

# MSNE

Materials Science and  
NanoEngineering



<b>WEB LINKS</b>	<a href="http://msne.rice.edu">http://msne.rice.edu</a>
<b>FRANK ADVICE</b>	Many MSNE students pursue graduate degrees in top graduate schools after earning their BS degree, so undergraduate research experiences are quite important. Research intern experiences also help students obtain industrial jobs after graduation.
<b>ADVICE FOR STUDENTS WITH AP CREDIT</b>	Students with AP credit for Calculus would do well to move the MATH and CAAM sequence up. If the CAAM sequence can be fully completed in the sophomore year, this reduces the junior year pressure and also allows for more opportunities to participate in undergraduate research.
<b>ALTERNATIVE CURRICULA</b>	Not applicable.
<b>BS VERSUS BA</b>	Students are encouraged to pursue the BS degree instead of the BA degree, especially those who plan to pursue a graduate degree.
<b>NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES</b>	See the Undergraduate Program page on our website, <a href="http://msne.rice.edu">http://msne.rice.edu</a>



<p><b>RESEARCH</b></p>	<p>All 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.</p>
<p><b>INTERNSHIPS</b></p>	<p>Summer research internships are often available through individual MSNE research labs, too. Many students also pursue industrial or government lab internships as well. Notices are posted to the MSNE undergrad email list.</p>
<p><b>PROFESSIONAL ORGANIZATIONS</b></p>	<p>American Ceramic Society (ACerS)  <a href="http://www.ceramics.org">http://www.ceramics.org</a>          Association for Iron &amp; Steel Technology (AIST)  <a href="http://www.aist.org">http://www.aist.org</a>          Materials Information Society  <a href="http://www.asminternational.org">http://www.asminternational.org</a>          Minerals, Metals, and Materials Society (TMS)  <a href="http://www.tms.org">http://www.tms.org</a>          Rice Undergraduate Materials Science and NanoEngineering Society  <a href="http://materialsociety.blogs.rice.edu">http://materialsociety.blogs.rice.edu</a>          Rice Center for eEngineering Leadership(RCEL)  <a href="http://rcel.rice.edu">http://rcel.rice.edu</a></p>
<p><b>INTERESTING COURSES FOR NON-MAJORS</b></p>	<p>MSNE 201 Introduction to NanoEngineering          MSNE 402 Mechanical Properties of Materials          MSNE 406 Physical Properties of Solids</p>

# B.S. In Materials Science and NanoEngineering

**Specializations:** Students select electives to suit their academic interests and career plans.

## Engineering and

**Sciences Electives:** At least four electives for a total of 12 hours of credit approved by a department academic advisor: One basic science elective at the 200 level or higher, one engineering elective (not MSNE), and two technical electives in science, engineering (including MSNE) or math at the 200 level or higher.

## Sample Degree Plan

*THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.*

*CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.*

FALL			SPRING		
<b>FRESHMAN</b> 18 credits			<b>FRESHMAN</b> 17 credits		
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
CHEM 121	General Chem I w/Lab	4*	CHEM 122	General Chem II w/Lab	4*
PHYS 101•	Mechanics w/Lab	4*	PHYS 102•	Electr & Magnetism w/Lab	4*
	or 111			or 112	
MSNE 201	Introduction to NanoEngineering	3	OPEN	Open elective	3
FWIS	Freshman Writing	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1			
<b>SOPHOMORE</b> 15 credits			<b>SOPHOMORE</b> 18 credits		
MATH 211	Ord Diff Eqs & Linear Algebra	3	MATH 212	Multivariable Calculus	3
PHYS 201	Waves & Optics	3	CAAM 210	Intro to Eng Computation	3
	or CHEM 211/311		DIST	Distribution elective	3
SPEC	MSNE Technical elective	3	DIST	Distribution elective	3
MSNE 301	Materials Science	3	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
<b>JUNIOR</b> 17 credits			<b>JUNIOR</b> 14 credits		
CAAM 335	Matrix Analysis	3	MSNE 303	Materials Science Junior Lab	1
MSNE 401	Transport Phenomena in Mat Sci	4	MSNE 311	Materials Selection and Design	4
MSNE 406	Physical Properties of Solids	3	MSNE 411	Mtlography & Phase Relations	3
MSNE 415	Ceramics and Glasses	3	SPEC	MSNE Engineering elective	3
MSNE 451	Materials Science Seminar	1	OPEN	Open elective	3
DIST	Distribution elective	3			
<b>SENIOR</b> 16 credits			<b>SENIOR</b> 16 credits		
MSNE 402	Mechanical Properties of Materials	3	MSNE 408	Capstone Design II	3
MSNE 407	Capstone Design I	4	MSNE 435	Crystallography and Diffraction	3
MSNE 450	Materials Science Seminar	0	MSNE 437	Materials Science Senior Lab	1
SPEC	MSNE Technical elective	3	DIST	Distribution elective	3
SPEC	MSNE Science elective	3	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3

\* In addition to class hours, these courses have a regularly scheduled lab and/or discussion session that must fit into your schedule.

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

BASIC REQUIREMENTS	General Math & Science Courses	37
	Core Courses in Major	39
ELECTIVE REQUIREMENTS	Specialization Electives	12
	Open Electives and LPAP	19
	FWIS and Distribution Courses	24
Minimum credit required for the B.S.		131

Of the 131 total credits, the BS in Materials Science and NanoEngineering requires 76 credits in general math and science courses and core courses.

## Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations & Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101*/111	4*	Mechanics w/Lab
PHYS 102**/112	4*	Electricity and Magnetism w/Lab
CHEM 121/123	4*	General Chemistry I w/Lab
CHEM 122/124	4*	General Chemistry with II Lab
CAAM 210	3	Introduction to Engineering Computation
CAAM 335	3	Matrix Analysis
PHYS 201/CHEM 211/311	3	Waves and Optics/Organic Chemistry/Physical Chemistry
MSNE 201	3	Introduction to NanoEngineering
MSNE 301	3	Materials Science
MSNE 303	1	Materials Science Junior Lab
MSNE 311	4	Materials Selection & Design
MSNE 401	4	Thermodynamics& Transport Phenomena in Materials Science
MSNE 402	3	Mechanical Properties of Materials
MSNE 406	3	Physical Properties of Solids
MSNE 407	4	Capstone Design I
MSNE 408	3	Capstone Design II
MSNE 411	3	Metallography and Phase Relations
MSNE 415	3	Ceramics and Glasses
MSNE 435	3	Crystallography and Diffraction
MSNE 450	0	Materials Science Seminar
MSNE 451	1	Materials Science Seminar
MSNE 437	1	Crystallography & Diffraction Lab/Materials Science Senior Lab
Elective	3	1 approved science elective (not MSNE)
Elective	3	1 approved technical elective (MSNE)
Elective	3	1 approved technical elective (MSNE)
Elective	3	1 approved engineering elective (not MSNE)

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•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

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