

BACHELOR OF ARTS (BA) DEGREE WITH A MAJOR IN MATERIALS SCIENCE AND NANOENGINEERING

Program Learning Outcomes for the BA Degree with a Major in Materials Science and Nanoengineering

Upon completing the BA degree with a major in Materials Science and Nanoengineering, students will demonstrate:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
6. An ability to acquire an apply new knowledge as needed, using appropriate learning strategies.

Requirements for the BA Degree with a Major in Materials Science and NanoEngineering

For general university requirements, see [Graduation Requirements \(https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/\)](https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BA degree with a major in Materials Science and NanoEngineering must complete:

- A minimum of 21-23 courses, depending on course selection, (59 credit hours) to satisfy major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 9 courses (25 credit hours) taken at the 300-level or above.

The BA program in Materials Science and NanoEngineering is highly flexible, involves less technical content than the BS, and allows students greater freedom to pursue areas of interest outside of engineering.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major's academic advisor, or where applicable, the department's Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major's [Official Certifier \(https://registrar.rice.edu/facstaff/degreeworks/\)](https://registrar.rice.edu/facstaff/degreeworks/).)

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 Major in Materials Science and NanoEngineering		59
Total Credit Hours Required for the BA with a Major in Materials Science and NanoEngineering		120

Degree Requirements

Code	Title	Credit Hours
Required Prerequisites in Materials Science & Nanoengineering		
MATH 101 or MATH 105	SINGLE VARIABLE CALCULUS I AP/OTH CREDIT IN CALCULUS I	3
MATH 102 or MATH 106	SINGLE VARIABLE CALCULUS II AP/OTH CREDIT IN CALCULUS II	3
<i>Select 1 from the following:</i> ¹		4
PHYS 101 & PHYS 103	MECHANICS (WITH LAB) and MECHANICS DISCUSSION	
PHYS 111	HONORS MECHANICS (WITH LAB)	
<i>Select 1 from the following:</i> ²		4
PHYS 102 & PHYS 104	ELECTRICITY & MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION	
PHYS 112	HONORS ELECTRICITY & MAGNETISM (WITH LAB)	
MATH 211	ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA	3
MATH 212 or MATH 232	MULTIVARIABLE CALCULUS HONORS MULTIVARIABLE CALCULUS	3
CHEM 121 or CHEM 111	GENERAL CHEMISTRY I AP/OTH CREDIT IN GENERAL CHEMISTRY I	3
CHEM 123 or CHEM 113	GENERAL CHEMISTRY LABORATORY I AP/OTH CREDIT IN GENERAL CHEMISTRY LAB I	1
CHEM 122 or CHEM 112	GENERAL CHEMISTRY II AP/OTH CREDIT IN GENERAL CHEMISTRY II	3
CHEM 124 or CHEM 114	GENERAL CHEMISTRY LABORATORY II AP/OTH CREDIT IN GENERAL CHEMISTRY LAB II	1
Required Courses in Materials Science & Nanoengineering		
MSNE 201 or MSNE 222	INTRODUCTION TO NANOTECHNOLOGY FOR ENGINEERS MATERIALS IN NATURE AND BIOMIMETIC STRATEGIES	3
MSNE 211	INTRODUCTION TO MATERIALS SCIENCE FOR ENGINEERS	3
MSNE 302	MATERIALS PROCESSING AND NANOMANUFACTURING	3
MSNE 304	MATERIALS SCIENCE JUNIOR LAB	3
MSNE 311	MATERIALS SELECTION AND DESIGN	3
MSNE 389	ETHICS & SAFETY FOR MATERIALS ENGINEERS	1

MSNE 435	CRYSTALLOGRAPHY & DIFFRACTION	3
<i>Select 3 courses from the following:</i>		9
MSNE 401	THERMODYNAMICS IN MATERIALS SCIENCE	
MSNE 402	MECH PROPERTIES OF MATERIALS	
MSNE 406	PHYSICAL PROPERTIES OF SOLIDS	
MSNE 411	MATERIALS CHARACTERIZATION FROM NANO TO MACRO	
<i>Select 1 course from the following:</i>		3
BIOE 370	BIOMATERIALS	
ELEC 261	INTRODUCTION TO PHYSICAL ELECTRONICS I	
MSNE 415	CERAMICS AND GLASSES	
MSNE 417	ELECTRONIC, OPTICAL AND MAGNETIC PROPERTIES OF POLYMERS	
Total Credit Hours Required for the Major in Materials Science and NanoEngineering		59
Additional Credit Hours to Complete Degree Requirements *		30
University Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) *		31
Total Credit Hours		120

Footnotes and Additional Information

* **Note:** [University Graduation Requirements](https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying FWIS or distribution requirements may additionally meet other requirements, such as the Analyzing Diversity (AD) requirement, or some of the student's declared major, minor, or certificate requirements. [Additional Credit Hours to Complete Degree Requirements](https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

¹ The Materials Science and NanoEngineering department has determined that credit awarded for PHYS 141 *CONCEPTS IN PHYSICS I* is not eligible for meeting the requirements of the Materials Science and NanoEngineering major.

² The Materials Science and NanoEngineering department has determined that credit awarded for PHYS 142 *CONCEPTS IN PHYSICS II* is not eligible for meeting the requirements of the Materials Science and NanoEngineering major.

Policies for the BA Degree with a Major in Materials Science and Nanoengineering

Program Restrictions and Exclusions

Students pursuing the BA Degree with a Major in Materials Science and NanoEngineering should be aware of the following program restriction:

- As noted in [Majors, Minors, and Certificates](https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/) (<https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/>), under *Declaring Majors, Minors and Certificates*, students may not obtain both a BA and a BS in the same major. Students pursuing the BA Degree with a Major in Materials Science and NanoEngineering may not additionally pursue the Bachelor of Science in Materials Science and NanoEngineering (BSMSNE) Degree.

Transfer Credit

For Rice University's policy regarding transfer credit, see [Transfer Credit](https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/) (<https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/>). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of [transfer credit advisors](https://oaa.rice.edu/advising-network/transfer-credit-advisors/) (<https://oaa.rice.edu/advising-network/transfer-credit-advisors/>) on their website: <https://oaa.rice.edu>. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines

Students pursuing the major in Materials Science and Nanoengineering should be aware of the following departmental transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program's official transfer credit advisor) on an individual case-by-case basis.

Additional Information

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

Opportunities for the BA Degree with a Major in Materials Science and Nanoengineering

Academic Honors

The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see [Latin Honors](https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (<https://ga.rice.edu/undergraduate-students/honors-distinctions/university/>) (*summa cum laude*, *magna cum laude*, and *cum laude*) and [Distinction in Research and Creative Work](https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (<https://ga.rice.edu/undergraduate-students/honors-distinctions/university/>). Some departments have department-specific Honors awards or designations.

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 \(https://ga.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/\)](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.

Research Opportunities

Many MSNE majors participate in undergraduate research; some even start during their freshman year. To get involved, speak to a MSNE undergraduate advisor or directly to a MSNE faculty member.

Additional Information

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