

# CURRICULUM CHANGE PROPOSAL

## APPROVAL PAGE

Proposal Title: BS MME FastTrack, MSE Minor and BS MME Catalog Changes

College: Engineering


Department: MMBME

### DEPARTMENT CHAIR

---

I have read the enclosed proposal and approve this proposal on behalf of the department.

**Stella A Quinones**

 Digitally signed by Stella A Quinones  
DN: cn=Stella A Quinones, o=UTEP, ou=MMBME, email=stellaq@utep.edu,  
c=US  
Date: 2020.10.16 16:44:26 -06'00'

Signature

Date

### COLLEGE CURRICULUM COMMITTEE CHAIR

---

I have read the enclosed documents and approve the proposal on behalf of the college curriculum committee.

Signature

Date

### COLLEGE DEAN

---

I have read the enclosed documents and approve the proposal on behalf of the college. I certify that the necessary funds will be allocated by the college in support of this proposal.

Signature

Date

**From:** [Granda, Virginia D](#)  
**To:** [Rivera, Julie A](#)  
**Cc:** [Nava, Patricia A.](#); [Love, Norman D](#); [Everett, Louis](#); [Quinones, Stella](#); [Smith, Shalayna L](#)  
**Subject:** FW: MMBME Undergraduate Curriculum Proposal Approved by COECC on October 16  
**Date:** Wednesday, October 21, 2020 10:01:44 AM  
**Attachments:** [image006.png](#)  
[MMBME--BSMME FastTrack-MSE Minor-BSMME Catalog Changesv3.pdf](#)  
[image008.png](#)  
[image010.png](#)  
[image012.png](#)  
[image014.png](#)  
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[image020.png](#)  
[image021.png](#)  
[image001.png](#)

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Julie,

Attached is the approved UG MMBME Proposal that we would to include in the next UGCC meeting.

See below for the chain of approvals.

Best Regards,

Virginia



**Virginia Granda-Becker**

Coordinator for Academic Affairs and Undergraduate Studies

College of Engineering  
The University of Texas at El Paso  
500 W. University Ave  
El Paso, TX 79968  
Office: (915) 747-8011  
[www.utep.edu/engineering/eec](http://www.utep.edu/engineering/eec)

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**From:** Nava, Patricia A.  
**Sent:** Wednesday, October 21, 2020 9:58 AM  
**To:** Granda, Virginia D <[granda@utep.edu](mailto:granda@utep.edu)>  
**Cc:** Love, Norman D <[ndlove@utep.edu](mailto:ndlove@utep.edu)>  
**Subject:** FW: MMBME Undergraduate Curriculum Proposal Approved by COECC on October 16

Virginia,

I approve of the attached proposal from MMBME.

PN



**Patricia A. Nava, Ph.D.**

Interim Dean  
Professor of Electrical and Computer Engineering  
El Paso Electric Professor in Education  
UTEP Distinguished Teaching Professor

College of Engineering  
The University of Texas at El Paso  
500 West University Avenue  
El Paso, TX 79968-0521  
Office: 915-747-6917  
Fax: 915-747-5437  
[utep.edu/engineering](http://utep.edu/engineering)



---

**From:** Love, Norman D

**Sent:** Monday, October 19, 2020 9:01 AM

**To:** Granda, Virginia D <[granda@utep.edu](mailto:granda@utep.edu)>

**Cc:** Nava, Patricia A. <[pnava@utep.edu](mailto:pnava@utep.edu)>

**Subject:** FW: MMBME Undergraduate Curriculum Proposal Approved by COECC on October 16

Hi Virginia,

I approve of the attached proposal from MMBME. I am including Dr. Nava in this email so that she may review.



**Norman Love, Ph.D.**

Associate Dean for Academic Affairs and Undergraduate Studies  
Professor of Mechanical Engineering  
Provost's Faculty Fellow, University Honors Program

College of Engineering  
The University of Texas at El Paso  
500 W. University Ave.  
El Paso, TX 79968-0521  
Office: 915-747-8981  
Fax: 915-747-5437  
[utep.edu/engineering/eec/index.html](http://utep.edu/engineering/eec/index.html)



**From:** "Granda, Virginia D" <[granda@utep.edu](mailto:granda@utep.edu)>  
**Date:** Friday, October 16, 2020 at 7:14 PM  
**To:** Norman Love <[ndlove@utep.edu](mailto:ndlove@utep.edu)>  
**Subject:** FW: MMBME Undergraduate Curriculum Proposal Approved by COECC on October 16

Dr. Love,

Please find attached the last UG proposal that was approved by our COECC and its chair. I have only included the UG proposal.

Can you please reply letting me know if you approve it?

Best Regards,

Virginia



**Virginia Granda-Becker**  
Coordinator for Academic Affairs and Undergraduate Studies  
  
College of Engineering  
The University of Texas at El Paso  
500 W. University Ave  
El Paso, TX 79968  
Office: (915) 747-8011  
[www.utep.edu/engineering/eec](http://www.utep.edu/engineering/eec)

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**From:** Everett, Louis  
**Sent:** Friday, October 16, 2020 6:06 PM  
**To:** Granda, Virginia D <[granda@utep.edu](mailto:granda@utep.edu)>  
**Subject:** Fwd: MMBME Graduate Curriculum Proposal

I approve these documents.

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**From:** Quinones, Stella <[stellag@utep.edu](mailto:stellag@utep.edu)>  
**Sent:** Friday, October 16, 2020 5:10:33 PM  
**To:** Everett, Louis <[leverett@utep.edu](mailto:leverett@utep.edu)>  
**Cc:** Love, Norman D <[ndlove@utep.edu](mailto:ndlove@utep.edu)>; Granda, Virginia D <[granda@utep.edu](mailto:granda@utep.edu)>; Smith, Shalayna L <[shalaynal@utep.edu](mailto:shalaynal@utep.edu)>; Boland, Thomas <[tboland@utep.edu](mailto:tboland@utep.edu)>; Quinones, Stella <[stellag@utep.edu](mailto:stellag@utep.edu)>; Rivera, Julie A <[jarivera6@utep.edu](mailto:jarivera6@utep.edu)>  
**Subject:** Re: MMBME Graduate Curriculum Proposal

Hello Everyone,

Here are the updated undergraduate and graduate curriculum proposals for MMBME, with the following changes:

#### Undergraduate Curriculum Proposal

- update to minimum hours for Materials Science and Engineering (MSE) minor
- addition of admissions language for majors accepted into MSE minor: allowed majors and minimum UTEP credit towards 3.0 minimum GPA required for admission

#### Graduate Curriculum Proposal

- inclusion of admissions forms for MS MME and PhD MASE admission language (required to go to UT system)
- removal of TOEFL language and replaced with link to graduate catalog
- addition of CIP codes for course additions

Thank you,  
Stella



**Stella A. Quinones**


Chair and UTEP Distinguished Teaching Professor  
Freeport-McMoRan Distinguished Chair in Metallurgical Engineering

Metallurgical, Materials and Biomedical Engineering  
The University of Texas at El Paso  
500 W. University Ave.  
El Paso, TX 79968  
Office: 915-747-6939

<https://www.utep.edu/engineering/mmbme/>

# UNDERGRADUATE CURRICULUM CHANGE MEMO

**Date:** September 29, 2020

**From:** Dr. Stella A. Quinones, Chair of MMBME Department 

**Through:** Dr. Louis Everett, Chair of Curriculum Committee, College of Engineering

**Through:** Dr. Norman Love, Associate Dean for Academic Affairs and Undergraduate Studies, College of Engineering

**Through:** Dr. Pat Nava, Interim Dean, College of Engineering

**To:** Dr. Art Duval, Chair of Undergraduate Curriculum Committee

**Proposal Title:** BS MME FastTrack, MSE Minor and BS MME Catalog Changes

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The MMBME faculty met in September and October 2020 to review and approve changes to the BS-MME MS-MME Fast-Track Program, to propose a new BS-MME MS-BME Fast-Track Program, and to propose a minor in Materials Science and Engineering. The MMBME Faculty voted unanimously on the changes being proposed here. The major changes to the degree plan are described in this document and include:

1. Changes to BS-MME/MS-MME Fast Track
2. Addition of BS-MME/MS-BME Fast Track
3. Addition of a minor in Materials Science and Engineering
4. Changes to the BS MME catalog
  - a. Change in the course description for MME 1205
  - b. Change in the requirements for BS MME degree, specifying that a concentration is not required to graduate

## 1. Changes to BS-MME/MS-MME Fast Track

- Addition of a “Fast-Track” link to BS MME to undergraduate catalog webpage (Attachment 1)
- Addition of catalog language describing Fast-Track Programs under new “Fast-Track” link (Attachment 1)

UTEP senior students with at least 90 hours accumulated toward their BSMME degree, a minimum of 24 of those hours at UTEP and a cumulative GPA of at least 3.30 may be eligible for admission into the following fast-track programs:

- BS-MME/Master Program in Metallurgical and Materials Engineering (MS-MME)
- BS-MME/Master Program in Biomedical Engineering (MS-BME)

Students admitted to these programs take graduate classes that count both toward graduate degree requirements and undergraduate degree requirements, for up to 15 credit hours of graduate courses per approval of the undergraduate and graduate advisors.

Eligible graduate courses come from a list approved for fast-track by the Metallurgical, Materials and Biomedical Engineering (MMBME) Faculty.

Students must earn a B or better in the graduate course to count as graduate credit for the Master of Science in Metallurgical and Materials Engineering or for the Master of Science in Biomedical Engineering. If the grade is a C, it will not count towards the graduate degree but will still count towards the undergraduate degree.

Additional program requirements can be found at:

<https://www.utep.edu/graduate/future-students/fast-track2.html#anchor1>

A list of approved MS-MME and MS-BME graduate courses can be found at:

<http://catalog.utep.edu/grad/academic-regulations/curriculum-and-classroom-policies/fast-track-dual-credit-courses/>

- Catalog Changes to the approved list of MME graduate fast track courses (Attachment 2)
- Fast-Track Change Form - addition and deletion of courses (Attachment 3)
  - Additions: MME 5308 Mechanical Behavior of Materials, MME 5310 Advanced Failure Analysis, MME 5313 Advanced Materials and Composites, MME 5390 Special Topics, MME 5302 Materials, Extraction, Synthesis and Processing
  - Deletions: MASE 6401 Mat Application and Eng, MASE 5194 Graduate Research, MME 5195 Graduate Seminar, MASE 6402 Microstruc & Microchem Charac, MASE 6400 Advanced Concepts Mat Sci/Eng

## 2. Addition of BS-MME/MS-BME Fast Track

- Addition of BS MME – MS BME Fast-Track program with list of approved MS BME courses (Attachment 4)
  - BME 5301 BME for Global Health
  - BME 5302 Telemedicine & Imaging Informatics
  - BME 5303 Research & Lab Methods
  - BME 5310 Biomaterials
  - BME 5333 Biomedical Signal & Image Proc
  - BME 5313 Tissue Engineering
  - BME 5321 Biomechatronics
  - BME 5304 BME Device Design & Regulation
  - BME 5390 Special Topics
  - MME 5390 Special Topics



### 3. **Addition of a minor in Materials Science and Engineering**

The following forms are included to support the request for a Minor in Materials Science and Engineering:

- Request Form for a New Minor (Attachment 5)
- Catalog Description (Attachment 6)
- Industry Advisor Board Survey (Attachment 7)
- Bureau of Labor Statistics – Long term job growth for Materials Engineers (Attachment 8)
- UTEP Engineering Survey (Attachment 9)

Program Name- Minor in Materials Science and Engineering (MSE)

Program Description- The Materials Science and Engineering minor degree program is designed to enhance students' fundamental knowledge of the materials paradigm to improve their marketability to employers or graduate schools.

Admission Requirements- Undergraduate students seeking a bachelor of science degree from any engineering major or undergraduate students majoring in Chemistry, Physics or Forensic Science, with at least a 3.0 GPA based on a minimum 12 credit hours completed at UTEP, will be eligible to apply for the minor.

Degree Requirements- The Minor in Materials Science and Engineering requires from 19-21 credit hours from a list of approved courses. These courses have pre-requisites, and their enrollment will require approval from the MMBME Department. The program will accept the equivalent of the MME2303 Introduction to Materials Science and Engineering course taught within other departments in the College of Engineering. Students must earn a grade of "C" or better in all courses counted towards the minor. A bachelor's degree must be completed for the degree to be awarded.

#### 4. Changes to the BS MME catalog

- Change in MME 1205 course description in order to ensure a more accurate representation of the course material and intent. A course change form was submitted as Attachment 10.

The change in the course description is from:

“The course provides an overview of important and novel processing methods used for the manufacture of advanced structural and functional semi-finished components, including the metals, polymers, ceramics, and their composites“ with pre-requisite of MATH 1411 Calculus I.

to:

“This course is an introduction to software basics and computation in material science. Students will be able to become familiar with the use and application of numerous software currently used in the field to support computation and advanced manufacturing” with pre-requisite of MATH 1411 Calculus I, which can be taken concurrently.

- Clarification to BS MME “General Concentration” catalog language to specify that BS MME students can graduate without a concentration. The following language was submitted as a catalog change in Attachment 11:

The Metallurgical and Materials Engineering (MME) program offers a Bachelor of Science MME degree with an option to develop an expertise in one of the four concentrations. If a student does not select a concentration, they are required to complete 4 elective courses (12 credit hours) from the list of all MME electives to satisfy the requirements for the BS MME degree.

Fast Track link to be added to catalog here after “Overview” link and before “4-Year Sample Degree Plan”:

<http://catalog.utep.edu/undergrad/college-of-engineering/metallurgical-materials-engineering/metallurgical-materials-engineering-bs/#fouryearsampldegreeplantext>

# Fast-Track Combined BSMME/Master Programs

UTEP senior students with at least 90 hours accumulated toward their BSMME degree, a minimum of 24 of those hours at UTEP and a cumulative GPA of at least 3.30 may be eligible for admission into the following fast-track programs:

- BS-MME/Master Program in Metallurgical and Materials Engineering (MS-MME)
- BS-MME/Master Program in Biomedical Engineering (MS-BME)

Students admitted to these programs take graduate classes that count both toward graduate degree requirements and undergraduate degree requirements, for up to 15 credit hours of graduate courses per approval of the undergraduate and graduate advisors.

Eligible graduate courses come from a list approved for fast-track by the Metallurgical, Materials and Biomedical Engineering (MMBME) Faculty.

Students must earn a B or better in the graduate course to count as graduate credit for the Master of Science in Metallurgical and Materials Engineering or for the Master of Science in Biomedical Engineering. If the grade is a C, it will not count towards the graduate degree but will still count towards the undergraduate degree.

Additional program requirements can be found at:

<https://www.utep.edu/graduate/future-students/fast-track2.html#anchor1>

A list of approved MS-MME and MS-BME graduate courses can be found at

<http://catalog.utep.edu/grad/academic-regulations/curriculum-and-classroom-policies/fast-track-dual-credit-courses/>

**M.S. in Metallurgical and Materials Engineering ; Ph.D. in Materials Science and Engineering (Interdisciplinary) / B.S. in Metallurgical and Materials Engineering**

<i>Code</i>	<i>Title</i>	<i>Hours</i>
<a href="#">MASE 6400/MME 5403</a>	Advanced Concepts Mat Sci/Engr	4
<a href="#">MASE 6401/MME 5302</a>	<del>Mat. Applications and Eng</del> <a href="#">Materials Extraction, Synthesis and Processing-</a>	4
<a href="#">MASE 6402MME 5401</a>	Microchem/Microstruc Char Matl	4
<a href="#">MME 5194</a>	<del>Graduate Research</del>	<del>4</del>
<a href="#">MME 5195</a>	<del>Graduate Seminar</del>	<del>4</del>
<a href="#">MME 5304</a>	Phase Transformations & Micros	3
<a href="#">MME 5308</a>	<a href="#">Mechanical Behavior of Materials</a>	<u>3</u>
<a href="#">MME 5310</a>	<a href="#">Advanced Failure Analysis</a>	<u>3</u>
<a href="#">MME 5313</a>	<a href="#">Advanced Materials and Composites</a>	<u>3</u>
<a href="#">MME 5390</a>	<a href="#">Special Topics</a>	<u>3</u>
<a href="#">MME 5401</a>	<del>Microstruc &amp; Microchem Charac</del>	4

Formatted Table

Course List

## Changes to an Existing Fast-Track Program

College: College of Engineering

Graduate Degree: MS MME

Undergraduate Degree: BS MME

\*\*\*\*\*Maximum Number of Graduate Credit Hours Allowed (up to 15 hours)\*\*\*\*\*

### Graduate Course Inventory Changes

#### Additions

Course Prefix & No. MME5308

Title: Mechanical Behavior of Materials

Course Prefix & No. MME5310

Title: Advanced Failure Analysis

Course Prefix & No. MME5313

Title: Advanced Materials and Composites

Course Prefix & No. MME 5390

Title: Special Topics

Course Prefix & No. MME 5302

Title: Materials Extraction, Synthesis and Processing

#### Deletions

Course Prefix & No. MASE 6401

Title: Mat. Application and Eng.

Course Prefix & No. MME 5194

Title: Graduate Research

Course Prefix & No. MME 5195

Title: Graduate Seminar

Course Prefix & No. MASE 6402

Title: Microstruc & Microchem Charac

Course Prefix & No. MASE 6400

Title: Advanced Concepts Mat Sci/Eng



**UTEP Graduate School**  
**Fast-Track Dual-Credit Program**  
**Courses Approved for Undergraduate and Graduate Credit**

College: Engineering

Graduate Degree: MS in Biomedical Engineering

Undergraduate Degrees: BS in Metallurgical and Materials Engineering

**Dual Credit Program Admission Requirements:**

Minimum GPA (3.30/4.00 or higher): 3.3

Maximum Number of Graduate Credit Hours Allowed (up to 15 hours): 15

Other: none

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**Graduate Course Inventory Approved for Dual Credit**

Course Prefix & No. BME 5301 Title: BME for Global Health

Course Prefix & No. BME 5302 Title: Telemedicine & Imaging Informatics

Course Prefix & No. BME 5303 Title: Research & Lab Methods

Course Prefix & No. BME 5310 Title: Biomaterials

Course Prefix & No. BME 5333 Title: Biomedical Signal & Image Proc

Course Prefix & No. BME 5313 Title: Tissue Engineering

Course Prefix & No. BME 5321 Title: Biomechatronics

Course Prefix & No. BME 5304 Title: BME Device Design & Regulation

Course Prefix & No. BME 5390 Title: Special Topics

Course Prefix & No. MME 5390 Title: Special Topics

The University of Texas at El Paso

College of Engineering  
Department of Metallurgical, Materials and  
Biomedical Engineering (MMBME)

**Minor in Materials Science and Engineering**

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# Request Form for a New Minor

## Administrative Information

1. Institution: The University of Texas at El Paso
2. Program Name: Minor in Materials Science and Engineering (MSE)
3. Proposed CIP Code: 14.1801.00.06
4. Number of Required Semester Credit Hours (SCHs): 20 credit hours
5. Brief Program Description: The Materials Science and Engineering minor degree program is designed to enhance students' fundamental knowledge of the materials paradigm to improve their marketability to employers or graduate schools.
6. Administrative Unit: Department of Metallurgical, Materials and Biomedical Engineering within the College of Engineering.
7. Proposed Implementation Date: Fall 2021
8. Contact Person – Provide contact information for the person who can answer specific questions about the minor:

Contact Name: Dr. Shalayna Smith  
Title: Professor of Practice, UG Program  
Director and MME Advisor/Recruiter  
E-mail: shalaynal@utep.edu  
Phone: 915.747.6904

Contact Name: Dr. Chris Bradley  
Title: Professor of Practice and MME  
Advisor/Recruiter  
E-mail: cbradley2@utep.edu  
Phone: 915.747.6904

## Minor Information

### I. Need

- A. Job Market Need – Provide short- and long-term evidence of the need for graduates in the job market.

In the short term a MSE minor will help UTEP graduates attain employment. The MME department IAB was surveyed on this topic in order to gather supporting evidence. The summary of the survey is included in Attachment 7.

The Bureau of Labor Statistics was referenced for the long term job growth of Materials Engineers. The long term growth is 2% which is below the total growth for all occupations (4%). The growth of all engineering fields is on par at 4%, an MSE minor would be used by these engineers to increase their job prospects by diversifying their knowledge. The "Job Outlook" report is included in Attachment 8.

Source: Bureau of Labor Statistics U.S. Department of Labor, Occupational Outlook Handbook, Materials Engineers, on the Internet at <https://www.bls.gov/ooh/architecture-and-engineering/materials-engineers.htm> (visited September 21, 2020).

- B. Student Demand – Provide short- and long-term evidence of demand for the minor.

UTEP Engineering students were surveyed in order to determine the demand for an MSE Minor. The students had a very positive response, the survey results are included in Attachment 9.

- C. Enrollment Projections – Use this table to show the estimated cumulative headcount and full-time student equivalent (FTSE) enrollment for the first five years of the minor. (*Include majors only and consider attrition and graduation.*)

YEAR	1	2	3	4	5
Headcount	5	10	15	15	15
FTSE					

## II. Quality

- A. Degree Requirements: The Minor in Materials Science and Engineering requires from 19-21 credit hours from a list of approved courses. These courses have pre-requisites, and their enrollment will require approval from the MMBME Department. The program will accept the equivalent of the MME2303 Introduction to Materials Science and Engineering course taught within other departments in the College of Engineering. Students must earn a grade of “C” or better in all courses counted towards the minor. A bachelor’s degree must be completed for the degree to be awarded.

Note: A Bachelor degree should not exceed 120 Semester Credit Hours (SCH) per Board rule 5.44 (a) (3). Those that exceed 120 SCH must provide detailed documentation describing the compelling academic reason for the number of required hours, such as programmatic accreditation requirements, statutory requirements, or licensure/certification requirements that cannot be met without exceeding the 120-hour limit.

- B. Curriculum – Use these tables to identify the required courses and prescribed electives of the minor. Note with an asterisk (\*) courses that would be added if the minor is approved. *(Add and delete rows as needed. If applicable, replicate the tables for different tracks/options.)*

Prefix and Number	Course Title	SCH
MME 2303	Intro to Materials Science and Engineering	3
MME 3406	Nanofunctional Physical Metallurgy	4
MME 3407 or MME 4316	Mechanical Behavior of Materials or Failure Analysis	3-4
MME 3413 or MME 4315	Materials Characterization or Metallography/Microstructure Interpretation	3-4
Two (2) electives selected from the following courses: MME 3306 Rate Processing MME 3308 Thermodynamics MME 3309 Circuits, Electronic Materials and Devices MME 4303 Metals Processing MME 4404 Materials Processing MME 4309 Corrosion MME 3413 Materials Characterization MME 4316 Failure Analysis and any MME course listed as a concentration course		
		19- 21

- B. Faculty – Use these tables to provide information about Core and Support faculty. Add an asterisk (\*) before the name of the individual who will have direct administrative responsibilities for the program. *(Add and delete rows as needed.)*

Name of <u>Core</u> Faculty and Faculty Rank	Highest Degree and Awarding Institution	Courses Assigned in Program	% Time Assigned To Program
Dr. Thomas Boland, Professor	Ph.D.	BME 3305	10%
Dr. Chris Bradley, Prof of Practice	Ph.D.	MME4315	10%
Dr. Darren Cone, Prof of Practice	M.S.	MME 4314, MME4332	20%
Dr. Binata Joddar, Assoc. Professor	Ph.D.	MME 4312, MME4334	20%
Dr. Peter Kim, Assoc. Professor	Ph.D.	MME 3306, MME 3308, MME 4341, MME 4304	40%
Dr. Sylvia Natividad, Assist. Professor	Ph.D.	BME 3303	10%
*Dr. Stella Quinones, Assoc. Professor	Ph.D.	MME 3309, MME 4309	20%
Dr. Dave Roberson, Assoc. Professor	Ph.D.	MME 3413, MME 4310	20%
Dr. Brian Schuster, Assoc. Professor	Ph.D.	MME 4333	10%

Dr. Shalayna Smith, Prof of Practice	Ph.D.	MME2303, MME4335, MME 4331	20%
Dr. Steve Stafford, Professor	Ph.D.	MME4316, MME 4321, MME 4331	20%
Dr. SK Varma, Professor	Ph.D.	MME 3406, MME 3407	20%
Dr. Guikuan Yue, Assist. Professor	Ph.D.	MME 4342, MME 4303, MME 4404	30%

- C. Students – Describe general recruitment efforts and admission requirements. In accordance with the institution’s Uniform Recruitment and Retention Strategy, describe plans to recruit, retain, and graduate students from underrepresented groups for the minor.

The department will advertise its Minor in Materials Science Engineering Program on the MMBME Department website, through social media, by Email to students contacted as a result of recruitment efforts, and by Email to pools of students applying to the College of Engineering.

Admission Requirements- Undergraduate students seeking a bachelor of science degree from any engineering major or undergraduate students majoring in Chemistry, Physics or Forensic Science, with at least a 3.0 GPA based on a minimum 12 credit hours completed at UTEP, will be eligible to apply for the minor.

- D. Library – Provide the library director’s assessment of library resources necessary for the minor. Describe plans to build the library holdings to support the minor.

Efforts to provide library resources for the minor will be in line with the efforts for the B.S. in Metallurgical and Materials Science (MME) and Engineering, the M.S. in Metallurgical and Materials Science (MME) and Engineering, and the Ph.D. in Materials Science and Engineering (MASE).

- F. Facilities and Equipment – Describe the availability and adequacy of facilities and equipment to support the minor. Describe plans for facility and equipment improvements/additions.

The MMBME Department houses materials characterization and mechanical testing equipment, in addition to a state-of-the-art metallography and optical microscopy lab. The equipment supporting the B.S. in MME, M.S. in MME and Ph.D. in MASE will also support the students in the minor.

- G. Accreditation – If the discipline has a national accrediting body, describe plans to obtain accreditation or provide a rationale for not pursuing accreditation.

The BS MME Program is ABET Accredited. There are no plans to file for accreditation of the Minor in Materials Science and Engineering.

- H. Evaluation – Describe the evaluation process that will be used to assess the quality and effectiveness of the new minor.

The program will be monitored on a yearly basis based on the following criteria:

- Growth
- Satisfaction of Learning Outcomes by Students enrolled in the program courses
- Hiring/Placement in industry or graduate school

### III. **Costs and Funding**<sup>1</sup>

Five-Year Costs and Funding Sources - Use this table to show five-year costs and sources of funding for the program.

<b>Five-Year Costs</b>		<b>Five-Year Funding</b>	
Personnel <sup>1</sup>	\$0	Reallocated Funds	\$0
Facilities and Equipment	\$0	Anticipated New Formula Funding <sup>3</sup>	\$0
Library, Supplies, and Materials	\$0	Special Item Funding	\$0
Other <sup>2</sup>	\$0	Other <sup>4</sup>	\$0
<b>Total Costs</b>	<b>\$0</b>	<b>Total Funding</b>	<b>\$0</b>

1. Report costs for new faculty hires, graduate assistants, and technical support personnel. For new faculty, prorate individual salaries as a percentage of the time assigned to the program. If existing faculty will contribute to program, include costs necessary to maintain existing programs (e.g., cost of adjunct to cover courses previously taught by faculty who would teach in new program).
2. Specify other costs here (e.g., administrative costs, travel).
3. Indicate formula funding for students new to the institution because of the program; formula funding should be included only for years three through five of the program and should reflect enrollment projections for years three through five.
4. Report other sources of funding here. In-hand grants, "likely" future grants, and designated tuition and fees can be included.

---

<sup>1</sup> Please use the "Program Funding Estimation Tool" found on the CB website to correctly estimate state funding.

## Catalog Copy for Minors

Program Name- Minor in Materials Science and Engineering (MSE)

Program Description- The Materials Science and Engineering minor degree program is designed to enhance students' fundamental knowledge of the materials paradigm to improve their marketability to employers or graduate schools.

Admission Requirements- Undergraduate students seeking a bachelor of science degree from any engineering major or undergraduate students majoring in Chemistry, Physics or Forensic Science, with at least a 3.0 GPA based on a minimum 12 credit hours completed at UTEP, will be eligible to apply for the minor.

Degree Requirements- The Minor in Materials Science and Engineering requires from 19-21 credit hours from a list of approved courses. These courses have pre-requisites, and their enrollment will require approval from the MMBME Department. The program will accept the equivalent of the MME2303 Introduction to Materials Science and Engineering course taught within other departments in the College of Engineering. Students must earn a grade of "C" or better in all courses counted towards the minor. A bachelor's degree must be completed for the degree to be awarded.

# MMBME IAB Survey - Materials Science and Engineering Minor

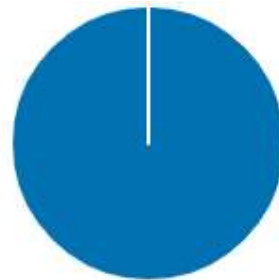
**8**  
Responses

**22:14**  
Average time to complete

**Active**  
Status

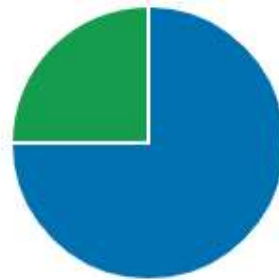
1. Is a Materials Science and Engineering (MSE) minor helpful in broadening the immediate job market appeal of an undergraduate engineering student?

Yes	8
No	0
Maybe	0



2. Is a Materials Science and Engineering (MSE) minor helpful in providing tools for the long-term success of an engineer?

Yes	6
No	0
Maybe	2



3. Please rank the proposed Program Educational Objective statement.

**8**  
Responses

★★★★☆  
4.38 Average Rating

4. Please provide any additional feedback on the programs education objective.

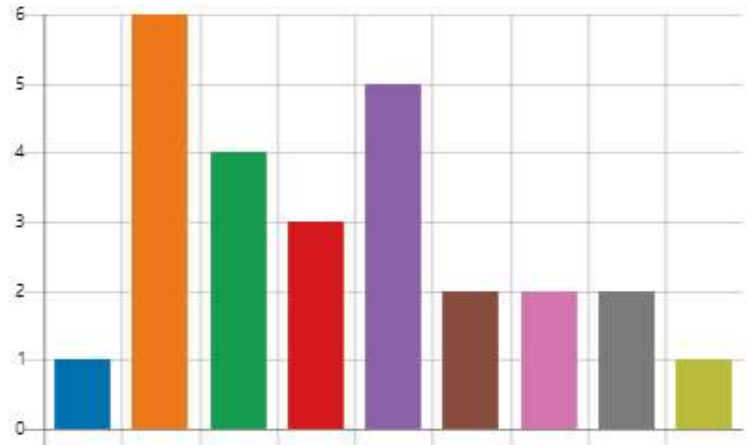
7  
Responses

Latest Responses

"the following would help strengthen (3) instead of manufacturing met...  
"editorial ..'(4) material performance characterization"  
"For (1) change to "materials properties and classification", for (3), cha..."

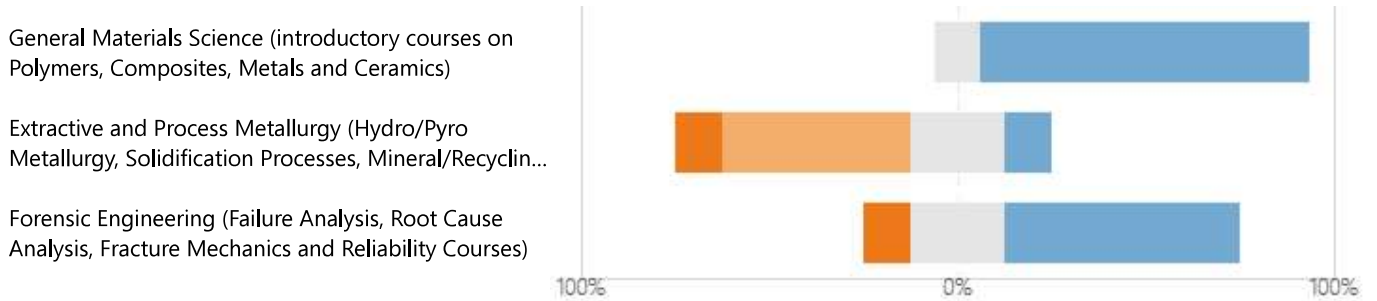
5. Should majors other than engineering and computer science be able to apply for the MSE minor? If yes, which of the UTEP BS degrees listed should be allowed?

- No 1
- Physics 6
- Chemistry 4
- Biochemistry 3
- Forensic Science 5
- Geological Sciences 2
- Environmental Science 2
- Geophysics 2
- Other 1



6. Please assess the relevance of the Minor Concentrations listed below. The minor will require between 15-19 hours (5 to 6 courses). If you would like to recommend a concentration not listed please provide it in Question 7 below.

0- Not Relevant    1    2    3    No Opinion





7. Please provide any additional comments or feedback regarding a MSE minor including potential concentrations not listed above.

6  
Responses

Latest Responses

"For a minor to be truly relevant, it should be crafted to be pragmatic i...

"I'd like to see NDE and mechanical testing included in the program. "

"Solidification processes and joining will be more applicable than extra...

8. What industry do you represent?

7  
Responses

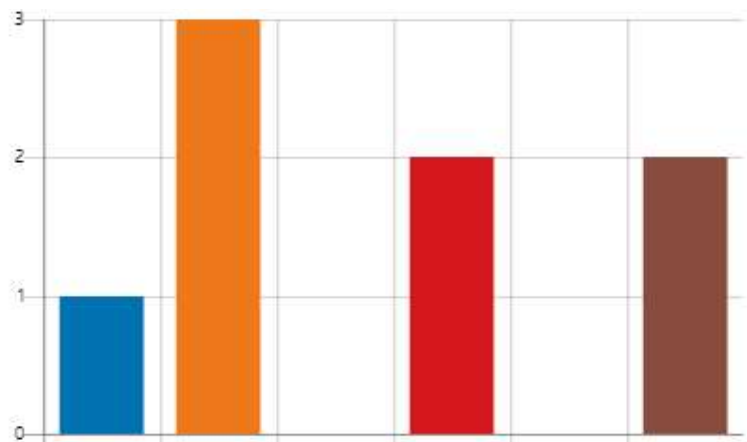
Latest Responses

"Oil and Gas"

"Aerospace"

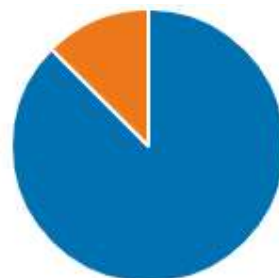
9. What region of the country do you represent?

● Northeast	1
● Southeast	3
● Midwest	0
● Southwest	2
● Rocky Mountain	0
● Pacific	2



10. Did you graduate from UTEP?

● Yes	7
● No	1





# OCCUPATIONAL OUTLOOK HANDBOOK

Occupational Outlook Handbook > Architecture and Engineering >

PRINTER-FRIENDLY

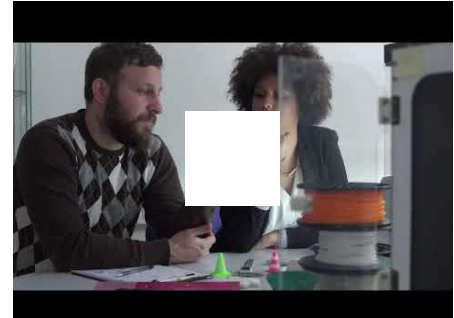
## Materials Engineers

- Summary
- What They Do
- Work Environment
- How to Become One
- Pay
- Job Outlook
- State & Area Data
- Similar Occupations
- More Info

Summary

### Summary

Quick Facts: Materials Engineers	
2019 Median Pay	\$93,360 per year \$44.88 per hour
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	None
On-the-job Training	None
Number of Jobs, 2019	27,500
Job Outlook, 2019-29	2% (Slower than average)
Employment Change, 2019-29	400



#### What Materials Engineers Do

Materials engineers develop, process, and test materials used to create a wide range of products.

#### Work Environment

Materials engineers generally work in offices where they have access to computers and design equipment. Others work in factories or research and development laboratories. Materials engineers typically work full time and may work overtime hours when necessary.

#### How to Become a Materials Engineer

Materials engineers must have a bachelor's degree in materials science and engineering or in a related engineering field. Completing internships and cooperative engineering programs while in school can be helpful in getting hired as a materials engineer.

#### Pay

The median annual wage for materials engineers was \$93,360 in May 2019.

#### Job Outlook

Employment of materials engineers is projected to grow 2 percent from 2019 to 2029, slower than the average for all occupations. About half of all materials engineers work in manufacturing industries, including many that are expected to have slow growth or declines in employment.

#### State & Area Data

Explore resources for employment and wages by state and area for materials engineers.

#### Similar Occupations

Compare the job duties, education, job growth, and pay of materials engineers with similar occupations.

#### More Information, Including Links to O\*NET

Learn more about materials engineers by visiting additional resources, including O\*NET, a source on key characteristics of workers and occupations.

What They Do ->

What They Do

### What Materials Engineers Do

About this section

Materials engineers develop, process, and test materials used to create a range of products, from computer chips and aircraft wings to golf clubs and biomedical devices. They study the properties and structures of metals, ceramics, plastics, composites, nanomaterials (extremely small substances), and other substances in order to create new materials that meet certain mechanical, electrical, and chemical requirements. They also help select materials for specific products and develop new ways to use existing materials.

#### Duties

Materials engineers typically do the following:

- Plan and evaluate new projects, consulting with other engineers and managers as necessary
- Prepare proposals and budgets, analyze labor costs, write reports, and perform other managerial tasks
- Supervise the work of technologists, technicians, and other engineers and scientists
- Design and direct the testing of processing procedures



Materials engineers work with metals, ceramics, and plastics to create new materials.

- Monitor how materials perform and evaluate how they deteriorate
- Determine causes of product failure and develop ways of overcoming such failure
- Evaluate technical specifications and economic factors relating to the design objectives of processes or products
- Evaluate the impact of materials processing on the environment

Materials engineers create and study materials at the atomic level. They use computers to understand and model the characteristics of materials and their components. They solve problems in several different engineering fields, such as mechanical, chemical, electrical, civil, nuclear, and aerospace.

Materials engineers may specialize in understanding specific types of materials. The following are examples of types of materials engineers:

**Ceramic engineers** develop ceramic materials and the processes for making them into useful products, from high-temperature rocket nozzles to glass for LCD flat-panel displays.

**Composites engineers** develop materials with special, engineered properties for applications in aircraft, automobiles, and related products.

**Metallurgical engineers** specialize in metals, such as steel and aluminum, usually in alloyed form with additions of other elements to provide specific properties.

**Plastics engineers** develop and test new plastics, known as polymers, for new applications.

**Semiconductor processing engineers** apply materials science and engineering principles to develop new microelectronic materials for computing, sensing, and related applications.

[<- Summary](#)

[Work Environment ->](#)

Work Environment

## Work Environment

[About this section](#)

Materials engineers held about 27,500 jobs in 2019. The largest employers of materials engineers were as follows:

Transportation equipment manufacturing	15%
Engineering services	13
Primary metal manufacturing	9
Computer and electronic product manufacturing	8
Research and development in the physical, engineering, and life sciences	7



Materials engineers may work in laboratories or industrial settings to observe the results of their research and development.

Materials engineers often work in offices where they have access to computers and design equipment. Others work in factories or research and development laboratories. Materials engineers may work in teams with scientists and engineers from other backgrounds.

### Work Schedules

Materials engineers generally work full time. Some materials engineers work more than 40 hours per week.

[<- What They Do](#)

[How to Become One ->](#)

How to Become One

## How to Become a Materials Engineer

[About this section](#)

Materials engineers must have a bachelor's degree in materials science and engineering or in a related engineering field. Completing internships and cooperative engineering programs while in school can be helpful in getting a position as a materials engineer.

### Education

Students interested in studying materials engineering should take high school courses in math, such as algebra, trigonometry, and calculus; in science, such as biology, chemistry, and physics; and in computer programming.

Entry-level jobs as a materials engineer require a bachelor's degree. Bachelor's degree programs include classroom and laboratory work focusing on engineering principles.

Some colleges and universities offer a 5-year program leading to both a bachelor's and master's degree. A graduate degree allows an engineer to work as a [postsecondary teacher](#) or to do research and development.



Materials engineers plan and evaluate new projects, consulting with others as necessary.

Many colleges and universities offer internships and cooperative programs in partnership with industry. In these programs, students gain practical experience while completing their education.

Many engineering programs are accredited by [ABET](#) . Some employers prefer to hire candidates who have graduated from an accredited program. A degree from an ABET-accredited program is usually necessary to become a licensed professional engineer.

### Important Qualities

**Analytical skills.** Materials engineers often work on projects related to other fields of engineering. They must determine how materials will be used and how they must be structured to withstand different conditions.

**Math skills.** Materials engineers use the principles of calculus and other advanced topics in math for analysis, design, and troubleshooting in their work.

**Problem-solving skills.** Materials engineers must understand the relationship between materials' structures, their properties, how they are made, and how these factors affect the products they are used to make. They must also figure out why a product might have failed, design a solution, and then conduct tests to make sure that the product does not fail again. These skills involve being able to identify root causes when many factors could be at fault.

**Speaking skills.** While working with technicians, technologists, and other engineers, materials engineers must state concepts and directions clearly. When speaking with managers, these engineers must also communicate engineering concepts to people who may not have an engineering background.

**Writing skills.** Materials engineers must write plans and reports clearly so that people without a materials engineering background can understand the concepts.

## Licenses, Certifications, and Registrations

Licensure for materials engineers is not as common as it is for other engineering occupations, nor is it required for entry-level positions. A Professional Engineering (PE) license, which allows for higher levels of leadership and independence, can be acquired later in one's career. Licensed engineers are called professional engineers (PEs). A PE can oversee the work of other engineers, sign off on projects, and provide services directly to the public. State licensure generally requires

- A degree from an ABET-accredited engineering program
- A passing score on the Fundamentals of Engineering (FE) exam
- Relevant work experience, typically at least 4 years
- A passing score on the Professional Engineering (PE) exam

The initial FE exam can be taken after earning a bachelor's degree. Engineers who pass this exam are commonly called engineers in training (EITs) or engineer interns (EIs). After meeting work experience requirements, EITs and EIs can take the second exam, called the Principles and Practice of Engineering (PE).

Each state issues its own licenses. Most states recognize licensure from other states, as long as the licensing state's requirements meet or exceed their own licensure requirements. Several states require continuing education for engineers to keep their licenses.

Certification in the field of metallography, the science and art of dealing with the structure of metals and alloys, is available through [ASM International](#) and other materials science organizations.

Additional training in fields directly related to metallurgy and materials' properties, such as corrosion or failure analysis, is available through ASM International.

## Other Experience

During high school, students can attend [engineering summer camps](#) to see what these and other engineers do. Attending these camps can help students plan their coursework for the remainder of their time in high school.

## Advancement

Junior materials engineers usually work under the supervision of experienced engineers. In large companies, new engineers may receive formal training in classrooms or seminars. As engineers gain knowledge and experience, they move on to more difficult projects where they have greater independence to develop designs, solve problems, and make decisions.

Eventually, materials engineers may advance to become technical specialists or to supervise a team of engineers and technicians. Many become engineering managers or move into other managerial positions or sales work. An engineering background is useful in sales because it enables sales engineers to discuss a product's technical aspects and assist in product planning, installation, and use. For more information, see the profiles on [architectural and engineering managers](#) and [sales engineers](#).

[← Work Environment](#)

[Pay →](#)

Pay

[About this section](#)

## Pay

The median annual wage for materials engineers was \$93,360 in May 2019. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$57,340, and the highest 10 percent earned more than \$148,960.

In May 2019, the median annual wages for materials engineers in the top industries in which they worked were as follows:

Research and development in the physical, engineering, and life sciences	\$108,860
Transportation equipment manufacturing	101,120
Computer and electronic product manufacturing	97,030
Engineering services	93,500
Primary metal manufacturing	81,580

Most materials engineers work full time. Some materials engineers work more than 40 hours per week.

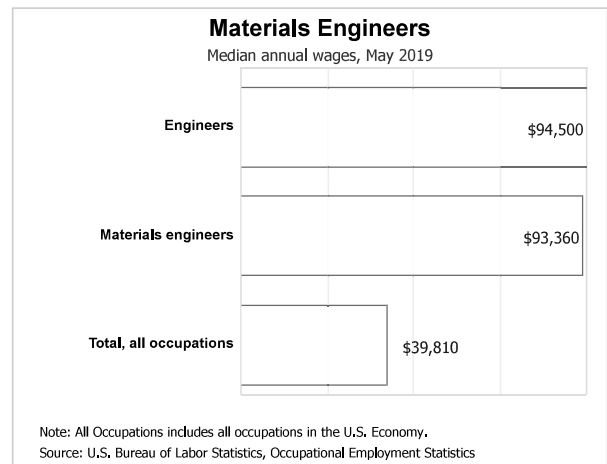
[← How to Become One](#)

[Job Outlook →](#)

Job Outlook

[About this section](#)

## Job Outlook

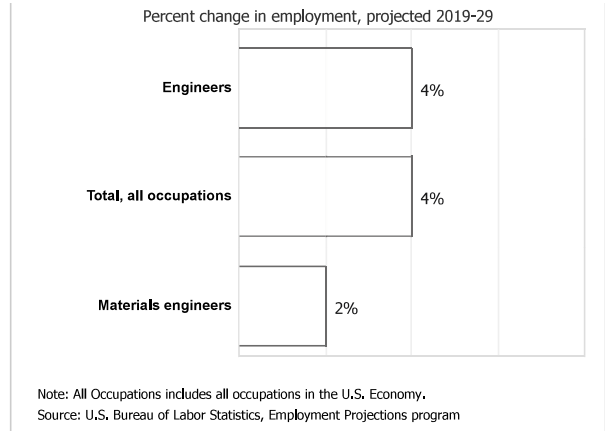


Employment of materials engineers is projected to grow 2 percent from 2019 to 2029, slower than the average for all occupations. About half of all materials engineers work in manufacturing industries, including many that are expected to have slow growth or declines in employment. Modest employment increases are projected for these engineers in professional, scientific, and technical services.

## Job Prospects

Prospects should be best for applicants who gained experience by participating in internships or co-op programs while in college.

Computer modeling and simulations, rather than extensive and costly laboratory testing, are increasingly being used to predict the performance of new materials. Thus, those with a background in computer modeling should have the best employment opportunities.



## Employment projections data for materials engineers, 2019-29

Occupational Title	SOC Code	Employment, 2019	Projected Employment, 2029	Change, 2019-29		Employment by Industry
				Percent	Numeric	
Materials engineers	17-2131	27,500	27,900	2	400	<a href="#">Get data</a>

SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program

<- Pay

State & Area Data

State & Area Data ->

## State & Area Data

About this section

### Occupational Employment Statistics (OES)

The [Occupational Employment Statistics](#) (OES) program produces employment and wage estimates annually for over 800 occupations. These estimates are available for the nation as a whole, for individual states, and for metropolitan and nonmetropolitan areas. The link(s) below go to OES data maps for employment and wages by state and area.

- [Materials engineers](#)

### Projections Central

Occupational employment projections are developed for all states by Labor Market Information (LMI) or individual state Employment Projections offices. All state projections data are available at [www.projectionscentral.com](http://www.projectionscentral.com). Information on this site allows projected employment growth for an occupation to be compared among states or to be compared within one state. In addition, states may produce projections for areas; there are links to each state's websites where these data may be retrieved.

### CareerOneStop

CareerOneStop includes hundreds of [occupational profiles](#) with data available by state and metro area. There are links in the left-hand side menu to compare occupational employment by state and occupational wages by local area or metro area. There is also a [salary info tool](#) to search for wages by zip code.

<- Job Outlook







Similar Occupations






Similar Occupations ->

## Similar Occupations

About this section

This table shows a list of occupations with job duties that are similar to those of materials engineers.

OCCUPATION	JOB DUTIES	ENTRY-LEVEL EDUCATION	2019 MEDIAN PAY
 <a href="#">Aerospace Engineers</a>	Aerospace engineers design primarily aircraft, spacecraft, satellites, and missiles.	Bachelor's degree	\$116,500
 <a href="#">Architectural and Engineering Managers</a>	Architectural and engineering managers plan, direct, and coordinate activities in architectural and engineering companies.	Bachelor's degree	\$144,830
 <a href="#">Biomedical Engineers</a>	Biomedical engineers combine engineering principles with medical sciences to design and create equipment, devices, computer systems, and software.	Bachelor's degree	\$91,410
 <a href="#">Chemical Engineers</a>	Chemical engineers apply the principles of chemistry, biology, physics, and math to solve problems that involve the use of fuel, drugs, food, and many other products.	Bachelor's degree	\$108,770
 <a href="#">Chemists and Materials Scientists</a>	Chemists and materials scientists study substances at the atomic and molecular levels and analyze the ways in which the substances interact with one another.	Bachelor's degree	\$78,790
 <a href="#">Electrical and Electronics Engineers</a>	Electrical engineers design, develop, test, and supervise the manufacture of electrical equipment.	Bachelor's degree	\$101,250

	OCCUPATION	JOB DUTIES	ENTRY-LEVEL EDUCATION 	2019 MEDIAN PAY 
	<a href="#">Mechanical Engineers</a>	Mechanical engineers design, develop, build, and test mechanical and thermal sensors and devices.	Bachelor's degree	\$88,430
	<a href="#">Physicists and Astronomers</a>	Physicists and astronomers study the ways in which various forms of matter and energy interact.	Doctoral or professional degree	\$122,220
	<a href="#">Sales Engineers</a>	Sales engineers sell complex scientific and technological products or services to businesses.	Bachelor's degree	\$103,900

[<- State & Area Data](#)

[More Info ->](#)

More Info

## Contacts for More Information

About this section

For more information about materials engineering career resources, visit

[The American Ceramic Society](#)

[American Institute of Mining, Metallurgical, and Petroleum Engineers](#)

[Materials Research Society](#)

[The Minerals, Metals and Materials Society](#)

For information about general engineering career resources, visit

[American Society for Engineering Education](#)

[Technology Student Association](#)

For more information about licensure as a professional engineer, visit

[National Council of Examiners for Engineering and Surveying](#)

[National Society of Professional Engineers](#)

For more information about certification, visit

[ASM International](#)

For more information about accredited engineering programs, visit

[ABET](#)

For more information about engineering summer camps, visit

[Engineering Education Service Center](#)

O\*NET

[Materials Engineers](#)

[<- Similar Occupations](#)

### SUGGESTED CITATION:

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Materials Engineers, on the Internet at <https://www.bls.gov/ooh/architecture-and-engineering/materials-engineers.htm> (visited September 21, 2020).

**Last Modified Date:** Monday, September 21, 2020

U.S. BUREAU OF LABOR STATISTICS Office of Occupational Statistics and Employment Projections PSB Suite 2135 2 Massachusetts Avenue NE Washington, DC 20212-0001

Telephone: 1-202-691-5700 [www.bls.gov/ooh](http://www.bls.gov/ooh) [Contact OOH](#)

# UTEP Student Survey - Materials Science and Engineering Minor

19

Responses

02:22

Average time to complete

Active

Status



Ideas

1. How interested would you be in pursuing a minor in Materials Science and Engineering?

19

Responses



4.68 Average Rating

2. Do you believe a Materials Science and Engineering (MSE) minor would be helpful in broadening the immediate job market appeal of an undergraduate engineering student?

Yes	17
No	0
Maybe	2



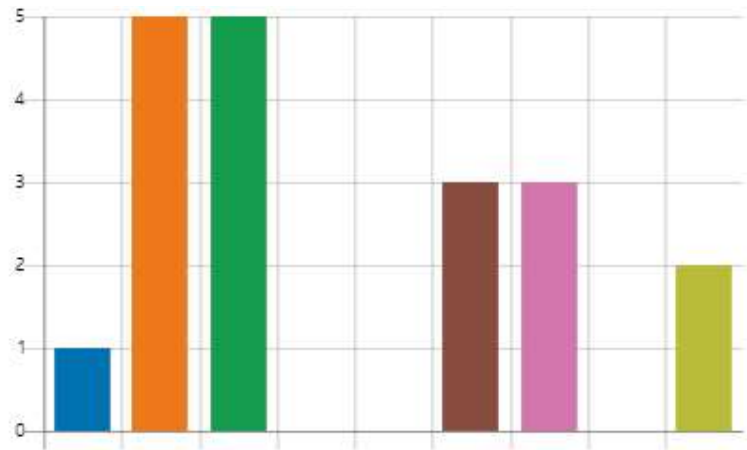
3. Do you believe a Materials Science and Engineering (MSE) minor would be helpful in providing tools for long-term success of scientists and engineers from other disciplines?

Yes	18
No	0
Maybe	1



4. Should majors other than engineering and computer science be able to apply for the MSE minor? If yes, which of the UTEP BS degrees listed should be allowed?

- No 1
- Physics 5
- Chemistry 5
- Biochemistry 0
- Forensic Science 0
- Geological Sciences 3
- Environmental Science 3
- Geophysics 0
- Other 2



5. Please rank your interest in the Minor Concentrations listed below. The minor will require between 15-19 hours (5 to 6 courses). If you would like to recommend a concentration not listed please provide it in Question 6 below.

- 0 - Not Interested
- 1
- 2
- 3 - Very Interested



6. Please provide any additional comments or feedback regarding a MSE minor and/or potential concentration areas.

5  
Responses

Latest Responses  
*"I think that a minor in material science would supplement electrical e..."*  
 "n/a"



7. Please provide your email if you are interested in pursuing a MSE minor.

11

Responses

Latest Responses

*"hjchaconpol@miners.utep.edu"*

*"cacrisp@miners.utep.edu"*

*"rmmach@miners.utep.edu"*

# COURSE CHANGE FORM

All fields below are required

---

College : Engineering

Department : MMBME

Rationale for changing the course:

The course description appears to be an error and does not match the course name or the intent of the course.

All fields below are required

---

Subject Prefix and number MME 1205

Course Title Computation/Graphics in Materials Science

Change	From	To
Ex. Prerequisite	Ex. POLS 2310	Ex. POLS 2312
Course Description	The course provides an overview of important and novel processing methods used for the manufacture of advanced structural and functional semi-finished components, including the metals, polymers, ceramics, and their composites	This course is an introduction to software basics and computation in material science. Students will be able to become familiar with the use and application of numerous software currently used in the field to support computation and advanced manufacturing
Pre-requisite	MATH 1411	MATH 1411 may be taken concurrently

These changes will be reflected in Banner, Goldmine, and the catalog

# BS in Metallurgical and Materials Engineering

- [Overview](#)
  - [4-Year Sample Degree Plan](#)
- Return to: [Degree Programs](#)

The Metallurgical and Materials Engineering undergraduate curriculum focuses on a strong materials science and engineering foundation, a deep understanding of how materials are processed, and how to tailor materials structure and properties to satisfy industrial needs and performance requirements. Students may choose a concentration in forensic engineering and materials performance, extractive and process metallurgy or biomaterials.

## Vision

Our vision is to provide a modern Metallurgical and Materials Engineering Program of the highest quality.

## Mission

The BS degree program in Metallurgical and Materials Engineering (MME) will serve two broad purposes: (1) to provide sufficient theory and hands-on experiences in metallurgical and materials engineering for a graduate to perform effectively, in industry or other employment; and (2) to provide opportunities for all types of students, while maintaining a high level of excellence as students progress through the curriculum. The MME program will also provide basic engineering skills for problem-solving and lifelong learning, along with good communication skills, both oral and written. MME faculty will maintain a balance between the applied and theoretical aspects, and will strive to provide pre-professional employment opportunities (either research experiences or internships) by continuously engaging industry in program activities with students.

### Educational Objectives

1. Graduates will secure employment and/or admission to a graduate program in metallurgical and materials engineering or related professions
2. Graduates will advance in their career by continuing lifelong learning and personal/professional development
3. Graduates work effectively as contributors and leaders on diverse, interdisciplinary teams enabling innovation at the leading edge of technology in an ever-changing global community.
4. Graduates will be more competitive as practicing professionals with broad understanding of material systems, associated manufacturing processes and engineering solutions.

The Metallurgical and Materials Engineering (MME) program offers a Bachelor of Science MME degree with an option to develop an expertise in one of the four concentrations. If a student does

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not select a concentration, they are required to complete 4 elective courses (12 credit hours) from the list of all MME electives to satisfy the requirements for the BS MME degree.

- Concentration 1: Forensic Engineering and Materials Performance
- Concentration 2: Extractive and Process Metallurgy
- Concentration 3: Biomaterials
- Concentration 4: General Metallurgical and Materials Engineering

Marketable Skills

Degree Plan

Concentrations

Forensic Engineering and Materials Performance

Extractive and Process Metallurgy

Biomaterials

General MME

University Core Curriculum