March 7, 2019

To: David Casper  
Chair, Subcommittee on Courses & Continuing, Part-Time, & Summer Session Education

From: Gregory Washington  
The Stacey Nicholas Dean of Engineering

Re: UCI Request to Change the Name and Degree Title of the Materials Science Engineering Undergraduate Program to the Materials Science and Engineering Undergraduate Program

The Department of Materials Science and Engineering requests renaming the undergraduate major in 'Materials Science Engineering' to 'Materials Science and Engineering', effective Fall 2019. The same title change is requested for the minor.

This title is more consistent with the established naming of programs across the country around the world, and matches the title we use for our graduate M.S. and Ph.D. programs. With the formation of the Department, the faculty feel it is appropriate that the originally requested title now be granted to reinforce that the undergraduate and graduate programs form a single, unified discipline.

Please let me know if you need any additional information.

Sincerely,

[Signature]

Gregory Washington

cc: Michelle Aucoin, Senate Analyst, Subcommittee on Courses & Continuing, Part-Time, & Summer Session Education  
Robin Jeffers, Director, Undergraduate Student Affairs, Samueli School of Engineering  
Robert Cassidy, Director, CASA, Samueli School of Engineering  
Priscilla Nguyen, Curriculum Management Specialist, Samueli School of Engineering
January 24, 2019

To: David Casper  
   Chair, Subcommittee on Courses & Continuing, Part-Time, & Summer Session Education

Via: Michael Green  
   Associate Dean for Undergraduate Student Affairs

From: Julie M. Schoenung, Professor and Chair  
   Department of Materials Science and Engineering

Re: B.S. & Minor in Materials Science and Engineering

The Department of Materials Science and Engineering requests renaming the undergraduate major in 'Materials Science Engineering' to 'Materials Science and Engineering', effective Fall 2019. The same title change is requested for the minor. The request for this change has been voted on by the MSE faculty, receiving unanimous support. As Department Chair, I also strongly support this change.

This title is more consistent with the established naming of programs across the country and around the world, and matches the title we use for our graduate M.S. and Ph.D. programs. With the formation of the new Department of Materials Science and Engineering, the time is right to harmonize the program titles, in an effort to reinforce that the undergraduate and graduate programs form a single, unified discipline.

A change in program title will require some additional action with ABET, the program's accrediting body. The program has an accreditation visit in Fall 2019 and is conversing with ABET whether some or all of this action can take place during that visit provided that the new title appear in the 2019-2020 Catalogue.

Student catalogue rights would be respected, with students able to remain in the program until degree completion or given the choice of changing into the new title under the 2019-2020 Catalogue with no restrictions. Students that applied for Fall 2019 would matriculate under the new title.

cc: Michelle Aucoin  
   Senate Analyst, Subcommittee on Courses & Continuing, Part-Time, & Summer Session Education  
   Robin Jeffers, Director, Undergraduate Student Affairs, Samueli School of Engineering  
   Robert Cassidy, Director, CASA, Samueli School of Engineering  
   Priscilla Nguyen, Analyst, Samueli School of Engineering
REQUEST FOR APPROVAL OF NEW OR MODIFIED UNDERGRADUATE DEGREE REQUIREMENTS

School: Samueli School of Engineering
Department: Materials Science and Engineering

B.S. or B.A. in Materials Science and Engineering
Proposed Effective Date: Fall 2019

Minor/Concentration/Specialization/Emphasis in Materials Science and Engineering; Specialization in Biomaterials, Electronics Processing and Materials; Materials and Mechanical Design

State proposed degree requirements. For revision of existing programs, attach a copy of the present degree requirements as well as the proposed requirements with the changes underlined.

1. Renumbering CBEMS course designations in both B.S. and Minor sections throughout the Catalogue and Sample Program
2. Updating CBEMS H199 with ENGR H199 in Specialization in Electronics Processing and Materials and Specialization in Materials and Mechanical Design
3. Updating nominal units due to Chemistry lab unit increase

Rationale, including the effect, if any, on other academic units. (attach additional sheet if necessary)
Attach a statement of agreement from the Department Chair of affected units.

1. Courses for the major were previously housed in the Department of Chemical Engineering and Materials Science under the CBEMS subject designation. With the formation of the new Department of Materials Science and Engineering, courses will renumber under the EngrMSE subject designation in an effort to reinforce that the undergraduate and graduate programs form a single, unified discipline.
2. CBEMS H199 has been deactivated. CHP students take ENGR H199.

Faculty concerned for the purposes of this major

Faculty (see the guidelines for establishing undergraduate majors and minors http://www.senate.uc.edu/4_SenCom/EducPolicy/CEP%20Docs/CEP_Docs_index.html)

Faculty vote: # For 9 # Against 0 # Abstain 0 # Not voting 0

Was there student participation? Yes √ No

APPROVED:

Julie Schpenung, Department Chair
Date 3/8/2019

Michael Green, Associate Dean
Date 3/11/2019

Approved Effective: Fall 2019
Current

Undergraduate Major in Materials Science Engineering

Program Educational Objectives: Graduates of the Materials Science Engineering program will (1) establish a productive Materials Science and Engineering career in industry, government or academia; (2) apply critical reasoning and the requisite analytical/quantitative skills in seeking solutions to materials science and engineering problems; (3) promote innovation in materials development and design through effective leadership, skilled communications, and multidisciplinary teamwork; (4) exhibit a commitment to engineering ethics, environmental stewardship, continued learning, and professional development.

(Program educational objectives are those aspects of engineering that help shape the curriculum; achievement of these objectives is a shared responsibility between the student and UCI.)

Since the beginning of history, materials have played a crucial role in the growth, prosperity, security, and quality of human life. In fact, materials have been so intimately related to the emergence of human culture and civilization that anthropologists and historians have identified early cultures by the name of the significant materials dominating those cultures. These include the stone, bronze, and iron ages of the past. At the present time, the scope of materials science and engineering has become very diverse; it is no longer confined to topics related to metals and alloys but includes those relevant to ceramics, composites, polymers, biomaterials, nanostructures, intelligent materials, and electronic devices. In addition, present activities in materials science and engineering cover not only areas whose utility can be identified today, but also areas whose utility may be unforeseen. The services of materials scientists and engineers are required in a variety of engineering operations dealing, for example, with emerging energy systems, design of semiconductors and optoelectronic and nano devices, development of new technologies based on composites and high-temperature super-conductivity, biomedical products, performance (e.g., quality, reliability, safety, energy efficiency) in automobile and aircraft components, improvement in nondestructive testing techniques, corrosion behavior in refineries, radiation damage in nuclear power plants, and fabrication of advanced materials.

The undergraduate major in Material Science Engineering (MSE) provides students with a thorough knowledge of basic engineering and scientific principles. The undergraduate curriculum in MSE includes (a) a core of Chemistry, Physics, and Mathematics; (b) basic Engineering courses; (c) Materials and Engineering core; and (d) technical courses in Materials Science, Engineering, and Sciences.

Because of the interdisciplinary nature of MSE and its intimate relations with other Engineering disciplines (Aerospace, Biomedical, Chemical, Civil, Computer, Electrical, Environmental, and Mechanical Engineering), qualified students will be able to satisfy in a straightforward manner the degree requirements of their Engineering major and the MSE major.

Admissions

High School Students: See School Admissions information.

Transfer Students: Preference will be given to junior-level applicants with the highest grades overall, and who have satisfactorily completed the following required courses: two years of approved calculus, one year of calculus-based physics with laboratories (mechanics, electricity and magnetism), completion of lower-division writing, one year of general chemistry (with laboratory), statics, Materials Science Engineering, and one course in introductory programming. For course equivalency specific to each college, visit assist.org.

Students are encouraged to complete as many of the lower-division degree requirements as possible prior to transfer. Students who enroll at UCI in need of completing lower-division coursework may find that it will take longer than two years to complete their degrees. For further information, contact The Henry Samueli School of Engineering at 949-824-4334.
Requirements for the B.S. in Materials Science Engineering

All students must meet the University Requirements.
All students must meet the School Requirements.

Major Requirements
Mathematics and Basic Science Courses:
Core Courses:
- ENGR 1A: General Chemistry for Engineers
- or CHEM 1A: General Chemistry
- CHEM 1B-1C: General Chemistry and General Chemistry
- CHEM 1LC: General Chemistry Laboratory
- MATH 2A-2B: Single-Variable Calculus and Single-Variable Calculus
- MATH 2D: Multivariable Calculus
- MATH 3A: Introduction to Linear Algebra
- MATH 3D: Elementary Differential Equations
- MATH 2E: Multivariable Calculus
- PHYSICS 7C-7LC: Classical Physics and Classical Physics Laboratory
- PHYSICS 7D-7E: Classical Physics and Classical Physics
- PHYSICS 7LD: Classical Physics Laboratory

Basic Engineering or Science Elective Courses:
Select four (4) units from the following:
- BIO SCI 93: From DNA to Organisms
- BME 50A: Cell and Molecular Engineering
- CHEM 51A: Organic Chemistry
- EECS 70B: Network Analysis II
- ENGR 7A-7B: Introduction to Engineering I and Introduction to Engineering II
- ENGRCEE 20: Introduction to Computational Problem Solving
- ENGRMAE 52: Computer-Aided Design
- ENGRMAE 80: Dynamics
- or ENGRCEE 80: Dynamics
- PHYSICS 51A: Modern Physics
- STATS 7: Basic Statistics

Engineering Topics Courses:
Students must complete a minimum of 22 units of engineering design.
Core Courses:
- CBEMS 65A: Thermodynamics of Materials
- or ENGRMAE 91: Introduction to Thermodynamics
- CBEMS 65B: Diffusion in Materials
- or CBEMS 125B-CBEMS 125C
- or ENGRMAE 120
- CBEMS 154: Polymer Science and Engineering
CBEMS 155  Mechanical Behavior and Design Principles
CBEMS 155L  Mechanical Behavior Laboratory
CBEMS 160  Advanced Lab in Synthesis of Materials
CBEMS 164  X-ray Diffraction, Electron Microscopy, and Microanalysis
CBEMS 164L  X-ray Diffraction, Electron Microscopy, and Microanalysis Lab
CBEMS 165  Materials Kinetics and Phase Transformations
CBEMS 169  Electronic and Optical Properties in Materials
CBEMS 175  Design Failure Investigation
          Senior Design Project I
          and Senior Design Project II
          and Senior Design Project III
CBEMS 189A-189B-189C  Network Analysis I
          Electric Circuits
         or ENGRMAE 60  Principles of Materials Science and Engineering
         ENGR 54  Mechanics of Structures
         ENGRMAE 10  Introduction to Engineering Computations
         ENGRMAE 30  Statics
         or ENGR 30  Statics
         or ENGRCEE 30  Statics
         ENGRMAE 150L  Mechanics of Structures Laboratory

Engineering Electives:
Students must complete a minimum of five courses from:
BME 50A  Cell and Molecular Engineering
BME 110A-110B  Biomechanics I
               and Biomechanics II
BME 111  Design of Biomaterials
BME 120  Sensory Motor Systems
CBEMS 110  Reaction Kinetics and Reactor Design
CBEMS 130  Separation Processes
CBEMS 141  Nano-Scale Materials and Applications
CBEMS 158  Ceramic Materials
CBEMS 163  Computer Techniques in Experimental Research
CBEMS 174  Semiconductor Device Packaging
CBEMS 176  Surface and Adhesion Science
CBEMS 191  Materials Outreach
CBEMS 199  Individual Study
EECS 70B  Network Analysis II
EECS 170B  Electronics II
EECS 174  Semiconductor Devices
EECS 176  Fundamentals of Solid-State Electronics and Materials
EECS 180A  Engineering Electromagnetics I
ENGR 165  Advanced Manufacturing
ENGRMAE 106  Mechanical Systems Laboratory
ENGRMAE 145  Theory of Machines and Mechanisms
ENGRMAE 147  Vibrations
ENGRMAE 151  Mechanical Engineering Design
ENGRMAE 152 Introduction to Computer-Aided Engineering
ENGRMAE 155 Composite Materials and Structures
ENGRMAE 157 Lightweight Structures
ENGRMAE 170 Introduction to Control Systems

Students select, with the approval of a faculty advisor, any additional engineering topics courses needed to satisfy school and department requirements.

**Engineering Professional Topics Course:**
ENGR 190W Communications in the Professional World
(The nominal Materials Science Engineering program will require 183 units of courses to satisfy all university and major requirements. Because each student comes to UCI with a different level of preparation, the actual number of units will vary. Dual engineering majors are reminded that they are required to satisfy all requirements of both majors individually. Students should not assume that courses for one, such as senior design, will satisfy the requirements of the other, without prior approval.)

1 ENGR 7A-ENGR 7B is available only to lower-division students. Both ENGR 7A-ENGR 7B must be taken to be counted as a Basic Engineering or Science Elective course.

Students majoring in MSE may elect, with approval of their faculty advisor, to use available engineering electives to complete one of the following specializations.

**Specialization in Biomaterials:**
Requires a minimum of 14 units from:
BME 50A Cell and Molecular Engineering
BME 110A-110B Biomechanics I and Biomechanics II
BME 111 Design of Biomaterials
BME 120 Sensory Motor Systems
CBEMS 154 Polymer Science and Engineering
CBEMS 199 Individual Study

**Specialization in Electronics Processing and Materials:**
Requires a minimum of 14 units from:
CBEMS 174 Semiconductor Device Packaging
CBEMS 199 Individual Study (up to 3 units; or CBEMS H199, up to 3 units)
EECS 70B Network Analysis II
EECS 170LA Electronics I Laboratory
EECS 174 Semiconductor Devices
ENGR 165 Advanced Manufacturing

**Specialization in Materials and Mechanical Design:**
Requires a minimum of 14 units from:
CBEMS 199 Individual Study (up to 3 units; or CBEMS H199, up to 3 units)
ENGRMAE 106 Mechanical Systems Laboratory
ENGRMAE 145 Theory of Machines and Mechanisms
ENGRMAE 147 Vibrations
ENGRMAE 151 Mechanical Engineering Design
ENGRMAE 152 Introduction to Computer-Aided Engineering
ENGRMAE 155 Composite Materials and Structures
Planning a Program of Study

A sample program of study chart for the major in Materials Science Engineering is available in the Undergraduate Student Affairs Office. Students should keep in mind that this program is based upon a sequence of prerequisites, beginning with adequate preparation in high school mathematics, physics, and chemistry. Students who are not adequately prepared, or who wish to make changes in the sequence for other reasons, must have their program approved by their faculty advisor. Materials Science Engineering majors must consult at least once every year with the academic counselors in the Undergraduate Student Affairs Office and with their faculty advisors.

Sample Program of Study — Materials Science Engineering

**Freshman**

<table>
<thead>
<tr>
<th>Fall</th>
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<tr>
<td>MATH 2A</td>
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<td>ENGR 1A</td>
<td>CHEM 1B</td>
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<td>ENGRMAE 10</td>
<td>PHYSICS 7C</td>
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<td>General Education</td>
<td>PHYSICS 7LC</td>
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<td>General Education</td>
<td>PHYSICS 7LD</td>
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**Sophomore**

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<td>ENGR 30</td>
<td>CBEMS 65A</td>
<td>EECS 70A</td>
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<td>ENGR 54</td>
<td>General Education</td>
<td>CBEMS 65B</td>
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<td>PHYSICS 7E</td>
<td>General Education</td>
<td>Basic Engineering/Science Elective</td>
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**Junior**

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<td>ENGR 150</td>
<td>CBEMS 155L</td>
<td>Engineering Elective</td>
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<td>ENGRMAE 150L</td>
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<td>Engineering Elective</td>
<td>CBEMS 164L</td>
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**Senior**

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<td>CBEMS 154</td>
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<td>CBEMS 189A</td>
<td>CBEMS 189B</td>
<td>CBEMS 189C</td>
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<tr>
<td>ENGR 190W</td>
<td>Engineering Elective</td>
<td>Engineering Elective</td>
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<td>General Education</td>
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Minor in Materials Science Engineering

The interdisciplinary field of materials science and engineering has become critical to many emerging areas of advanced technology and their applications. As a result, there are needs and opportunities for engineers and scientists with education and training in materials science and engineering. The goal of the minor in Materials Science Engineering (MSE) is to provide students at UCI with such education and training that will enable them, upon graduation, to not only participate in projects or programs of an interdisciplinary nature but also address challenging societal needs and complex technological advances.

Admission

Admission in the MSE minor requires a minimum 2.5 overall UCI GPA. Students are required to complete all prerequisites for required courses and selected electives. In particular, students need to complete the following courses before applying:

- CHEM 1A General Chemistry
- CHEM 1LE Accelerated General Chemistry Lab
- MATH 2D Multivariable Calculus
- MATH 2E Multivariable Calculus
- MATH 3A Introduction to Linear Algebra
- MATH 3D Elementary Differential Equations
- PHYSICS 7C Classical Physics
- PHYSICS 7LC Classical Physics Laboratory
- PHYSICS 7D Classical Physics
- PHYSICS 7LD Classical Physics Laboratory

Requirements for the Minor in Materials Science Engineering

The minor in Materials Science Engineering requires a total of seven courses—five required courses and two electives:

Required courses:
- CBEMS 155 Mechanical Behavior and Design Principles
- ENGR 54 Principles of Materials Science and Engineering

Select three of the following:
- CBEMS 165 Materials Kinetics and Phase Transformations
- CBEMS 169 Electronic and Optical Properties in Materials
- CBEMS 175 Design Failure Investigation
- CBEMS 199 Individual Study (contingent upon the availability of research positions in the Materials Science Engineering faculty’s research groups)

Electives:

Select two of the following:
- BME 110A-110B Biomechanics I and Biomechanics II
- BME 111 Design of Biomaterials
- BME 120 Sensory Motor Systems
- CBEMS 141 Nano-Scale Materials and Applications
- CBEMS 154 Polymer Science and Engineering
- CBEMS 158 Ceramic Materials
- CBEMS 163 Computer Techniques in Experimental Research
For students who plan to pursue a graduate degree in MSE, it is highly recommended that they take CBEMS 165 in addition to two of the following courses: CBEMS 169, CBEMS 175, or CBEMS 199.
Proposed

Undergraduate Major in Materials Science and Engineering

Program Educational Objectives: Graduates of the Materials Science and Engineering program will (1) establish a productive Materials Science and Engineering career in industry, government or academia; (2) apply critical reasoning and the requisite analytical/quantitative skills in seeking solutions to materials science and engineering problems; (3) promote innovation in materials discovery, development and design through effective leadership, skilled communications, and multidisciplinary teamwork; (4) exhibit a commitment to engineering ethics, environmental stewardship, continued learning, and professional development.

(Program educational objectives are those aspects of engineering that help shape the curriculum; achievement of these objectives is a shared responsibility between the student and UCI.)

Since the beginning of history, materials have played a crucial role in the growth, prosperity, security, and quality of human life. In fact, materials have been so intimately related to the emergence of human culture and civilization that anthropologists and historians have identified early cultures by the name of the significant materials dominating those cultures. These include the stone, bronze, and iron ages of the past. At the present time, the scope of materials science and engineering has become very diverse; it is no longer confined to topics related to metals and alloys but includes those relevant to ceramics, composites, polymers, biomaterials, nanostructures, intelligent materials, and electronic devices. In addition, present activities in materials science and engineering cover not only areas whose utility can be identified today, but also areas whose utility may be unforeseen. The services of materials scientists and engineers are required in a variety of engineering operations dealing, for example, with emerging energy systems, design of semiconductors and optoelectronic and nano devices, development of new technologies based on composites and high-temperature super-conductivity, biomedical products, performance (e.g., quality, reliability, safety, energy efficiency) in automobile and aircraft components, improvement in nondestructive testing techniques, corrosion behavior in refineries, radiation damage in nuclear power plants, and fabrication of advanced materials.

The undergraduate major in Material Science and Engineering (MSE) provides students with a thorough knowledge of basic engineering and scientific principles. The undergraduate curriculum in MSE includes (a) a core of Chemistry, Physics, and Mathematics; (b) basic Engineering courses; (c) Materials and Engineering core; and (d) technical courses in Materials Science, Engineering, and Sciences.

Because of the interdisciplinary nature of MSE and its intimate relations with other Engineering disciplines (Aerospace, Biomedical, Chemical, Civil, Computer, Electrical, Environmental, and Mechanical Engineering), qualified students will be able to satisfy in a straightforward manner the degree requirements of their Engineering major and the MSE major.

Admissions

High School Students: See School Admissions information.

Transfer Students: Preference will be given to junior-level applicants with the highest grades overall, and who have satisfactorily completed the following required courses: two years of approved calculus, one year of calculus-based physics with laboratories (mechanics, electricity and magnetism), completion of lower-division writing, one year of general chemistry (with laboratory), statics, an introductory Materials Science and Engineering, and one course in introductory programming. For course equivalency specific to each college, visit assist.org.

Students are encouraged to complete as many of the lower-division degree requirements as possible prior to transfer. Students who enroll at UCI in need of completing lower-division coursework may find that it will take longer than two years to complete their degrees. For further information, contact The Henry Samueli School of Engineering at 949-824-4334.
Requirements for the B.S. in Materials Science and Engineering

All students must meet the University Requirements.
All students must meet the School Requirements.

Major Requirements
Mathematics and Basic Science Courses:

Core Courses:

- ENGR 1A: General Chemistry for Engineers
- or CHEM 1A: General Chemistry
- CHEM 1B- 1C: General Chemistry and General Chemistry
- CHEM 1LC: General Chemistry Laboratory
- MATH 2A- 2B: Single-Variable Calculus and Single-Variable Calculus
- MATH 2D: Multivariable Calculus
- MATH 3A: Introduction to Linear Algebra
- MATH 3D: Elementary Differential Equations
- MATH 2E: Multivariable Calculus
- PHYSICS 7C- 7LC: Classical Physics and Classical Physics Laboratory
- PHYSICS 7D- 7E: Classical Physics and Classical Physics
- PHYSICS 7LD: Classical Physics Laboratory

Basic Engineering or Science Elective Courses:
Select four (4) units from the following:

- BIO SCI 93: From DNA to Organisms
- BME 50A: Cell and Molecular Engineering
- CHEM 51A: Organic Chemistry
- EECS 70B: Network Analysis II
- ENGR 7A- 7B: Introduction to Engineering I and Introduction to Engineering II
- ENGRCEE 20: Introduction to Computational Problem Solving
- ENGRMAE 52: Computer-Aided Design
- ENGRMAE 80: Dynamics
- or ENGRCEE 80: Dynamics
- PHYSICS 51A: Modern Physics
- STATS 7: Basic Statistics

Engineering Topics Courses:
Students must complete a minimum of 22 units of engineering design.

Core Courses:

- ENGRMSE 65A CBEMS 65A: Thermodynamics of Materials
- or ENGRMAE 91: Introduction to Thermodynamics
- ENGRMSE 65B CBEMS 65B: Diffusion in Materials
- or CBE 120B-CBE 120C
- or CBEMS 125B-CBEMS 125C
- or ENGRMAE 120
ENGR MSE 154 CBEMS 154  
Polymer Science and Engineering
ENGR MSE 155 CBEMS 155  
Mechanical Behavior and Design Principles
ENGR MSE 155L CBEMS 155L  
Mechanical Behavior Laboratory
ENGR MSE 160 CBEMS 160  
Advanced Lab in Synthesis of Materials
ENGR MSE 164 CBEMS 164  
X-ray Diffraction, Electron Microscopy, and Microanalysis
ENGR MSE 164L CBEMS 164L  
X-ray Diffraction, Electron Microscopy, and Microanalysis Lab
ENGR MSE 165 CBEMS 165  
Materials Kinetics and Phase Transformations
ENGR MSE 169 CBEMS 169  
Electronic and Optical Properties in Materials
ENGR MSE 175 CBEMS 175  
Design Failure Investigation
ENGR MSE 189A-189B-189C  
Senior Design Project I  
and Senior Design Project II  
and Senior Design Project III
EECS 70A  
or ENGRMAE 60  
Network Analysis I
or ENGR 54  
Electric Circuits
ENGR 150  
Principles of Materials Science and Engineering
ENGR 150  
Mechanics of Structures
ENGRMAE 10  
Introduction to Engineering Computations
ENGRMAE 30  
Statics
or ENGR 30  
Statics
or ENGRCEE 30  
Statics
ENGRMAE 150L  
Mechanics of Structures Laboratory

**Engineering Electives:**
Students must complete a minimum of five courses from:
BME 50A  
Cell and Molecular Engineering
BME 110A-110B  
Biomechanics I  
and Biomechanics II
BME 111  
Design of Biomaterials
BME 120  
Sensory Motor Systems
CBE 110 CBEMS 110  
Reaction Kinetics and Reactor Design
CBE 130 CBEMS 130  
Separation Processes
ENGR MSE 141 CBEMS 141  
Nano-Scale Materials and Applications
ENGR MSE 158 CBEMS 158  
Ceramic Materials for Sustainable Energy
ENGR MSE 163 CBEMS 163  
Computer Techniques in Experimental Research
CBE 187 CBEMS 174  
Semiconductor Device Packaging
ENGR MSE 176 CBEMS 176  
Surface and Adhesion Science
ENGR MSE 191 CBEMS 191  
Materials Outreach
ENGR MSE 199 CBEMS 199  
Individual Study
EECS 70B  
Network Analysis II
EECS 170LA  
Electronics I Laboratory
EECS 170B  
Electronics II
EECS 174  
Semiconductor Devices
EECS 176  
Fundamentals of Solid-State Electronics and Materials
EECS 180A  
Engineering Electromagnetics I
ENGR 165  
Advanced Manufacturing
ENGRMAE 106  
Mechanical Systems Laboratory
ENGRMAE 145  
Theory of Machines and Mechanisms
Students select, with the approval of a faculty advisor, any additional engineering topics courses needed to satisfy school and department requirements.

**Engineering Professional Topics Course:**

**ENGR 190W**  Communications in the Professional World

(The nominal Materials Science and Engineering program will require 184 units of courses to satisfy all university and major requirements. Because each student comes to UCI with a different level of preparation, the actual number of units will vary. Dual engineering majors are reminded that they are required to satisfy all requirements of both majors individually. Students should not assume that courses for one, such as senior design, will satisfy the requirements of the other, without prior approval.)

1 ENGR 7A-ENGR 7B is available only to lower-division students. Both ENGR 7A-ENGR 7B must be taken to be counted as a Basic Engineering or Science Elective course.

Students majoring in MSE may elect, with approval of their faculty advisor, to use available engineering electives to complete one of the following specializations.

**Specialization in Biomaterials:**

Requires a minimum of 14 units from:

- BME 50A  Cell and Molecular Engineering
- BME 110A-110B  Biomechanics I and Biomechanics II
- BME 111  Design of Biomaterials
- BME 120  Sensory Motor Systems
- ENGRMSE 154 CBEMS 454  Polymer Science and Engineering
- ENGRMSE 199 CBEMS 199  Individual Study

**Specialization in Electronics Processing and Materials:**

Requires a minimum of 14 units from:

- CBE 187 CBEMS 174  Semiconductor Device Packaging
- ENGRMSE 199 CBEMS 199  Individual Study (up to 3 units; or ENGR H199 CBEMS H199, up to 3 units)
- EECS 70B  Network Analysis II
- EECS 170LA  Electronics I Laboratory
- EECS 174  Semiconductor Devices
- ENGR 165  Advanced Manufacturing

**Specialization in Materials and Mechanical Design:**

Requires a minimum of 14 units from:

- ENGRMSE 199 CBEMS 199  Individual Study (up to 3 units; or ENGR H199 CBEMS H199, up to 3 units)
- ENGRMAE 106  Mechanical Systems Laboratory
- ENGRMAE 145  Theory of Machines and Mechanisms
- ENGRMAE 147  Vibrations
Planning a Program of Study

A sample program of study chart for the major in Materials Science and Engineering is available in the Undergraduate Student Affairs Office. Students should keep in mind that this program is based upon a sequence of prerequisites, beginning with adequate preparation in high school mathematics, physics, and chemistry. Students who are not adequately prepared, or who wish to make changes in the sequence for other reasons, must have their program approved by their faculty advisor. Materials Science and Engineering majors must consult at least once every year with the academic counselors in the Undergraduate Student Affairs Office and with their faculty advisors.

Sample Program of Study — Materials Science and Engineering

**Freshman**

**Fall**
- MATH 2A
- ENGR 1A
- ENGRMAE 10
- General Education

**Winter**
- MATH 2B
- CHEM 1B
- PHYSICS 7C
- PHYSICS 7LC
- General Education

**Spring**
- MATH 2D
- CHEM 1C
- CHEM 1LC
- PHYSICS 7D
- PHYSICS 7LD

**Sophomore**

**Fall**
- MATH 3A
- ENGR 30
- ENGR 54
- PHYSICS 7E

**Winter**
- MATH 3D
- ENGRMSE 65A CBEMS 65A
- General Education

**Spring**
- MATH 2E
- EECS 70A
- ENGRMSE 65B CBEMS 65B
- Basic Engineering/Science Elective

**Junior**

**Fall**
- ENGRMSE 165 CBEMS-165
- ENGR 150
- ENGRMAE 150L
- Engineering Elective

**Winter**
- ENGRMSE 155 CBEMS-155
- ENGRMSE 155L CBEMS-155L
- ENGRMSE 164 CBEMS-164
- ENGRMSE 164L CBEMS-164L
- General Education

**Spring**
- ENGRMSE 175 CBEMS-175
- Engineering Elective
- Engineering Elective
- General Education

**Senior**

**Fall**
- ENGRMSE 154 CBEMS-154
- ENGRMSE 189A CBEMS-189A
- ENGR 190W
- General Education

**Winter**
- ENGRMSE 169 CBEMS-169
- ENGRMSE 189B CBEMS-189B
- Engineering Elective
- General Education

**Spring**
- ENGRMSE 160 CBEMS-160
- ENGRMSE 189C CBEMS-189C
- Engineering Elective
- General Education
## UNIT COUNT

Sample Program of Study — Materials Science and Engineering

### Freshman

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### Senior

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**TOTAL: 483 184**
Minor in Materials Science and Engineering

The interdisciplinary field of materials science and engineering has become critical to many emerging areas of advanced technology and their applications. As a result, there are needs and opportunities for engineers and scientists with education and training in materials science and engineering. The goal of the minor in Materials Science and Engineering (MSE) is to provide students at UCI with such education and training that will enable them, upon graduation, to not only participate in projects or programs of an interdisciplinary nature but also address challenging societal needs and complex technological advances.

Admission

Admission in the MSE minor requires a minimum 2.5 overall UCI GPA. Students are required to complete all prerequisites for required courses and selected electives. In particular, students need to complete the following courses before applying:

- CHEM 1A General Chemistry
- CHEM 1LE Accelerated General Chemistry Lab
- MATH 2D Multivariable Calculus
- MATH 2E Multivariable Calculus
- MATH 3A Introduction to Linear Algebra
- MATH 3D Elementary Differential Equations
- PHYSICS 7C Classical Physics
- PHYSICS 7LC Classical Physics Laboratory
- PHYSICS 7D Classical Physics
- PHYSICS 7LD Classical Physics Laboratory

Requirements for the Minor in Materials Science and Engineering

The minor in Materials Science and Engineering requires a total of seven courses—five required courses and two electives:

Required courses:

- ENGRMSE 155 CBEMS 155 Mechanical Behavior and Design Principles
- ENGR 54 Principles of Materials Science and Engineering
- Select three of the following:
  - ENGRMSE 165 CBEMS 165 Materials Kinetics and Phase Transformations
  - ENGRMSE 169 CBEMS 169 Electronic and Optical Properties in Materials
  - ENGRMSE 175 CBEMS 175 Design Failure Investigation
  - ENGRMSE 199 CBEMS 199 Individual Study (contingent upon the availability of research positions in the Materials Science Engineering faculty’s research groups)

Electives:

Select two of the following:

- BME 110A- 110B Biomechanics I and Biomechanics II
- BME 111 Design of Biomaterials
- BME 120 Sensory Motor Systems
- ENGRMSE 141 CBEMS 141 Nano-Scale Materials and Applications
- ENGRMSE 154 CBEMS 154 Polymer Science and Engineering
- ENGRMSE 158 CBEMS 158 Ceramic Materials for Sustainable Energy
- ENGRMSE 163 CBEMS 163 Computer Techniques in Experimental Research
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<td>CHEM 225</td>
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<td>EECS 170A- 170B</td>
<td>Electronics I and Electronics II</td>
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<tr>
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<td>Mechanics of Structures</td>
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<td>Introduction to Condensed Matter Physics</td>
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<td>Plasma Physics</td>
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1 For students who plan to pursue a graduate degree in MSE, it is highly recommended that they take ENGRMSE 165 CBEMS-165 in addition to two of the following courses: ENGRMSE 169, ENGRMSE 175, or ENGRMSE 199, CBEMS 169, CBEMS 175, or CBEMS 199.