Michigan State University College of Engineering
Undergraduate Studies

1410 Engineering Building
East Lansing, MI 48824
(517)355-6616 ext. 1
http://www.egr.msu.edu/egr/programs/bachelors/degreeprograms.php

Materials Science and Engineering

Accredited by the Engineering Accreditation Commission of ABET,
111 Market Place, Suite 1050, Baltimore, MD 21204-4012 - telephone (410) 347-7700.

University Requirements (23-24):

Writing, Rhetoric and American Cultures (WRA)	4
Integrative Studies in Humanities (IAH)	8
Integrative Studies in Social Sciences (ISS)	8
Bioscience (one of the following): BS 110, BS 111, ENT 205, MMG 201, MMG 301, PLB 105, PSL 250, ZOL 141	3-4

College Requirements (30):

CEM 151	General and Descriptive Chemistry	4
*EGR 100	Introduction to Engineering Design	2
*EGR 102	Introduction to Engineering Modeling	2
MTH 132	Calculus I	3
MTH 133	Calculus II	4
MTH 234	Multivariable Calculus	4
MTH 235	Differential Equations	3
PHY 183	Physics for Scientists & Engineers I	4
PHY 184	Physics for Scientists & Engineers II	4

A. Major Requirements (44):

CE 221	Statics	3
CEM 152	Principles of Chemistry	3
CEM 161	Chemistry Laboratory I	1
ECE 345	Electronic Instrumentation and Systems	3
ME 222	Mechanics of Deformable Solids	4
MSE 250	Materials Science and Engineering	3
MSE 310	Phase Equilibria in Materials	3
MSE 320	Mechanical Properties of Materials	3
MSE 331	Materials Characterization Methods I	1
MSE 350	Electronic Structure & Properties of Matls	3
MSE 360	Fundamentals of Microstructural Design	3
MSE 370	Physical Processing of Materials	3
MSE 381	Materials Characterization Methods II	2
MSE 466	Design and Failure Analysis (W)	3
MSE 477	Manufacturing Processes	3
STT 351	Probability and Statistics for Engineering	3

*EGR 100 and EGR 102 are required for all students matriculating at MSU beginning Fall Semester, 2008. Students who matriculate before Fall 2008 must complete CSE 131 in place of EGR 102.

B. Select two of the following courses (6):

MSE 454	Ceramic and Refractory Materials	3
MSE 465	Desn & Application of Engr Materials (W)	3
MSE 476	Phys Metallurgy of Ferrous & Alumn Alloys	3

C. Complete at least 5 credits from 400-level courses within the College of Engineering (5).

D. Technical Electives (7):

Complete at least 7 credits in courses selected from a list of approved technical electives available from the Department of Chemical Engineering and Materials Science.

E. Concentrations (18-27):

Students may elect to complete a more focused set of courses to enhance their ability to function at the interface with another scientific, engineering, or business discipline. Concentrations are available to, but not required of, any student enrolled in the Bachelor of Science degree in Materials Science and Engineering. Completing the Bachelor of Science degree in Materials Science and Engineering with a concentration may require more than 128 credits. Students who elect to complete one of the following concentrations are not required to complete section B., C., or D.

Biomedical Materials Engineering Concentration (27):

ANTR 350	Human Gross Anatomy & Structural Biol	3
CEM 351	Organic Chemistry I	3
ME 495	Tissue Mechanics	3
MSE 425	Biomaterials and Biocompatibility	3
ZOL 341	Fundamental Genetics	4
Complete one of the following courses (3):		
MSE 454	Ceramics and Refractory Materials	3
MSE 465	Design and Application of Egr. Materials	3
MSE 476	Phys Metallurgy of Ferrous & Alumn Alloys	3

Technical Electives (9):

An approved list of Technical Electives is available from the adviser.

Manufacturing Engineering Concentration (18):

ECE 415	Computer Aided Manufacturing	3
ME 478	Product Development	3
MSE 465	Design and Application of Egr. Materials	3
Complete three of the following courses (9):		
GBL 323	Introduction to Business Law	3
MSE 426	Introduction to Composite Materials	3
MSE 454	Ceramics and Refractory Materials	3
MSE 476	Physical Metallurgy of Ferrous and Aluminum Alloys	3
STT 471	Statistics for Quality and Productivity	3

Completion of this concentration fulfills requirement 2 of the admission requirements for the Master of Science degree in Manufacturing and Engineering Management offered by The Eli Broad College of Business.

Metallurgical Engineering Concentration (18):

ME 423	Intermediate Mechanics of Deformable Solids	3
ME 475	Computer Aided Design of Structures	3
MSE 465	Design and Application of Egr. Materials	3
MSE 476	Physical Metallurgy of Ferrous and Aluminum Alloys	3
Complete one of the following courses (3):		
MSE 426	Introduction to Composite Materials	3
STT 471	Statistics for Quality and Productivity	3
Complete one of the following courses (3):		
ME 425	Experimental Mechanics	3
MSE 451	Microscopic & Diffraction Anlys of Matls	3

Polymeric Engineering Concentration (18):

CEM 351	Organic Chemistry I	3
CHE 311	Fluid Flow and Heat Transfer	3
CHE 472	Composite Materials Processing	3
CHE 473	Chemical Engineering Principles in Polymers and Materials Systems	3
MSE 426	Introduction to Composite Materials	3
STT 471	Statistics for Quality and Productivity	3

Upon completion of the required courses for one of these concentrations, the student should contact the Department of Chemical Engineering and Materials Science and request certification for the completion of the option. After the certification is approved by the chairperson of the department and the Dean of the College of Engineering, the Office of the Registrar will enter on the student's academic record the name of the option and the date that it was completed. This certification will appear on the student's transcript.

Other Electives (Variable)

Total Credits Required for Degree **128**

The requirements listed above apply to students admitted to the major of Materials Science and Engineering in the Department of Chemical Engineering and Materials Science (CHEMS) beginning Fall, 2008. The Department of Chemical Engineering and Materials Science constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encourages to consult with his/her advisor to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Materials Science and Engineering should contact the Engineering Undergraduate Studies Advising Office, 1415 Engineering Building, phone (517) 355-6616, extension 1.

Some courses may have prerequisites, which are no otherwise required in the program. Students should check course descriptions to ensure they are aware of prerequisites.

Last revised May, 2008

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Materials Science and Engineering

Sample Program

Freshman Year

Fall	Credits	Spring	Credits
CEM 151	4	CEM 152	3
CEM 161	1	EGR 102	2
EGR 100	2	Elective	1/2
ISS 2XX	4	MTH 133	4
MTH 132	3	WRA 1XX	4
Total	**14**	**Total**	**14/15**

Sophomore Year

Fall	Credits	Spring	Credits
CE 221	3	Bioscience	3/4
ISS 3XX	4	ME 222	4
MSE 250	3	MSE 350	3
MTH 234	4	MTH 235	3
PHY 183	4	PHY 184	4
Total	**18**	**Total**	**17/18**

Junior Year

Fall	Credits	Spring	Credits
Elective	3	ECE 345	3
IAH 20X	4	Elective	3
MSE 310	3	IAH 2XX	4
MSE 320	3	MSE 360	3
MSE 331	1	MSE 370	3
STT 351	3	MSE 381	2
Total	**17**	**Total**	**18**

Senior Year

Fall	Credits	Spring	Credits
MSE 454/466/476	3	Elective	3
MSE 454/466/476	3	Elective	3
MSE 477	3	Engr 400-lvl	3
Technical Elective	3	MSE 465	3
Technical Elective	3	Technical Elective	3
Total	**15**	**Total**	**15**

Materials Science and Engineering Program Educational Objectives

Approved to replace the document adopted on 5/11/05

The MSE program prepares students to apply their understanding of the processing, application, and sustainable use of engineering materials essential to the realization of new ideas coming from engineers, scientists, enterprises, and society. Our overarching objectives are to equip graduates with the confidence that comes from professionalism, and provide them with the tools needed to contribute meaningfully within any of the diverse professional career paths they may choose. Since the discipline creates bridges between science and engineering, MSE majors must communicate effectively with people in many different specialties, and work effectively in multi-disciplinary teams. MSE graduates must be aware of the economic, social, and environmental implications entailed in the processing and use of materials, and must have a solid grounding in professional engineering ethics.

The faculty provide a rigorous academic environment so that graduates will have mastered the analytical and technical skills needed to successfully compete as professionals, entrepreneurs, or as postgraduate scholars.

The MSE Program prepares our graduates to:

I. Achieve success in Materials Science & Engineering or another chosen career;
II. Advance to leadership roles within their profession and community;
III. Contribute effectively to their disciplines, economies and society;
IV. Compete with confidence for opportunities for postgraduate education;
V. Enjoy the benefits of a lifetime of learning and professional development.

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