Materials Science and Engineering

Everything Americans use is composed of materials, from computer chips to flexible concrete skyscrapers, from plastic bags to artificial hips, from fiber optical cables to automobiles. Materials science and engineering makes these materials reliable and useful through design, processing and analysis of controlled compositions, microstructures and properties. Without new materials, the next generation of computers, automobiles, aircraft telecommunications, skyscrapers and medical implants will not exist. Materials of the future will be *smart* and will *think* on their own, in addition to meeting the traditional property demands. As such, the field of materials science and engineering abounds with scientific challenges and technological excitement.

About This Major

- **College:** Engineering
- **Degree:** Bachelor of Science in Materials Science and Engineering
- **Hours for the Degree:** 125
- **Specializations:** Ceramics, Electronic Materials, Metals, Polymeric and Biomaterials
- **Minor:** Yes
- **Combined-Degree Program:** Yes
- www.mse.ufl.edu

Overview

The bachelor's degree program provides a broad materials science and engineering core with specialization in ceramics, electronic materials, metals or polymers. Biomaterials also is taught at the combined bachelor's/master's level.

Admission Requirements

It is the department’s policy to admit the best-qualified transfer applicants as demonstrated by academic achievement.

Successful applicants must have earned an overall 2.5 grade point average, based on the first two attempts, in the eight preprofessional courses and have earned a grade of C or higher in each course of Calculus 1 (MAC 2311), Calculus 2 (MAC 2312), Calculus 3 (MAC 2313), Differential Equations (MAP 2302), General Chemistry 1 and laboratory (CHM 2045/2045L), General Chemistry 2 and laboratory (CHM 2046/2046L), Physics with Calculus 1 and laboratory (PHY 2048/2048L), and Physics with Calculus 2 and laboratory (PHY 2049/2049L). Only the first two attempts (including withdrawals) in each course will be considered for admission to or retention in the department. A cumulative GPA of 2.0 or greater is required for all courses.

Educational Objectives

The program objectives of the MSE program at the University of Florida are to produce engineering practitioners and graduate students who in three to five years after graduation will be

- Problem solvers: using their technical skills to advance society, science and technology;
- Designers: using their knowledge to improve systems, components or processes;
- Professionals: using their professional skills to create solutions and advance their ideas; and
- Role models: creating solutions that meet the needs of society.

Department Requirements

A minimum grade of C or higher is required in ENC 3254.

The department encourages students to accept internships and opportunities to study abroad. However, it is highly recommended that students seek academic advising for appropriate registration planning.

Mission

The department strives to serve the scientific and engineering community of the state and nation by providing quality education in the field, conducting basic and applied research to enhance science in the field, and supplying short courses, technology transfer, industrial consulting and distance learning to promote engineering in the field.

Critical Tracking

To graduate with this major, students must complete all university, college and major requirements.

Equivalent critical tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students

Semester 1

- 2.0 UF GPA required for semesters 1-5
- 2.5 GPA on all critical tracking coursework for semesters 1-5
- Complete 1 of 8 critical tracking courses with a minimum grade of C within two attempts: CHM 2045 or CHM 2095, CHM 2046 or CHM 2096, MAC 2311,
  MAC 2312, MAC 2313, MAP 2302, PHY 2048, PHY 2049

Semester 2

- Complete 1 additional critical tracking course with a minimum grade of C within two attempts

Semester 3

- Complete 2 additional critical tracking courses with minimum grades of C within two attempts

Semester 4

- Complete 2 additional critical tracking courses with minimum grades of C within two attempts

Semester 5

- Complete all 8 critical tracking courses with minimum grades of C in each course within two attempts

Recommended Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold.

Semester 1	Credits
If you don't place out of ENC 1101, take it in the fall.	
CHM 2045 General Chemistry 1 (GE-P) or CHM 2095 Chemistry for Engineers 1 (GE-P)	**3**
CHM 2045L General Chemistry 1 Laboratory (GE-P)	1
MAC 2311 Analytic Geometry and Calculus 1 (GE-M)	**4**
Humanities (GE-H)	3
Social and Behavioral Sciences (GE-S)	3
	Total 14

Semester 2	Credits
CHM 2046 General Chemistry 2 (GE-P) or CHM 2096 Chemistry for Engineers 2 (GE-P)	**3**
CHM 2046L General Chemistry 2 Laboratory (GE-P)	1
ENC 3254 Professional Communication for Engineers (GE-C)	**3**
MAC 2312 Analytic Geometry and Calculus 2 (GE-M)	4
Humanities (GE-H)	3
	Total 14

Semester 3	Credits
EIN 4354 Engineering Economy (3) or MAN 3025 Principles of Management (4) or MAR 3023 Principles of Marketing (4)	3-4
EMA 3010 Materials	3
MAC 2313 Analytic Geometry and Calculus 3 (GE-M)	**4**
PHY 2048 Physics with Calculus 1 (GE-P)	**3**
PHY 2048L Physics with Calculus 1 Laboratory (GE-P)	1
Computer programming course (COP 2271 or see adviser for approved list)	2
	Total 16-17

Semester 4	Credits
EGM 2511 Engineering Mechanics - Statics	3
EMA 3011 Fundamental Principles of Materials	3
EMA 3800 Error Analyses and Optimization Methodologies in Materials Research	3
MAP 2302 Elementary Differential Equations	**3**
PHY 2049 Physics with Calculus 2	**3**
PHY 2049L Physics with Calculus 2 Laboratory	1
	Total 16

Semester 5	Credits
EEL 3003 Elements of Electrical Engineering	3
Humanities (GE-H) or Social and Behavioral Sciences (GE-S)	3
Social and Behavioral Sciences (GE-S)	3
	Total 9

Semester 6	Credits
EGM 3520 Mechanics of Materials	3
EMA 3050 Introduction to Inorganic Materials	3
EMA 3066 Introduction to Organic Materials	3
EMA 3080C Materials Laboratory 1	2
EMA 4314 Energetics and Kinetics in Material Science	3

	Total 14
Semester 7	**Credits**
EMA 3013C Materials Laboratory 2	2
EMA 3413 Introduction to Electronic Materials	3
EMA 3513C Analysis of the Structure of Materials	4
EMA 4121 Interfacial Engineering	3
EMA 4223 Mechanical Behavior of Materials	3
	Total 15

Ceramics

Semester 8	**Credits**
EMA 4125 Transport Phenomena in Materials Processing	3
EMA 4144 Physical Ceramics 1	3
EMA 4324 Stability of Materials	3
EMA 4913 Research in Materials Science and Engineering 1 (2) or EMA 4915 Integrated Product and Process Design Program 1 (3)	2-3
EMA elective (see adviser for list)	1
	Total 12-13
Semester 9	**Credits**
EMA 4041L Advanced Ceramics Laboratory 1	1
EMA 4645 Processing of Ceramic Materials	3
EMA 4714 Materials Selection and Failure Analysis	3
EMA 4914 Research in Materials Science and Engineering 2 (2) or EMA 4916 Integrated Product and Process Design Program 2 (3)	2-3
EMA electives (see adviser for list; specialization requires seven credits of additional EMA courses)	6
	Total 15-16

Electronic Materials

Semester 8	**Credits**
EEE 3396 Solid-State Electronic Devices	3
EMA 4125 Transport Phenomena in Materials Processing	3
EMA 4324 Stability of Materials	3
EMA 4614 Production of Electronic Materials	3
EMA 4913 Research in Materials Science and Engineering 1 (2) or EMA 4915 Integrated Product and Process Design Program 1 (3)	2-3
	Total 14-15
Semester 9	**Credits**
EMA 4615 Compound Semiconductor Materials	3
EMA 4714 Materials Selection and Failure Analysis	3
EMA 4914 Research in Materials Science and Engineering 2 (2) or EMA 4916 Integrated Product and Process Design Program 2 (3)	2-3
EMA electives (see adviser for list; specialization requires five credits of additional EMA courses)	5
	Total 13-14

Metals

Semester 8	**Credits**
EMA 4120 Physical Metallurgy 1	3
EMA 4125 Transport Phenomena in Materials Processing	3
EMA 4324 Stability of Materials	3
EMA 4913 Research in Materials Science and Engineering 1 (2) or EMA 4915 Integrated Product and Process Design Program 1 (3)	2-3
EMA elective (see adviser for list)	1
	Total 12-13
Semester 9	**Credits**
EMA 4224 Physical Metallurgy 2	3
EMA 4623C Process Metallurgy	4

EMA 4714 Materials Selection and Failure Analysis	3
EMA 4914 Research in Materials Science and Engineering 2 (2) or EMA 4916 Integrated Product and Process Design Program 2 (3)	2-3
EMA electives (see adviser for list; specialization requires four credits of additional EMA courses)	3
	Total 15-16

Polymeric and Biomaterials

Semester 8	Credits
EMA 4061 Biomaterials: Structures and Properties	3
EMA 4125 Transport Phenomena in Materials Processing	3
EMA 4161C Physical Properties of Polymers	4
EMA 4324 Stability of Materials	3
EMA 4913 Research in Materials Science and Engineering 1 (2) or EMA 4915 Integrated Product and Process Design Program 1 (3)	2-3
	Total 15-16

Semester 9	Credits
CHM 4272 The Organic Chemistry of Polymers	2
EMA 4062 Biopolymers: Manufacture, Stability and Biocompatibility	3
EMA 4714 Materials Selection and Failure Analysis	3
EMA 4914 Research in Materials Science and Engineering 2 (2) or EMA 4916 Integrated Product and Process Design Program 2 (3)	2-3
EMA elective (see adviser for list; specialization requires two credits of additional EMA courses)	2
	Total 12-13

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