

DOCUMENTS OF THE GENERAL FACULTY

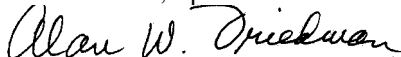
PROPOSAL TO CREATE MATERIAL SCIENCE AND ENGINEERING MINOR IN THE COCKRELL SCHOOL OF ENGINEERING CHAPTER IN THE *UNDERGRADUATE CATALOG 2018-2020*

Dean Sharol L. Woods, in the Cockrell School of Engineering, has filed with the Secretary of the Faculty Council the following proposal to create a Material Science and Engineering minor in the Cockrell School of Engineering chapter in the *Undergraduate Catalog, 2018-2020*. On July 31, 2017, the Minor Faculty Committee approved the proposal; it was approved by the Mechanical Engineering (ME) Faculty on August 28, 2017; by the Degrees and Courses Committee on August 31, 2017, and by the Cockrell School of Engineering (CSE) Faculty and Dean Woods on September 18, 2017. The Secretary has classified this proposal as legislation of general interest to more than one college or school.

The Committee on Undergraduate Degree Program Review recommended approval of the proposal on March 7, 2018, and forwarded it to the Office of the General Faculty. The Faculty Council has the authority to approve this legislation on behalf of the General Faculty. The authority to grant final approval on this legislation resides with the Provost on behalf of the President.

If no objection is filed with the Office of the General Faculty by the date specified below, the legislation will be held to have been approved by the Faculty Council. If an objection is filed within the prescribed period, the legislation will be presented to the Faculty Council at its next meeting. The objection, with reasons, must be signed by a member of the Faculty Council.

To be counted, a protest must be received in the Office of the General Faculty by April 3, 2018.



Alan W. Friedman, Secretary of the General Faculty and Faculty Council
The University of Texas at Austin

Arthur J. Thaman and Wilhelmina Doré Thaman Professor of English and Comparative Literature

**PROPOSAL TO CREATE MATERIAL SCIENCE AND ENGINEERING MINOR IN THE
COCKRELL SCHOOL OF ENGINEERING CHAPTER IN THE *UNDERGRADUATE CATALOG 2018-
2020***

- 1. TYPE OF PROPOSAL:** New Transcript-Recognized Minor
 Change an Existing Transcript-Recognized Minor
 Delete a Transcript-Recognized Minor
- 2. THIS PROPOSAL INVOLVES*:** **(Please check all that apply)**
- | | | |
|---|--|---|
| <input checked="" type="checkbox"/> Courses in other colleges | <input type="checkbox"/> Courses in proposer's college that are frequently taken by students in other colleges | <input type="checkbox"/> Flags |
| <input type="checkbox"/> Course in the core curriculum | <input type="checkbox"/> Change in course sequencing for an existing program | <input type="checkbox"/> Courses that have to be added to the inventory |
| <input checked="" type="checkbox"/> Change in admission requirements (external or internal) | <input type="checkbox"/> Requirements not explicit in the catalog language (e.g., lists of acceptable courses maintained by department office) | |
- 3. SCOPE OF PROPOSED CHANGE:**
- a. Does this proposal impact other colleges/schools? Yes No
If yes, then how?
Students from the College of Natural Science with majors in chemistry (CH) and physics (PHY) will be eligible to receive a minor in Engineering. There will likely be a small increase in the number of students from the College of Natural Sciences taking courses in the Cockrell School of Engineering, but we expect that this will offset by a similarly small increase in the number of students from the Cockrell School of Engineering (CSE) who are taking courses in the College of Natural Sciences (CNS).
- b. Do you anticipate a net change in the number of students in your college? Yes No
If yes, how many more (or fewer) students do you expect?
- c. Do you anticipate a net increase (or decrease) in the number of students from outside of your college taking classes in your college? Yes No
If yes, please indicate the number of students and/or class seats involved.
- d. Do you anticipate a net increase (or decrease) in the number of students from your college taking courses in other colleges? Yes No
If yes, please indicate the number of students and/or class seats involved.

If 3 a, b, c, or d was answered with yes, please answer the following questions. If the proposal has potential budgetary impacts for another college/school, such as requiring new sections or a non-negligible increase in the number of seats offered, at least one contact must be at the college-level.

How many students do you expect to be impacted?

Impacted schools must be contacted and their response(s) included:

Person communicated with: David Vandebout

Date of communication: September 1, 2017

Response: Dr. Vandebout wanted to ensure that CNS staff would not be handling advising for the minor. It was confirmed that this would not be the case. CSE will do all the advising.

Person communicated with: Jack Ritchie, PHY Department Chair

Date of communication: November 7, 2017

Response: "With regards the proposed Engineering Minor in Materials Science, as Chair of the Physics Department, I approve of the proposal. I think it will be valuable and popular among students at UT Austin. Greg Sitz has kept me apprised of the progress of the proposal, and I can state that the Department has the seat capacity for the relevant physics courses. Any change in load is unlikely to have an adverse impact on our program."

Person communicated with: Dr. Graeme Henkelman/Dr. Simon Humphrey, CH

Date of communication: November 10, 2017

Response: Dr. Henkelman participated on the steering committee to form the minor and was instrumental in selecting the courses for the Chemistry majors. Dr. Humphrey plans to bring up the subject of the minor in the next departmental Course and Curriculum Committee meeting.

4. OFFICIAL NAME: Materials Science and Engineering Minor

5. PROPOSED IMPLEMENTATION DATE: Fall 2018

6. FIELD OF STUDY, CIP CODE (administrative unit awarding the certificate):
Materials Engineering 14.1801

7. STATEMENT OF OBJECTIVE: The proposed Materials Science and Engineering (MS&E) minor is intended for students who wish to develop proficiencies in the interdisciplinary field of Materials Science and Engineering while pursuing a major in a related field. It is anticipated that the minor will prepare students for fields that cross traditional disciplinary boundaries and/or those who wish to prepare themselves for graduate school in Materials Science and Engineering or a related discipline.

The material science and engineering (MSE) minor will initially be available to students from two colleges (Natural Sciences and the Cockrell School of Engineering) from four majors (chemistry, physics, electrical engineering and mechanical engineering). The MSE minor may be extended to students in other majors and colleges at a later date. The current majors were chosen because they:

1. Offer clear areas of synergy and overlap with MSE, so that required courses in the major will adequately prepare students for courses in the MSE minor
2. There are well-defined areas within the major discipline where Materials Science and Engineering concepts can be applied
3. There are potential advantages for students seeking employment who have a recognized minor in the discipline
4. The major can accommodate a MSE minor without extending time to graduation

8. ADMISSIONS REQUIREMENT (IF ANY):

- The minor must be completed in conjunction with an undergraduate degree in one of the four supported majors—chemistry, physics, electrical engineering, and mechanical engineering
- Students must have completed Mathematics 408C, Mathematics 408D, Mathematics 427J, Chemistry 301, Physics 303K and Physics 303L, or equivalent and all with a grade of C- or higher
- Students must have completed thirty hours or more and have not taken more than sixty hours and will be encouraged to apply online at the earliest possible date; deadlines will be March 1 for fall or summer and October 1 for spring.
- Applicants will be reviewed by the MSE faculty advisor and decisions will be made in time for fall and spring admissions.

9. NUMBER OF STUDENTS EXPECTED TO RECEIVE THE TRANSCRIPT-RECOGNIZED MINOR EACH SEMESTER: Twenty

10 ANTICIPATED ENROLLMENT CAPACITY? 100

11. NUMBER OF HOURS REQUIRED FOR COMPLETION: Fifteen

12. COMPOSITION OF THE MINOR FACULTY COMMITTEE (INCLUDING THE COMMITTEE CHAIR):

Name of Faculty Member	College/Department	Title at UT Austin	Highest Degree and Awarding Institution

Desiderio Kovar (Chair)	CSE/Mechanical Eng.	Professor	Ph.D., UC Berkeley
Graeme Henkelman	CNS/Chemistry	Professor	Ph.D., Univ. of Washington
Gregory Sitz Edward Yu	CNS/Physics CSE/Electrical & Computer Eng.	Professor Professor	Ph.D., Stanford Ph.D., Cal. Tech
Brian Korgel	CSE/Chem. Eng.	Professor	Ph.D., UCLA
Nathaniel Lynd	CSE/Chem. Eng.	Assistant Prof.	Ph.D., Univ. of Minnesota
J. Eric Bickel	CSE/Mechanical Eng.	Associate Prof.	Ph.D., Stanford
Ananth Dodabalapur	CSE/Electrical & Computer Eng.	Professor	Ph.D., UT Austin
John Markert	CNS/ Physics	Professor	Ph.D., Cornell
Cynthia Wilson (<i>ex officio</i>)	CSE/Dean's Office	Director of Academic Projects	Ph.D., UT Austin

13. Academic Course Requirements: Use this table to identify the courses that qualify for this certificate program.

Academic course requirement for the MSE minor are specific to each major. See below for each major.

Chemistry Majors

	Topic	Counts for
1. ES 360M Experiments in MS&E	Relationships between atomic structure, microstructure and properties; characterization techniques	CSE Elective #1
2. Ch 353 Thermodynamics	Classical Thermodynamics	Already required for Ch
PHY 355 Modern Physics for Engineers	Introd. to modern physics	General Elective
4. CHE 355: Introduction to Polymers	Polymers	CSE Elective #2
5. ME 349 Corrosion	Corrosion	CSE Elective #3
6. Optional Electives: <ul style="list-style-type: none"> • ChE 323, Chemical Engineering for Micro- and Nanofabrication • ChE 355, Introduction to Polymers • Ch 367L, Materials Chemistry • Ch 367L, Macromolecular Chemistry • EE 334K Quantum Theory of Engineering Materials • ME 336 Materials Processing • ME 359 Materials Selection 	Open	Tech. Option Elective #4

<ul style="list-style-type: none"> • PHY 375S Intro. To Solid State Physics • PHY 369 Thermodynamics and Statistical Mechanics • PHY 345 Biophysics 		
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Physics Majors

	Topic	Counts for
1. ES 360M Experiments in MS&E	Relationships between atomic structure, microstructure and properties; characterization techniques	General Elective
2. PHY 369 Thermodynamics and Statistical Mechanics	Thermodynamics	Already required for PHY
3. EE 325 Electromagnetic Engineering	E&M	General Elective
4. CH 354S. Elements of Spectroscopy.	Spectroscopy	General Elective
5. EE 334K Quantum Theory of Engineering Materials	Applied Quantum Theory	General Elective
6. Optional Electives: <ul style="list-style-type: none"> • ChE 323, Chemical Engineering for Micro- and Nanofabrication • ChE 355, Introduction to Polymers • Ch 354, Quantum Chemistry and Spectroscopy • Ch 354L, Physical Chemistry II • Ch 367L, Materials Chemistry • Ch 367L, Macromolecular Chemistry • EE 325 Electromagnetic Engineering • EE 334K Quantum Theory of Engineering Materials • EE 339S Solar Engineering Conversion Devices • ME 336 Materials Processing • ME 359 Materials Selection • PHY 375S Intro. To Solid State Physics • PHY 345 Biophysics 	Open	General Elective

Electrical Engineering Majors

	Topic	Counts for
1. ES 360M Experiments in MS&E	Relationships between atomic structure, microstructure and properties; characterization techniques	Academic Enrichment #1
2. PHY 369 Thermodynamics and Statistical Mechanics	Thermodynamics	Academic Enrichment #2
3. EE 325 Electromagnetic Engineering	E&M	EE Core

4. CH 354S, Elements of Spectroscopy or CH 367C Materials Chemistry*	Spectroscopy/Materials Synthesis	Academic Enrichment #3
5. EE 334K Quantum Theory of Engineering Materials	Applied Quantum Theory	EE Technical Core
6. Optional Electives: <ul style="list-style-type: none"> • ChE 323, Chemical Engineering for Micro- and Nanofabrication • ChE 355, Introduction to Polymers • Ch 354, Quantum Chemistry and Spectroscopy • Ch 354L, Physical Chemistry II • Ch 367C, Materials Chemistry • Ch 367L, Macromolecular Chemistry • EE 339S Solar Eng. Conv. • EE 347 Modern Optics • EE 348 Laser and Opt. Eng. • ME 336 Materials Processing • ME 359 Materials Selection • PHY 375S Intro. To Solid State Physics • PHY 345 Biophysics 	Open	Academic Enrichment #4 (requires 1 extra credit hour to graduate for EE students)

* currently limited to Chemistry students

Mechanical Engineering Majors

	Topic	Counts for
1. ES 360M Experiments in MS&E	Relationships between atomic structure, microstructure and properties; characterization techniques	Career Gateway Elective #1
2. ME 316T Thermodynamics	Classical Thermodynamics	Already required for ME
3. PH 355 Modern Physics for Engineers or PH375S Intro. To Solid State Physics or PH 369 Thermodynamics and Statistical Mechanics	Intro to Solid State and Statistical Mech.	Natural Sci. Elective
4. ME 378K Mechanical Behavior of Materials	Deformation and Fracture	Career Gateway Elective #2
5. ME 349 Corrosion	Corrosion	Career Gateway Elective #3
6. Optional Electives: <ul style="list-style-type: none"> • ChE 323, Chemical Engineering for Micro- and Nanofabrication • ChE 355, Introduction to Polymers • CH 353 Physical Chemistry I: Thermodynamics • Ch 354, Quantum Chemistry and Spectroscopy • Ch 354L, Physical Chemistry II • Ch 367C, Materials Chemistry • Ch 367L, Macromolecular Chemistry 	Open	Career Gateway Elective #4

<ul style="list-style-type: none"> • EE 334K Quantum Theory of Engineering Materials • ME 336 Materials Processing • ME 359 Materials Selection • ME 379M Failure Analysis • PHY 355 Modern Physics for Engineers • PHY 375S Intro. To Solid State Physics • PHY 369 Thermodynamics and Statistical Mechanics • PHY 345 Biophysics 		
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14. OTHER MINOR REQUIREMENTS:

15. COLLEGE/SCHOOL APPROVAL PROCESS:

Department approval date:	July 31, 2017	Minor Faculty Committee
	August 28, 2017	ME Faculty
College approval date:	August 31, 2017	Degrees & Courses Committee
Dean approval date:	September 18, 2017	CSE Faculty; Sharon L. Wood, Dean

PROPOSED NEW CATALOG TEXT

MINOR AND CERTIFICATE PROGRAMS

MATERIALS SCIENCE AND ENGINEERING MINOR

The transcript-recognized undergraduate academic minor in Materials Science and Engineering must be completed in conjunction with an undergraduate degree at the University of Texas at Austin in one of the following majors: Chemistry, Physics, Electrical and Computer Engineering, or Mechanical Engineering; students pursuing an integrated undergraduate/graduate program must complete the requirements for the minor within one year after completing the undergraduate requirements of their program. For more information regarding the requirements for achieving a minor, including a comprehensive list of minors, please visit the Minor and Certificate Programs section of the *Undergraduate Catalog*. Details about the minor in Materials Science and Engineering are available at tmi.utexas.edu/minor.

Admissions

To be considered for admission into the Minor Program for Materials Science and Engineering, students must meet the following requirements:

- The minor must be completed in conjunction with an undergraduate degree in one of the four supported majors of Chemistry, Physics, Electrical and Computer Engineering, or Mechanical Engineering
- Students must have completed Mathematics 408C, Mathematics 408D, Mathematics 427J, Chemistry 301, Physics 303K and Physics 303L, or equivalent and all with a grade of C- or higher
- Students who have completed thirty hours or more and have not taken more than sixty hours will be encouraged to apply online at the earliest possible date; deadlines will be March 1 for fall or summer and October 1 for spring.
- Applications will be reviewed and rendered in time for fall and spring admissions.

Requirements

The requirements for the minor in Materials Science and Engineering will consist of fifteen credit hours towards the minor. All students will be required to take a three-credit hour, laboratory-based bridge course (Engineering

Studies 360). The remainder of the required courses required for the minor will consist of a sequence of courses that are specific to the major degree and which are detailed below.

If students are interested in additional coursework, they can see tmi.utexas.edu/minor for a complete list of courses that would serve as optional electives. Courses beyond fifteen hours are not required for the completion of the minor.

<u>Chemistry Majors</u>		<u>Hours</u>
<u>ES 360M</u>	<u>Experiments in MS&E</u>	<u>3</u>
<u>CH 353</u>	<u>Physical Chemistry I</u>	<u>3</u>
<u>PHY 355</u>	<u>Modern Physics for Engineers</u>	<u>3</u>
<u>CHE 355:</u>	<u>Introduction to Polymers</u>	<u>3</u>
<u>ME 349</u>	<u>Corrosion</u>	<u>3</u>
[Optional Electives	See tmi.utexas.edu/minor for a complete list of courses	3]
All classes must be taken on the letter-grade basis. The student must earn a combined grade point average of at least 2.00 in these courses.		
*An additional three hours of optional electives may be taken. For a complete list of courses available, please see tmi.utexas.edu/minor .		

<u>Physics Majors</u>		<u>Hours</u>
<u>ES 360M</u>	<u>Experiments in MS&E</u>	<u>3</u>
<u>PHY 369</u>	<u>Thermodynamics and Statistical Mechanics</u>	<u>3</u>
<u>CH 367C or CH 367L or ME 336</u>	<u>Materials Chemistry or Macromolecular Chemistry or Materials Processing</u>	<u>3</u>
<u>CH 354S</u>	<u>Elements of Spectroscopy</u>	<u>3</u>
<u>EE 334K</u>	<u>Quantum Theory of Engineering Materials</u>	<u>3</u>
[Optional Electives	See tmi.utexas.edu/minor for a complete list of courses	3]
All classes must be taken on the letter-grade basis. The student must earn a combined grade point average of at least 2.00 in these courses.		
*An additional three hours of optional electives may be taken. For a complete list of courses available, please see tmi.utexas.edu/minor .		

<u>Electrical Engineering Majors</u>		
<u>ES 360M</u>	<u>Experiments in MS&E</u>	<u>3</u>
<u>PHY 369</u>	<u>Thermodynamics and Statistical Mechanics</u>	<u>3</u>
<u>EE 325</u>	<u>Electromagnetic Engineering</u>	<u>3</u>
<u>CH 354S or CH 367C</u>	<u>Elements of Spectroscopy or Materials Chemistry</u>	<u>3</u>
<u>EE 334K</u>	<u>Quantum Theory of Engineering Materials</u>	<u>3</u>

[Optional Electives See tmi.utexas.edu/minor for a complete list of courses]

All classes must be taken on the letter-grade basis. The student must earn a combined grade point average of at least 2.00 in these courses.

*An additional three hours of optional electives may be taken. For a complete list of courses available, please see tmi.utexas.edu/minor.

Mechanical Engineering Majors

<u>ES 360M</u>	<u>Experiments in MS&E</u>	<u>3</u>
<u>ME 316T</u>	<u>Thermodynamics</u>	<u>3</u>
<u>PH 355 or PH375S or PH 369</u>	<u>Modern Physics for Engineers or Intro. To Solid State Physics or Thermodynamics and Statistical Mechanics</u>	<u>3</u>
<u>ME 378K</u>	<u>Mechanical Behavior of Materials</u>	<u>3</u>
<u>ME 349</u>	<u>Corrosion</u>	<u>3</u>
[Optional Electives	See tmi.utexas.edu/minor for a complete list of courses]	

All classes must be taken on the letter-grade basis. The student must earn a combined grade point average of at least 2.00 in these courses.

*An additional three hours of optional electives may be taken. For a complete list of courses available, please see tmi.utexas.edu/minor.