

Materials Science and Engineering Curriculum

Updated January 9, 2015

First Semester

160:159	Chemistry I for Engineers	3
160:171	Intro to Experimentation	1
355:101	Expository Writing	3
640:151	Calculus I Math/Phys	4
750:123	Analytical Physics IA	2
440:100	Engineering Orientation Lec	1
____:____	Hum/SocSci Elective	3

Credits 17

Second Semester

160:160	Chemistry II for Engineers	3
640:152	Calculus II Math/Phys	4
750:124	Analytical Physics IB	2
440:127	Intro Computers for Eng'g	3
440:221	Eng Mechanics:Statics	3
____:____	Hum/SocSci Elective	3

Credits 18

Third Semester

640:251	Multivariable Calculus	4
750:227	Analytical Physics IIA	3
750:229	Analytical Physics IIA Lab	1
960:xxx*	Statistics (*211, 384, 401, 490)	M 3
635:203	Intro to MSE	M 3
635:205	Crystal Chem & Struct	M 3

Credits 17

Fourth Semester

640:244	Differential Eqs (w/Lin Alg)	4
635:204	Materials Processing	M 3
635:206	Mat. Thermodynamics	M 4
635:212	Physics of Materials	M 3
635:252	Laboratory I	M 2

Credits 16

Fifth Semester

635:305	Materials Microprocessing	M 3
635:307	Kinetics of Mat'l Processing	M 3
635:309	Characterization of Materials	M 3
635:314	Strength of Materials	M 3
635:353	Laboratory II	M 2
635:____	Specialization Elective	M 3

Credits 17

Sixth Semester

220:102	Microeconomics	M 3
635:316	EOM Properties of Mat'l	M 3
635:354	Laboratory III	M 2
635:401	Senior MSE Lab I	M 3
OR (only one of 401/411 is required)		
635:411	MSE Eng Design I	M 3
635:____	Specialization Elective	M 3

Credits 14

Seventh Semester

635:402	Senior MSE Lab II	M 3
OR (only one of 402/412 is required)		
635:412	MSE Eng Design I	M 3
635:403	MSE Seminar	M 1
635:____	Specialization Elective	M 3
635:____	Specialization Elective	M 3
____:____	Technical Elective	M 3
____:____	Hum/SocSci Elective (300+)	3

Credits 16

Eighth Semester

635:404	MSE Seminar	M 1
635:____	Specialization Elective	M 3
635:____	Specialization Elective	M 3
____:____	Hum/SocSci Elective (300+)	3
____:____	General Elective	3

Credits 13

Total Credits at Graduation: 128

Specialization and Technical Electives:

Two of the six **Specialization Electives** must be taken from the following list:

- 635:312 Glass Engineering
- 635:360 Ceramics Engineering
- 635:361 Materials Science and Engineering of Polymers
- 635:362 Physical Metallurgy

The other four **Specialization Electives** must be from the list of offered Departmental Electives (including the list above) and/or any science/technical courses in the university that are approved by the Undergraduate Director.

The one Technical Elective must be selected from any science and/or technical course in the university that is approved by the Undergraduate Director.

Statistics

One of the following courses must be taken to satisfy the elective in statistics:

- 960:211 Statistics I
- 960:384 Intermediate Statistical Analysis
- 960:401 Basic Statistics for Research
- 960:490 Introduction to Experimental Design

Double Majoring

The MSE curriculum is highly flexible and permits double majoring in certain instances for students with AP credits or transfer credits.

Concentrations

The MSE Department presently has six areas of concentration in which you may specialize and receive a certificate upon graduation. These are highly relevant areas science and engineering that are favored by graduate schools and employers. See the following page. To receive a certificate in any one of these areas you must take at least three of the courses listed.

Questions on any aspect of the curriculum? Check with the Undergraduate Director:

Professor Wenzel

wenzel@rci.rutgers.edu

Room 231, McLaren Ceramics Building

(848) 445-5092

MSE Concentrations

*Enhance your MSE experience with a Concentration
in one or more specific areas of interest described below.*

Concentration	Acceptable Courses (Choose 3)
Biomaterials – Faculty coordinators: Professors Mann & Fabris. Note: One course from each of the two groups marked with ** and ❖ is required.	<ul style="list-style-type: none">• 01:119:101 General Biology I(3)**• 01:119:102 General Biology II(3)• 01:160:307 Organic Chemistry I (4)**• 01:694:214 Introduction to Molecular Biology Research(3)• 14:125:404 Introduction to Biomaterials (3)❖• 14:635:410 Biological Applications of Nanomaterials(3) ❖
Electronic and Optical -- Faculty coordinators: Professors Harrington and Safari	<ul style="list-style-type: none">• 14:635:316 Electronic, Optical and Magnetic Properties of Materials (3)• 14:635:322 Photonic, Electronic and Magnetic Applications of Nanostructures and Nanomaterials (3)• 14:635:405 Solar Cell Design and Processing (3)• 14:635:413 Solar Technology Venture Analysis (3)• 14:635:433 Optical Materials (3)• 14:332:466 Opto-Electronic Devices (3)• 12:750:305 Modern Optics (3)• 12:750:406 Introductory Solid State Physics (3)
Energy Conversion and Storage – Faculty coordinators: Professors Klein and Amatucci	<ul style="list-style-type: none">• 11:375:322 (F) Energy Technology and its Environmental Impact (3)• 14:635:405 (F) Solar Cell Design and Processing (3)• 14:332:402 (S) Sustainable Energy: Choosing Among Options (3)• 14:635:440 (S) Electrochemical Devices (3)• 14:332:361 (S) Electronic Devices (pre-requisite is Principles of Electrical Engineering 14:332:222) (3)• 14:332:460 (S) Power Electronics (pre-requisite is Electronic Devices 14:332:361) (3)
Nanomaterials – Faculty coordinators: Professors Chhowalla and O’Carroll	<ul style="list-style-type: none">• 14:635:320 Introduction to Nanomaterials (3)• 14:635:322 Photonic, Electronic, and Magnetic Properties of Nanomaterials. (3)• 14:635:410 Biological Applications of Nanomaterials (3)• 16:635:604 Introduction to Nanoscience and Nanotechnology (3)• 16:635:321 Structural, Mechanical, and Chemical Properties of Nanomaterials. (3)
Polymers – Faculty coordinators: Professors Lehman and Wenzel	<ul style="list-style-type: none">• 01:160:307 Organic Chemistry I (4)• 14:635:361 Materials Science and Engineering of Polymers• 16:155:551 Polymer Science and Engineering

- 14:440:301 Introduction to Packaging
- Polymer Engineering or Science Elective (TBD)

Packaging Materials –

Faculty coordinators:

Professors Lehman, Kear, and
Wenzel.

- 14:635:312 Glass Engineering
- 14:635:361 Materials Science and Engineering of Polymers
- 14:635:362 Physical Metallurgy
- Packaging Engineering or Science Elective (TBD)

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