MASTER OF MATERIALS SCIENCE AND NANOENGINEERING (MMSNE) DEGREE

Program Learning Outcomes for the MMSNE Degree

Upon completing the MMSNE degree, students will be able to:

1. Acquire broad, advanced knowledge within either Materials Science or NanoEngineering, which is also in-depth in one major sub-discipline of the field.
2. Conduct research at an advanced level in at least one area of Materials Science and Nanoengineering.
3. Communicate scientific ideas effectively in writing and when speaking.

Requirements for the MMSNE Degree in Materials Science and NanoEngineering

The MMSNE degree is a non-thesis master's degree. For general university requirements, please see Non-Thesis Master's Degrees (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees/). For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/). Students pursuing the MMSNE degree must complete:

- A minimum of 13 courses (33 credit hours) to satisfy degree requirements.
- A minimum of 33 credit hours of graduate-level study (graduate semester credit hours, coursework at the 500-level or above).
- A minimum of 26 graduate semester credit hours must be taken at Rice University.
- A minimum of 24 graduate semester credit hours must be taken in standard or traditional courses (with a course type of lecture, seminar, laboratory, lecture/laboratory).
- A minimum residency enrollment of one fall or spring semester of part-time graduate study at Rice University.
- A maximum of 2 courses (6 graduate semester credit hours) from transfer credit. For additional departmental guidelines regarding transfer credit, see the Policies (p. 3) tab.
- The requirements for one area of specialization. The MMSNE degree program offers three areas of specialization:
  - Materials Science (p. 2), ***or***
  - Microelectric and Quantum Materials (p. 2), ***or***
  - NanoEngineering (p. 3).
- A minimum overall GPA of 2.67 or higher in all Rice coursework.
- A minimum program GPA of 3.00 or higher in all Rice coursework that satisfies requirements for the non-thesis master's degree with a minimum grade of B- (2.67 grade points) in each course.

The MMSNE degree program is open to students who have shown academic excellence in their undergraduate studies. This non-thesis degree option is designed for engineers who have attained a bachelor's degree and are looking to further their careers in industry. They combine engineering coursework with professional development and communications. A list of required and suggested courses are available on the MSNE website (https://msne.rice.edu/). Students should develop a specific plan of study based on their particular interests and discussions with their advisor.

The courses listed below satisfy the requirements for this degree program. In certain instances, courses not on this official list may be substituted upon approval of the program's academic advisor or, where applicable, the department or program's Director of Graduate Studies. Course substitutions must be formally applied and entered into Degree Works by the department or program's Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/). Additionally, these course substitutions must be approved by the Office of Graduate and Postdoctoral Studies. Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

Code	Title	Credit Hours
Total Credit Hours Required for the MMSNE Degree		33

Degree Requirements

Code	Title	Credit Hours
Core Requirements		
Area of Specialization		
Select 1 from the following Areas of Specialization (see Areas of Specialization below): [1, 2]		*18*
Materials Science		
Microelectronic and Quantum Materials		
NanoEngineering		
Non-Coursework		
MSNE 500	MATERIALS SCIENCE SEMINAR (2 semesters required, 1st semester) [3]	1
MSNE 500	MATERIALS SCIENCE SEMINAR (2 semesters required, 2nd semester) [3]	1
MSNE 501	GRADUATE STUDENT SEMINAR [3]	1
Research Project		
MSNE 621	M.M.S. RESEARCH PROJECT I [4]	3
MSNE 622	M.M.S. RESEARCH PROJECT II [4]	3
Professional Development		
Select at least 1 course from the following:		*3*
BIOE 513	STRATEGIC CAREER PREPAREDNESS FOR INDUSTRY JOBS	
ENGI 501	WORKPLACE COMMUNICATION FOR PROFESSIONAL MASTER'S STUDENTS IN ENGINEERING	
ENGI 510	TECHNICAL AND MANAGERIAL COMMUNICATIONS	
ENGI 529 / CEVE 529	ETHICS AND ENGINEERING LEADERSHIP	
ENGI 530	ENGINEERING PRACTICUM	
ENGI 610 / NSCI 610	MANAGEMENT FOR SCIENCE AND ENGINEERING	

NSCI 511	SCIENCE POLICY, AND ETHICS	
RCEL 501	ENGINEERING MANAGEMENT & LEADERSHIP THEORY AND APPLICATION	
RCEL 502	ENGINEERING PROJECT MANAGEMENT	
RCEL 503	ENGINEERING PRODUCT MANAGEMENT IN INDUSTRY 4.0	
RCEL 504	ETHICAL-TECHNICAL LEADERSHIP	
RCEL 505	ENGINEERING ECONOMICS FOR ENGINEERING LEADERS	
RCEL 506	APPLIED STATISTICS AND DATA SCIENCE FOR ENGINEERING LEADERS	
RCEL 542	PROFESSIONAL COMMUNICATION FOR ENGINEERING LEADERS	
RCEL 615	LEADERSHIP COACHING FOR ENGINEERS	
Elective Requirements		
Select 3 credit hours of remaining coursework from approved electives at the 500-level or above to reach 33 total credit hours [4]		*3*
Total Credit Hours		**33**

Footnotes and Additional Information

1. If MSNE 502, MSNE 503, MSNE 505, MSNE 506, MSNE 517, MSNE 521, and/or MSNE 535/PHYS 535 are not taken to satisfy the Core Requirements, they can be taken as Technical Electives.
2. MSNE 500 is not considered a Technical Elective.
3. MSNE 500 and MSNE 501 are taken for a Satisfactory/Unsatisfactory grade and must be completed with a Satisfactory grade. As S/U courses, they do not apply to the requirement of a minimum grade of B- (2.67 grade points) in each required course.
4. Students can repeat MSNE 621, MSNE 622, or work with their advisor to receive approval for courses according to their interests and field of study.

Areas of Specialization

Students must complete a minimum of 6 courses (18 credit hours) from one Area of Specialization.

Area of Specialization: Materials Science

Students pursuing the Materials Science area of specialization must complete:

Code	Title	Credit Hours
Core Requirements		
MSNE 502	MECH PROPERTIES OF MATERIALS [1, 2]	3
MSNE 503	THERMODYNAMICS IN MATERIALS SCIENCE [1, 2]	3
Select 1 course from the following: [2]		*3*
MSNE 505	MICROSTRUCTURE AND NANOSTRUCTURE EVOLUTION	
MSNE 506	PHYSICAL PROPERTIES OF SOLIDS	
MSNE 517	ORGANIC AND POLYMER SEMICONDUCTORS FOR ELECTRONICS AND PHOTONICS	
MSNE 521	SEMICONDUCTING MATERIALS: PROPERTIES, DEVICES, ANALYSIS	
MSNE 535 / PHYS 535	CRYSTALLOGRAPHY & DIFFRACTION	
Technical Electives		
Select 3 courses (minimum of 9 credit hours) from the following: [3]		*9*
MSNE 511	MATERIALS CHARACTERIZATION FROM NANO TO MACRO	
MSNE 512 / PHYS 512	MATERIALS SCIENCE AND ENGINEERING WITH QUANTUM PHOTONICS	
MSNE 513	3D PRINTING AND ADDITIVE MANUFACTURING: THEORY AND APPLICATIONS	
MSNE 518	MATERIALS SELECTION FOR BIOLOGICAL SYSTEMS	
MSNE 519	SOLID-STATE QUANTUM MATERIALS AND TECHNOLOGIES	
MSNE 522	EMERGING MATERIALS FOR NANOELECTRONICS DEVICES	
MSNE 523	PROPERTIES, SYNTHESIS AND DESIGN OF COMPOSITE MATERIALS	
MSNE 533	COMPUTATIONAL MATERIALS MODELING	
MSNE 540	THIN FILM AND DEVICE PHYSICS	
MSNE 555	MATERIALS IN NATURE AND BIO-MIMETIC STRATEGIES	
MSNE 569	SCIENCE AND APPLICATIONS OF CORROSION SCIENCE AND ENGINEERING	
MSNE 580 / CHEM 580	MICROSCOPY METHODS IN MATERIALS SCIENCE	
MSNE 613	SPECIAL TOPICS I	
MSNE 614	SPECIAL TOPICS II	
MSNE 615	SPECIAL TOPICS III	
MSNE 650	NANOMATERIALS AND NANOMECHANICS	
Total Credit Hours		**18**

Footnotes and Additional Information

1. For students with a BS or BA degree from the MSNE Department, MSNE 502 and MSNE 503 can be replaced by other relevant graduate-level courses courses upon petition.
2. If MSNE 502, MSNE 503, MSNE 505, MSNE 506, MSNE 517, MSNE 521, and/or MSNE 535/PHYS 535 are not taken to satisfy the Core Requirements, they can be taken as Technical Electives.
3. MSNE 500 is not considered a Technical Elective.

Area of Specialization: Microelectronic and Quantum Materials

Students pursuing the Microelectronic and Quantum Materials area of specialization must complete:

Code	Title	Credit Hours
Core Requirements		
MSNE 506	PHYSICAL PROPERTIES OF SOLIDS [1]	3
MSNE 521	SEMICONDUCTING MATERIALS: PROPERTIES, DEVICES, ANALYSIS [1]	3

Select 1 course from the following: [2]		*3*
MSNE 502	MECH PROPERTIES OF MATERIALS	
MSNE 503	THERMODYNAMICS IN MATERIALS SCIENCE	
MSNE 505	MICROSTRUCTURE AND NANOSTRUCTURE EVOLUTION	
MSNE 517	ORGANIC AND POLYMER SEMICONDUCTORS FOR ELECTRONICS AND PHOTONICS	
MSNE 535 / PHYS 535	CRYSTALLOGRAPHY & DIFFRACTION	
Technical Electives		
Select 3 courses (minimum of 9 credit hours) from the following: [3, 4]		*9*
MSNE 511	MATERIALS CHARACTERIZATION FROM NANO TO MACRO	
MSNE 512 / PHYS 512	MATERIALS SCIENCE AND ENGINEERING WITH QUANTUM PHOTONICS	
MSNE 519	SOLID-STATE QUANTUM MATERIALS AND TECHNOLOGIES	
MSNE 522	EMERGING MATERIALS FOR NANOELECTRONICS DEVICES	
MSNE 540	THIN FILM AND DEVICE PHYSICS	
Total Credit Hours		**18**

Footnotes and Additional Information

1. For students with a BS or BA degree from the MSNE Department, MSNE 506 and MSNE 521 can be replaced by other relevant graduate-level courses courses upon petition.
2. If MSNE 502, MSNE 503, MSNE 505, MSNE 506, MSNE 517, MSNE 521, and/or MSNE 535/PHYS 535 are not taken to satisfy the Core Requirements, they can be taken as Technical Electives.
3. MSNE 500 is not considered a Technical Elective.
4. Other Technical Electives may fulfill requirements upon approval by MMSNE academic advisors. The approval must be formally applied and entered into Degree Works by the program's Official Certifier.

Area of Specialization: NanoEngineering

Students pursuing the NanoEngineering area of specialization must complete:

Code	Title	Credit Hours
Core Requirements		
MSNE 506	PHYSICAL PROPERTIES OF SOLIDS [1, 2]	3
MSNE 535 / PHYS 535	CRYSTALLOGRAPHY & DIFFRACTION [1, 2]	3
Select 1 course from the following: [2]		*3*
MSNE 502	MECH PROPERTIES OF MATERIALS	
MSNE 503	THERMODYNAMICS IN MATERIALS SCIENCE	
MSNE 505	MICROSTRUCTURE AND NANOSTRUCTURE EVOLUTION	
MSNE 517	ORGANIC AND POLYMER SEMICONDUCTORS FOR ELECTRONICS AND PHOTONICS	
MSNE 521	SEMICONDUCTING MATERIALS: PROPERTIES, DEVICES, ANALYSIS	
Technical Electives		
Select 3 courses (minimum of 9 credit hours) from the following: [3]		*9*
MSNE 511	MATERIALS CHARACTERIZATION FROM NANO TO MACRO	
MSNE 512 / PHYS 512	MATERIALS SCIENCE AND ENGINEERING WITH QUANTUM PHOTONICS	
MSNE 513	3D PRINTING AND ADDITIVE MANUFACTURING: THEORY AND APPLICATIONS	
MSNE 518	MATERIALS SELECTION FOR BIOLOGICAL SYSTEMS	
MSNE 519	SOLID-STATE QUANTUM MATERIALS AND TECHNOLOGIES	
MSNE 522	EMERGING MATERIALS FOR NANOELECTRONICS DEVICES	
MSNE 523	PROPERTIES, SYNTHESIS AND DESIGN OF COMPOSITE MATERIALS	
MSNE 533	COMPUTATIONAL MATERIALS MODELING	
MSNE 540	THIN FILM AND DEVICE PHYSICS	
MSNE 555	MATERIALS IN NATURE AND BIO-MIMETIC STRATEGIES	
MSNE 569	SCIENCE AND APPLICATIONS OF CORROSION SCIENCE AND ENGINEERING	
MSNE 580 / CHEM 580	MICROSCOPY METHODS IN MATERIALS SCIENCE	
MSNE 613	SPECIAL TOPICS I	
MSNE 614	SPECIAL TOPICS II	
MSNE 615	SPECIAL TOPICS III	
MSNE 650	NANOMATERIALS AND NANOMECHANICS	
Total Credit Hours		**18**

Footnotes and Additional Information

1. For students with a BS or BA degree from the MSNE Department, MSNE 506 and MSNE 535 can be replaced by other relevant graduate-level courses upon petition.
2. If MSNE 502, MSNE 503, MSNE 505, MSNE 506, MSNE 517, MSNE 521, and/or MSNE 535/PHYS 535 are not taken to satisfy the Core Requirements, they can be taken as Technical Electives.
3. MSNE 500 is not considered a Technical Elective.

Policies for the MMSNE Degree

Department of Materials Science and NanoEngineering Graduate Program Handbook

The General Announcements (GA) is the official Rice curriculum.
As an additional resource for students, the department of Materials Science and NanoEngineering publishes a graduate program handbook, which can be found here: https://gradhandbooks.rice.edu/2026_27/Materials_Science_NanoEngineering_Graduate_Handbook.pdf.

Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/#transfer). Some departments and programs have additional restrictions on transfer credit. Requests for transfer credit must be approved for Rice equivalency by the appropriate academic department offering the Rice equivalent course (corresponding to the subject code of the course content) and by the Office of Graduate and Postdoctoral Studies (GPS). Students are encouraged to meet with their academic program's advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines

Students pursuing the MMSNE degree should be aware of the following departmental transfer credit guideline:

- No more than 2 courses (6 credit hours) of transfer credit from U.S. or international universities of similar standing as Rice may apply towards the degree.

Academic Standards

Students are expected to earn letter grades of at least B- (2.67 grade points) in all courses taken, and maintain a minimum overall GPA of 3.00 to graduate. If a student's semester GPA is below 3.00, the student will be placed on departmental probation, and if the student's semester GPA is below 3.00 for two consecutive semesters, the student's performance will be reviewed by the Graduate Committee in consultation with the Department Chair, and the student may be dismissed from the program.

Additional Information

For additional information, please see the Materials Science and Nanoengineering website: https://msne.rice.edu/.

Opportunities for the MMSNE Degree

Fifth-Year Master's Degree Option for Rice Undergraduate Students

In certain situations and with some terminal master's degree programs, Rice students have an option to pursue a master's degree by adding an additional fifth year to their four years of undergraduate studies.

Advanced Rice undergraduate students in good academic standing typically apply to the master's degree program during their junior or senior year. Upon acceptance, depending on course load, financial aid status, and other variables, they may then start taking some required courses of the master's degree program. A plan of study will need to be approved by the student's undergraduate major advisor and the master's degree program director.

As part of this option and opportunity, Rice undergraduate students:

- must complete the requirements for a bachelor's degree and the master's degree independently of each other (i.e. no course may be counted toward the fulfillment of both degrees).
- should be aware there could be financial aid implications if the conversion of undergraduate coursework to that of graduate level reduces their earned undergraduate credit for any semester below that of full-time status (12 credit hours).
- more information on this *Undergraduate - Graduate Concurrent Enrollment* opportunity, including specific information on the registration process can be found here (https://ga.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/).

Rice undergraduate students completing studies in science and engineering may have the option to pursue the Master of Materials Science and NanoEngineering (MMSNE) degree. For additional information, students should contact their undergraduate major advisor and the MMSNE program director.

Additional Information

For additional information, please see the Materials Science and Nanoengineering website: https://msne.rice.edu/.