

MICHIGAN STATE UNIVERSITY

September 20, 2013

MEMORANDUM

TO: Dr. Douglas Estry, Associate Provost for Undergraduate Education
and Dean of Undergraduate Studies

FROM: Dr. John Gaboury, Associate Provost for Academic Services

RE: Request for a New Linked Bachelor of Science Degree in Materials
Science and Engineering and Master of Science Degree in Materials
Science and Engineering

For Transmittal to the University Committee on Undergraduate
Education (UCUE)

The request referenced above is being sent to the University Committee on Undergraduate Education (UCUE) in accordance with the *Bylaws for Academic Governance*, 4.4.

UCUE Response Requested:

Please ask the committee to consider the request referenced above and provide consultative commentary. Please mail the related materials referenced under the heading Attachments at the end of this memorandum to the committee members.

After receiving the committee's consultative response, the Provost will make a determination to forward or not to forward the request to the University Committee on Curriculum for its approval of curriculum and degree requirements.

If you have any questions, please call Joy Speas, University Curriculum Administrator, at 5-8420.

Thank you.

Attachments:

1. Request to Establish a New Academic Program form dated June 10, 2013: Linked Bachelor of Science Degree in Materials Science and Engineering and Master of Science Degree in Materials Science and Engineering and attachments.



University Curriculum and Catalog

Hannah Admin. Building
426 Auditorium Road
Room 151
East Lansing, MI 48824

517-355-8420
Fax: 517-353-1935

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COLLEGE OF ENGINEERING

1. Request to establish a **Linked Bachelor of Science Degree in Materials Science and Engineering and Master of Science Degree in Materials Science and Engineering** in the Department of Chemical Engineering and Materials Science. The University Committee on Undergraduate Education (UCUE) will consider this request. The University Committee on Graduate Studies (UCGS) will consider this request at its October 7, 2013 meeting.

Per University policy:

A candidate for a Linked Bachelor's-Master's Degree from Michigan State University may request the application of up to 9 credits toward the master's program for qualifying 400-level and above course work taken at the undergraduate level at Michigan State University or an external accredited institution. The number of approved credits, not to exceed 9, are applied toward the credit requirement of the master's degree. Credits applied to the Linked Bachelor's-Master's Program are not eligible to be applied to any other graduate degree program.

- a. Add the following statement in the Department of Chemical Engineering and Materials Science:

LINKED BACHELOR'S-MASTER'S DEGREE IN MATERIALS SCIENCE AND ENGINEERING
Bachelor of Science Degree in Materials Science and Engineering
Master of Science Degree in Materials Science and Engineering

The department welcomes applications from Michigan State University Materials Science and Engineering undergraduate students in their junior and senior year. Admission applications must be made during the prior spring semester for an anticipated spring graduation or the prior fall semester for an anticipated fall graduation to allow admission before the final semester as a Materials Science and Engineering undergraduate. Admission to the program requires a minimum undergraduate grade-point average of 3.5 and an approved program of study for the Master of Science degree in Materials Science and Engineering at the time of admission. Admission to the Linked Bachelor's-Master's program allows the application of up to 9 credits toward the master's program for qualifying 400-level and above course work taken at the undergraduate level at Michigan State University or an external accredited institution. The number of approved credits, not to exceed 9, are applied toward the credit requirement of the master's degree. Credits applied to the Linked Bachelor's-Master's program are not eligible to be applied to any other graduate degree program.

Effective Summer 2014.

View a Program		Main Menu
Joy Speas, RO	Monday, 6/10/2013	
Program Name: Linked Bachelor's - Master's Degree in Materials Science and Engineering Degree: LINK Sequence Number: 1	Program Request ID: 2467	
Effective Dates: Spring 2014 - Open Status: Interim Initial Action: New		
Requested Date: 5/15/2013 1:57:41 PM		
<p>1. Department/School/College: 16140 Department of Chemical Engineering and Materials Science</p> <p>2. Name of Program: Linked Bachelor's - Master's Degree in Materials Science and Engineering</p> <p>3. Name of Degree: LINK</p> <p>4. Type of Program: Major</p> <p>5. Effective Start Semester: Spring 2014 <i>Summer</i></p> <p>6. Target student audience for the program: Bachelor's Degree Students in Materials Science and Engineering</p> <p>7. Enrollment: What is the expected enrollment per year: 5 What is the minimum enrollment acceptable: 1</p> <p>8. Source of budget for the program: To align academic planning and curricular change, ALL requests for NEW funds must be included in the College's annual planning letter. Provost approval of new funds and the effective date for the new program must align. If funding is not approved, then the program request will not be forwarded to Faculty Senate. Internal reallocation If new funds, was this request included in the College's annual planning letter? Indicate yes or no. If no, then this is a department or college fund reallocation (If the program is implemented, no additional resources are required.). No additional resources are required.</p> <p>9. Projected Costs as compared to other programs in unit: Same</p> <p>10. Staff requirement: How many additional staff will be required: 0</p>		

Who will provide the primary instruction. Describe any external linkages(industry, government, etc.):

11. Will additional equipment be required:

Approximate cost: 0

Source of funding:

12. Will additional library materials be required:

Approximate cost: 0

Source of funding: N/A

13. Will additional space be required:

Type:

Approximate amount:

14. If the program requirements contain a named concentration, do you wish for the concentration to be noted on the student's transcript?:

Yes

15. Detailed Description:

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16. Are there admissions requirements for this program?:

Grade or grade-point average requirements and if so in which course(s), portfolio requirement, audition, essay, etc. If there are not admission requirements other than those required by the University policy indicate "none".

3.5 GPA

DEPARTMENT LEVEL APPROVAL STATUS

Approved: Department of Chemical Engineering and Materials Science
5/15/2013 2:03:49 PM by Nicole Marshall for Martin Hawley, Chairperson

COLLEGE LEVEL APPROVAL STATUS

Approved: College of Engineering
6/10/2013 2:24:54 PM by Taylor Logan for Manoochehr Koochesfahani, Associate Dean

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MATERIALS SCIENCE and ENGINEERING

Materials Science and Engineering majors learn to select and create materials used to realize engineering designs in fields such as bioengineering, microelectronics and aerospace. They also learn how to manipulate the elements of matter into the atomic arrangements that insure efficient and cost-effective materials performance, demanded by today's advanced applications.

Through the core course work, students gain the scientific and engineering foundation needed to design metallic, ceramic, polymeric, and composite materials and, in turn, components manufactured from these materials. Students may enhance the knowledge they gain in metals, ceramics, and polymers by completing a concentration in biomedical materials, manufacturing, polymers, or metallurgy. Students may also choose to enroll in electives of complementary fields such as business, electronic materials or statistics.

The Bachelor of Science Degree program in Materials Science and Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

Requirements for the Bachelor of Science Degree in Materials Science and Engineering

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 128 credits, including general elective credits, are required for the Bachelor of Science degree in Materials Science and Engineering.

The University's Tier II writing requirement for the Materials Science and Engineering major is met by completing Materials Science and Engineering 466. That course is referenced in item 3. a. below.

Students who are enrolled in the College of Engineering may complete the alternative track to Integrative Studies in Biological and Physical Sciences that is described in item 1. under the heading **Graduation Requirements for All Majors** in the College statement. Certain courses referenced in requirement 3. below may be used to satisfy the alternative track.

2. The requirements of the College of Engineering for the Bachelor of Science degree. The credits earned in certain courses referenced in requirement 3. below may be counted toward College requirements as appropriate.

3. The following requirements for the major:

	CREDITS
a. All of the following courses:	42
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 260 Electronic, Magnetic, Thermal and Optical Properties of Materials	3
MSE 310 Phase Equilibria in Materials	3
MSE 320 Mechanical Properties of Materials	3
MSE 331 Materials Characterization Methods I	2
MSE 360 Fundamentals of Microstructural Design	3
MSE 370 Synthesis and Processing of Materials	3
MSE 381 Materials Characterization Methods II	2
MSE 466 Design and Failure Analysis (W)	3
STT 351 Probability and Statistics for Engineering	3
Electrical and Computer Engineering 302 and 303 may be substituted for Electrical and Computer Engineering 345.	
b. Four of the following courses:	12
ME 477 Manufacturing Processes	3
MSE 454 Ceramic and Refractory Materials	3
MSE 460 Electronic Structure and Bonding in Materials and Devices	3
MSE 465 Design and Application of Engineering Materials	3
MSE 476 Physical Metallurgy of Ferrous and Aluminum Alloys	3
c. Complete at least 6 credits from 400-level courses within the College of Engineering.	
d. Complete at least 3 credits in courses selected from a list of approved technical electives available from the Department of Chemical Engineering and Materials Science.	

Concentrations in Materials Science and Engineering

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. The concentration will be noted on the student's transcript.

Biomedical Materials Engineering

To gain interdisciplinary skills in human biology and earn a Bachelor of Science degree in Materials Science and Engineering with a biomedical materials engineering concentration, students must complete requirement 3. a. above and the following (28 credits):

1. All of the following courses (16 credits):

ANTR 350	Human Gross Anatomy and Structural Biology	3
CEM 351	Organic Chemistry I	3
ME 495	Tissue Mechanics	3
MSE 425	Biomaterials and Biocompatibility	3
ZOL 341	Fundamental Genetics	4
2. Two of the following courses (3 credits):

ME 477	Manufacturing Processes	3
MSE 454	Ceramics and Refractory Materials	3
MSE 460	Electronic Structure and Bonding in Materials and Devices	3
MSE 465	Design and Application of Engineering Materials	3
MSE 476	Physical Metallurgy of Ferrous and Aluminum Alloys	3
3. At least 6 credits from a list of approved technical electives 6

Manufacturing Engineering

To gain interdisciplinary skills with business and design engineers for manufacturing projects and earn a Bachelor of Science degree in Materials Science and Engineering with a manufacturing engineering concentration, students must complete requirement 3. a. above and the following (21 credits):

1. All of the following courses (12 credits):

ECE 415	Computer Aided Manufacturing	3
ME 477	Manufacturing Processes	3
ME 478	Product Development	3
MSE 465	Design and Application of Engineering Materials	3
2. Three of the following courses (9 credits):

GBL 323	Introduction to Business Law	3
MSE 426	Introduction to Composite Materials	3
MSE 454	Ceramic and Refractory Materials	3
MSE 476	Physical Metallurgy of Ferrous and Aluminum Alloys	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

To enhance the student's ability to characterize, process, and design with metals in association with mechanical engineers and earn a Bachelor of Science degree in Materials Science and Engineering with a metallurgical engineering concentration, students must complete requirement 3. a. above and the following (21 credits):

1. All of the following courses (18 credits):

ME 423	Intermediate Mechanics of Deformable Solids	3
ME 475	Computer Aided Design of Structures	3
ME 477	Manufacturing Processes	3
MSE 451	Spectroscopic and Diffraction Analysis of Materials	3
MSE 465	Design and Application of Engineering Materials	3
MSE 476	Physical Metallurgy of Ferrous and Aluminum Alloys	3
2. One of the following courses (3 credits):

ME 425	Experimental Mechanics	3
MSE 426	Introduction to Composite Materials	3

Polymeric Engineering

To gain interdisciplinary skills to facilitate interactions with chemical engineers and earn a Bachelor of Science degree in Materials Science and Engineering with a polymeric engineering concentration, students must complete requirement 3. a. above and the following (21 credits):

1. All of the following courses (18 credits):

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
MSE 460	Electronic Structure and Bonding in Materials and Devices	3
2. Complete at least 3 credits in courses selected from a list of approved technical electives available from the Department of Chemical Engineering and Materials Science.

MINOR IN MATERIALS SCIENCE AND ENGINEERING

The Minor in Materials Science and Engineering, which is administered by the Department of Chemical Engineering and Materials Science, provides students with a basic foundation in materials

science that is applicable to many disciplines. The minor also offers opportunities for students to work in industry, research, or government, as well as to prepare for graduate study in materials science.

The minor is available as an elective to students in a bachelor's degree program in the College of Engineering, other than the Bachelor of Science Degree in Materials Science and Engineering. With the approval of the college, the courses that are used to satisfy the minor may also be used to satisfy the requirements for the bachelor's degree. At least 12 unique credits counted towards the requirements for a student's minor must not be used to fulfill the requirements for that student's major.

Students who plan to complete the requirements for the minor must apply to the Department of Chemical Engineering and Materials Science. To be accepted into the minor, the student must be admitted into the College of Engineering. Enrollment for some MSE courses may be limited. Application forms are available at www.chems.msu.edu.

Requirements for the Minor in Materials Science and Engineering

	CREDITS
Complete 18 credits from the following:	
1. Both of the following courses (6 credits):	
MSE 250 Materials Science and Engineering	3
MSE 360 Fundamentals of Microstructural Design	3
2. One of the following courses (3 credits):	
MSE 260 Electronic, Magnetic, Thermal and Optical Properties of Materials	3
MSE 310 Phase Equilibria in Materials	3
MSE 320 Mechanical Properties of Materials	3
MSE 370 Synthesis and Processing of Materials	3
3. Three of the following courses (9 credits):	
MSE 310 Phase Equilibria in Materials	3
MSE 320 Mechanical Properties of Materials	3
MSE 370 Synthesis and Processing of Materials	3
MSE 410 Materials Foundations for Energy Applications	3
MSE 425 Biomaterials and Biocompatibility	3
MSE 451 Spectroscopic and Diffraction Analysis of Materials	3
MSE 454 Ceramic and Refractory Materials	3
MSE 460 Electronic Structure and Bonding in Materials and Devices	3
MSE 465 Design and Application of Engineering Materials	3
MSE 466 Design and Failure Analysis (W)	3
MSE 476 Physical Metallurgy of Ferrous and Aluminum Alloys	3
MSE 477 Manufacturing Processes	3
A course used to fulfill requirement 2. above may not be used to fulfill this requirement.	

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GRADUATE STUDY

The Department of Chemical Engineering and Materials Science offers Master of Science and Doctor of Philosophy degree programs in chemical engineering and in materials science and engineering. A wide range of course offerings and research activities allows an individual program to be designed to fit the background, capabilities, and aims of the student. Studies in the department may be supplemented with courses offered by other departments in the College of Engineering and in other colleges.

The graduate programs in chemical engineering and materials science and engineering are designed to develop research expertise needed for the graduate to serve as a principal investigator in industrial or academic research. Course work is designed to expand the student's knowledge of engineering principles and applications. Each student conducts an extensive research project that significantly advances fundamental understanding of a chemical engineering or materials science system. Results of the research are documented in a thesis, dissertation, and research paper(s) for publication in a peer-reviewed journal.

LINKED BACHELOR'S-MASTER'S DEGREE IN MATERIALS SCIENCE AND ENGINEERING
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Master of Science Degree in Materials Science and Engineering

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