic Materials <sup>3</sup>	3
M S & E 760	Molecular Modeling of Materials <sup>3</sup>	3
M S & E 699	Independent Study <sup>2</sup>	1-4
E C E 549	Integrated Circuit Fabrication Laboratory	4

### Computation and Artificial Intelligence in Materials Engineering<sup>1</sup>

Code	Title	Credits
<b>Required courses:</b>		
M S & E 803	Special Topics in Materials Science (Data Science in Materials)	3
M S & E 660	Mesoscale Modeling of Materials	3
At least one course from the following two: <sup>3</sup>		
M S & E 460	Introduction to Computational Materials Science and Engineering	
M S & E 760	Molecular Modeling of Materials	
<b>Electives:</b>		
M S & E 401	Special Topics in Materials Science and Engineering (Modern Alloy Design)	3
M S & E 401	Special Topics in Materials Science and Engineering (Quantum Materials)	3
M S & E 456	Electronic, Optical, and Magnetic Properties of Materials	3
M S & E 460	Introduction to Computational Materials Science and Engineering <sup>3</sup>	3
M S & E 553	Nanomaterials & Nanotechnology	3
M S & E 699	Independent Study <sup>2</sup>	1-4
M S & E 756	Structure and Properties of Advanced Electronic Materials	3
M S & E 760	Molecular Modeling of Materials <sup>3</sup>	3
COMP SCI/E C E/E M A/E P/M E 759	High Performance Computing for Applications in Engineering	3

#### Footnotes

<sup>1</sup> These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

- <sup>2</sup> Students in this program may apply a maximum of 4 credits of M S & E 699 Independent Study to the degree, with advisor approval.
- <sup>3</sup> The same course may not satisfy more than one requirement. For example, if M S & E 456 Electronic, Optical, and Magnetic Properties of Materials is taken as a required course, it cannot also be used as an elective course.

**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 or graduate degree programs.