BS in Metallurgical and Materials Engineering

The success of our students in their education at UTEP and in building and sustaining a career is our primary interest. Graduates in metallurgical and materials engineering often pursue careers in industries such as oil & gas, R&D, aerospace, primary metals, and biomedical components. The job functions of our engineers include failure analysis, product development, quality assurance, and production management.

Marketable Skills

Students will develop the following marketable skills:

1. Communication: Reach mutual understanding through effective exchange of information, ideas, and feelings
2. Critical thinking: Analyze and evaluate issues in order to solve problems and develop informed opinions
3. Leadership: Step up, think, and act critically and creatively to bring others together to accomplish a common task
4. Network building: Project-based learning, tours and formal interactions with industry partners
5. Problem-solving: Find solutions to difficult or complex issues
6. Research: Be able to search, investigate and critically analyze information in response to a specific research question
7. Teamwork: Participate as an effective, efficient member of a group in order to meet a common goal
8. Technical expertise: Hands-on experience with testing and analysis equipment

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 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

Fast Track

The Fast-Track Program (http://catalog.utep.edu/admissions/undergraduate/fast-track/#text) enables outstanding undergraduate UTEP students to receive both undergraduate and graduate credit for up to 15 hours of UTEP course work as determined by participating Master's and Doctoral programs. Not all undergraduate programs have elected to participate in the Fast Track option, so students should see their departmental graduate advisor for

information about requirements and guidelines. A list of courses that have been approved for possible use at the graduate level is found here (http://catalog.utep.edu/admissions/undergraduate/fast-track/#fasttrackcoursestext).

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 here. (https://www.utep.edu/graduate/future-students/fast-track2.html#anchor1)

Degree Plan

BS in Metallurgical and Materials Engineering

Required Credits: 128

Code	Title	Hours
University Core Curriculum		
University Core Curriculum requirements (some of which are listed below) (p. 4)		42
Metallurgical & Materials Engineering Designated Core (All courses listed require a grade of C or better.)		
CE 2326	Econ for Engrs & Scientists	
CHEM 1105	Laboratory for CHEM 1305	
CHEM 1305	General Chemistry	
CHEM 1306	General Chemistry	
MATH 1508	Precalculus ((Listed if completed, but not required))	
or MATH 1310	Trigonometry and Conics	
or MATH 1411	Calculus I	
Additional Required Courses:		
MATH 1411	Calculus I	4
MATH 1312	Calculus II	3
MATH 2313	Calculus III	3
MATH 2326	Differential Equations	3
PHYS 2320	Introductory Mechanics	3
PHYS 2120	Laboratory for PHYS 2320	1
PHYS 2321	Introductory Electromagnetism	3
PHYS 2121	Laboratory for PHYS 2321	1
BSMME (Lower Division) (All courses require a grade of C or better.)		
Required Courses:		
MME 1205	Computation/Graph in Mater Sci	2
MME 1405	Intro to Metal and Matls Eng	4
MME 2303	Intro to Materials Sci & Engrg	3
MME 2305	Material & Energy Balance	3
MME 2434	Mechanics of Materials	4

Code	Title	Hours
Metallurgical and Materials Engineering (Upper Division and Concentration Courses)		
Required Courses:		
MME 3195	Junior Professional Orintati [C]	1
MME 3306	Rate Processes [C]	3

MME 3308	Appl Chemical Thermodynamics [C]	3
MME 3309	Circuits, Elect Mat & Devices [C]	3
MME 3406	Nanofuctnl Physical Metallurgy [C]	4
MME 3407	Mechanical Behavior of Matls [C]	4
MME 3413	Materials Characterization [C]	4
MME 4219	Senior Design Project 1	2
MME 4220	Senior Design Project 2	2
MME 4303	Metals Processing [C]	3
MME 4309	Corrosion	3
MME 4316	Failure Analysis [C]	3
MME 4404	Mat. Synthesis & Manufacturing [C]	4
Select one concentration:		**12**
Concentration Elective Course I [C]		
Concentration Elective Course II [C]		
Concentration Elective Course III [C]		
Concentration Elective Course IV [C]		
Total Hours		**128**

c
Courses require a grade of C or better.

Concentrations

Forensic Engineering and Materials Performance

Code	Title	Hours
BSMME- Forensic Engineering and Materials Performance		
Choice of 4 courses from the following:		
MME 4315	Metallogrphy and Micro Inter [*c]	3
MME 4317	Advanced Failure Analysis	3
MME 4331	Non-Destructive Examination [c]	3
MME 4332	Root Cause Analysis [c]	3
MME 4333	Fracture Mechanics [c]	3
MME 4334	Biomed Product Performance [c]	3
MME 4335	Functional Failure Analysis [c]	3
MME 4390	Special Topics in MME [c]	3

*****
Required Courses.

C
Courses require a grade of C or better.

Extractive and Process Metallurgy

Code	Title	Hours
BSMME- Extractive Metallurgy		
Choice of 4 courses from the following:		
MME 4315	Metallogrphy and Micro Inter [*c]	3
MME 4340	Mineral Processing [c]	3
MME 4341	Recycling Processes [c]	3
MME 4342	Hydrometallurgy [*c]	3
MME 4350	Material Joining Technologies [c]	3
MME 4390	Special Topics in MME [c]	3
GEOL 4315	Topics in Geological Sciences [c]	3

*****
Required Courses.

c
Courses require a grade of C or better.

Biomaterials

Code	Title	Hours
BSMME- Biomaterials		
Choice of 4 courses from the following:		
BME 3303	Fundamentals of BME I [c]	3
BME 3305	Fundamentals of BME II [c]	3
MME 4304	Printable Materials [c]	3
MME 4310	Polymer Engineering [c]	3
MME 4312	Biomaterials Science and Eng [*c]	3
MME 4314	Composite Materials [c]	3
MME 4334	Biomed Product Performance [c]	3
MME 4390	Special Topics in MME [c]	3

*****
Required Courses.

c
Courses require a grade of C or better.

General MME

Code	Title	Hours
BSMME- General		
Choice of 3 courses from the following and 1 course from another MME concentration:		
MME 4310	Polymer Engineering [c]	3
MME 4314	Composite Materials [c]	3
MME 4315	Metallogrphy and Micro Inter [c]	3
MME 4321	Engineering Alloys [c]	3
MME 4331	Non-Destructive Examination [c]	3
MME 4350	Material Joining Technologies [c]	3
MME 4390	Special Topics in MME [c]	3

*****
Required Courses.

c
Course require a grade of C or better.

University Core Curriculum

The department may make specific suggestions for courses which are most applicable towards your major.

All courses require a C or better

I. Communication (six hours)

Code	Title	Hours
The objective of the communication component is to enable the student to communicate effectively in clear and correct prose or orally in a style appropriate to the subject, occasion, and audience.		
Select six hours of the following:		6
For students whose secondary education was in English:		
COMM 1611	Written and Oral Communication	
ENGL 1313	Writing About Literature	
RWS 1301	Rhetoric & Composition I	
RWS 1302	Rhetoric & Composition 2	
RWS 1601	Rhetoric, Composition & Comm	

For students whose secondary education was not in English:

ESOL 1311	Expos Engl Compos-Spkr Esl	
ESOL 1312	Res & Crit Writng Spkr Esl	
Total Hours		**6**

II. American History (six hours)

Code	Title	Hours
The objectives of the history component are to expand students' knowledge of the origin and history of the U.S., their comprehension of the past and current role of the U.S. in the world, and their ability to critically evaluate and analyze historical evidence. U.S. history courses (three hours must be Texas history) include:		
HIST 1301	History of U.S. to 1865	3
HIST 1302	History of U.S. Since 1865	3
Total Hours		**6**

III. Language, Philosophy & Culture (three hours)

Code	Title	Hours
The objective of the humanities component is to expand students' knowledge of the human condition and human cultures, especially in relation to behaviors, ideas, and values expressed in works of human imagination and thought. Through study in disciplines such as literature and philosophy, students engage in critical analysis and develop an appreciation of the humanities as fundamental to the health and survival of any society.		
Select one of the following:		3
AFST 2300	Intro-African Amer Studies	
CHIC 2302	Latina/o Presence in the U.S.	
ENGL 2311	English Literature	
ENGL 2312	English Literature	
ENGL 2313	Intro to American Fiction	
ENGL 2314	Intro to American Drama	
ENGL 2318	Intro to American Poetry	
FREN 2322	Making of the "Other" Americas	
HIST 2301	World History to 1500	
HIST 2302	World History Since 1500	
PHIL 1301	Introduction to Philosophy	
PHIL 2306	Ethics	
RS 1301	Introduct to Religious Studies	
SPAN 2340	Seeing & Naming: Conversations	
WS 2300	Introduction to Womens Studies	
WS 2350	Global Feminisms	
Total Hours		**3**

IV. Mathematics (three hours)

Code	Title	Hours
The objective of the mathematics component is to develop a quantitatively literate college graduate. Every college graduate should be able to apply basic mathematical tools in the solution of real-world problems.		
Select one of the following:		3
MATH 1309	College Algebra	
MATH 1310	Trigonometry and Conics	
MATH 1319	Math in the Modern World	
MATH 1320	Math for Social Sciences I	
MATH 1411	Calculus I	
MATH 1508	Precalculus [1,2]	
MATH 2301	Math for Social Sciences II	
STAT 1380	Statistical Literacy	
STAT 2480	Elementary Statistical Methods	

1 A higher-level course in the calculus sequence can be substituted.

2 TCCN MATH 1314 will also satisfy this requirement.

Total Hours	**3**

V. Life & Physical Sciences (six hours)

Code	Title	Hours
The objective of the study of the natural sciences is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the bases for building and testing theories. The courses listed are for non-majors; the major courses in the discipline can be substituted for the non-major sequence. A minimum of two semesters of lecture and one semester of laboratory associated with one of the courses, or two semesters of combined (3 credit) lecture-laboratory courses (Only six hours apply toward the required 42.):		
Select one of the following:		1-4
ASTR 1107	Astronomy Lab I	
ASTR 1307	Elem Astronomy-Solar System	
ASTR 1308	Elem Astr Stars & Galaxies	
BIOL 1103	Introductory Biology Lab	
BIOL 1104	Human Biology Laboratory	
BIOL 1107	Topics in Study of Life I	
BIOL 1108	Organismal Biology Laboratory	
BIOL 1203	Introductory Biology	
BIOL 1304	Human Biology	
BIOL 1305	General Biology	
BIOL 1306	Organismal Biology	
BIOL 2111	Human Anat/Physio Lab I	
BIOL 2113	Human Anat/Physio Lab II	
BIOL 2311	Human Anat/Physiology I	
BIOL 2313	Human Anat/Physiology II	
CHEM 1105	Laboratory for CHEM 1305	
CHEM 1106	Laboratory for CHEM 1306	
CHEM 1107	Intro General Chemistry Lab	
CHEM 1108	Intro Organic & Biochem Lab	
CHEM 1305	General Chemistry	
CHEM 1306	General Chemistry	
CHEM 1307	Intro to General Chemistry	
CHEM 1308	Intro Organic & Biochemistry	
ESCI 1101	Environmental Sci. Lab	
ESCI 1102	Non-major Lab for ESCI 1301	
ESCI 1202	Intro to Environment Science 2	
ESCI 1301	Intro to Environmental Sci	
GEOG 1106	Laboratory for GEOG 1306	
GEOG 1306	Physical Geography	
GEOL 1103	Lab for GEOL 1313	
GEOL 1104	Lab for GEOL 1314	
GEOL 1111	Principles of Earth Sci - Lab	
GEOL 1112	Laboratory for Geology 1212	
GEOL 1211	Principles of Earth Sciences	
GEOL 1212	Principles of Earth Science	
GEOL 1230	The Blue Planet	
GEOL 1231	Natural Hazards	
GEOL 1313	Intro to Physical Geology	
GEOL 1314	Intro to Historical Geol	
HSCI 2302	Fundamentals of Nutrition	
HSCI 2303	Wellness Dynamics	

MICR 2330	Microorganisms and Disease	
PHYS 1403	General Physics I	
PHYS 1404	General Physics II	
PHYS 2120	Laboratory for PHYS 2320	
PHYS 2121	Laboratory for PHYS 2321	
PHYS 2320	Introductory Mechanics	
PHYS 2321	Introductory Electromagnetism	
Total Hours		**6**

VI. Political Science (six hours)

Code	Title	Hours
The objectives of the political science component are to expand students' knowledge of the origin and evolution of the U.S. and Texas political systems, focusing on the growth of political institutions, and on the constitutions of Texas and the United States; and to enhance their understanding of federalism, states rights, and individual civil liberties, rights, and responsibilities.		
Required Courses:		
POLS 2310	Introduction to Politics	3
POLS 2311	American Gover & Politics	3
Total Hours		**6**

VII. Social and Behavioral Sciences (three hours)

Code	Title	Hours
The objective of the social and behavioral science component is to increase students' knowledge of how social and behavioral scientists discover, describe, and explain the behaviors and interactions among individuals, groups, institutions, events, and ideas. Such knowledge will better equip students to understand themselves and the roles they play in addressing the issues facing humanity.		
Select one of the following:		3
ANTH 1301	Intro-Phys Anth/Archeolog	
ANTH 1302	Intro-Cultural Anthropology	
ANTH 1310	Cultural Geography	
ANTH 2320	Intro to Linguistics	
CE 2326	Econ for Engrs & Scientists	
ASIA 2300	Asian American Studies	
COMM 2350	Interpersonal Communication	
COMM 2372	Mass Media and Society	
ECON 2303	Principles of Macroeconomics	
ECON 2304	Principles of Microeconomics	
EDPC 1301	Introduction to Ed Psychology	
EDU 1342	Action Research in Classrooms	
ENGL 2320	Introduction to Linguistics	
GEOG 1310	Cultural Geography	
LEAD 2300	Community Service	
LING 2320	An Intro. to Linguistics	
LING 2340	Lang. Inside & Out: Sel Topics	
PSYC 1301	Introduction to Psychology	
SOCI 1301	Introduction to Sociology	
SOCI 1310	Cultural Geography	
Total Hours		**3**

VIII. Creative Arts (three hours)

Code	Title	Hours
The objective of the visual and performing arts component is to expand students' knowledge and appreciation of the human imagination as expressed through works of visual art, dance, music, theatre and film. Through study in these disciplines, students will form aesthetic judgments and develop an appreciation of the arts as fundamental to the health and survival of any society.		
Select one of the following:		3

ART 1300	Art Appreciation	
ARTH 1305	History of Art I	
ARTH 1306	History of Art II	
CHIC 1311	Chicana/o Fine Arts Appreciat	
DANC 1304	Dance Appreciation	
FILM 1390	Intro-Art of Motion Pict.	
MUSL 1324	Music Appreciation	
MUSL 1327	Jazz to Rock	
MUSL 2321	Music, Culture, and Society	
THEA 1313	Introduction to Theatre	
Total Hours		**3**

IX. Component Area Option (six hours)

Code	Title	Hours
The objective of the institutionally designated option component is to develop the critical thinking skills and academic tools required to be an effective learner. Special emphasis is placed on the use of technology in problem-solving, communications, and knowledge acquisition.		
Select two of the following:		6
BUSN 1301	Intro to Global Business	
COMM 1301	Public Speaking	
COMM 1302	Business/Profession Comm	
CS 1310	Intro-Computational Thinking	
CS 1320	Computer Programming Sci/Engr	
EL 1301	Eng Innovation and Leadership	
LEAD 1300	Introduction to Leadership	
SCI 1301	Inquiry in Math & Science	
UNIV 1301	Seminar/Critical Inquiry	
Total Hours		**6**

4-Year Sample Degree Plan

BS Materials and Metallurgical Engineering (Starting with Pre-Calculus)

Code	Title	Hours
BACHELOR OF SCIENCE IN MATERIALS AND METALLURGICAL ENGINEERING		
Summer		
(if needed)		
MATH 1508	Precalculus [+^]	5
or MATH 1310	Trigonometry and Conics	
FRESHMAN		
Fall		
CHEM 1305 & CHEM 1105	General Chemistry and Laboratory for CHEM 1305 [+]	4
MATH 1411	Calculus I [+^]	4
MME 1405	Intro to Metal and Matls Eng [+]	4
RWS 1301	Rhetoric & Composition I [+]	3
Spring		
CHEM 1306	General Chemistry [+]	3
HIST 1301	History of U.S. to 1865 [+]	3
MATH 1312	Calculus II [+^]	3
MME 1205	Computation/Graph in Mater Sci	2
RWS 1302	Rhetoric & Composition 2 [+]	3
UNIV 1301	Seminar/Critical Inquiry	3
SOPHOMORE		
Fall		

CE 2326	Econ for Engrs & Scientists [+]	3
HIST 1302	History of U.S. Since 1865 [+]	3
MATH 2313	Calculus III [+]	3
MME 2303	Intro to Materials Sci & Engrg [+]	3
PHYS 2320	Introductory Mechanics	3
PHYS 2120	Laboratory for PHYS 2320	1
Spring		
MATH 2326	Differential Equations [+]	3
MME 2305	Material & Energy Balance [+]	3
MME 2434	Mechanics of Materials [+]	4
PHYS 2321	Introductory Electromagnetism	3
PHYS 2121	Laboratory for PHYS 2321	1
Visual & Performing Arts Elective [2, +]		3
JUNIOR		
Fall		
MME 3195	Junior Professional Orintati [+]	1
MME 3308	Appl Chemical Thermodynamics [+]	3
MME 3309	Circuits, Elect Mat & Devices [+]	3
MME 3406	Nanofuctnl Physical Metallurgy [+]	4
POLS 2310	Introduction to Politics [+]	3
Spring		
COMM 1302	Business/Profession Comm	3
MME 3306	Rate Processes [+]	3
MME 3407	Mechanical Behavior of Matls [+]	4
MME 3413	Materials Characterization [+]	4
POLS 2311	American Gover & Politics [+]	3
SENIOR		
Fall		
MME 4303	Metals Processing	3
MME 4316	Failure Analysis	3
Concentration I [4]		3
Concentration II [4]		3
Language Philosophy & Culture [3, +]		3
Spring		
MME 4220	Senior Design Project 2	2
MME 4309	Corrosion	3
MME 4404	Mat. Synthesis & Manufacturing	4
Concentration III [4]		3
Concentration VI [4]		3
Notes:		
+ Grade "C" or better required. A "C" or better is required in MME courses through the junior level		
^ MATH 1508 or MATH 1310 do not count towards the 128-hour degree, but must be taken if not placed into MATH 1411.		
[1] Component Area: UNIV 1301 and COMM 1302		
[2] Visual and Performing Arts menu.		
[3] Language, Philosophy and Culture menu		
[4] Concentration Option from (1) Forensic Engineering and Materials Performance, (2) Extractive and Process Metallurgy, (3) Biomaterials and (4) General MME Concentrations.		
Total Hours		**131**

BS Materials and Metallurgical Engineering (Starting with Calculus)

Code	Title	Hours
BACHELOR OF SCIENCE IN MATERIALS AND METALLURGICAL ENGINEERING		
FRESHMAN		
Fall		
CHEM 1305 & CHEM 1105	General Chemistry and Laboratory for CHEM 1305 +	4
MATH 1411	Calculus I +^	4
MME 1405	Intro to Metal and Matls Eng +	4
RWS 1301	Rhetoric & Composition I +	3
Spring		
CHEM 1306	General Chemistry +	3
HIST 1301	History of U.S. to 1865 +	3
MATH 1312	Calculus II +^	3
MME 1205	Computation/Graph in Mater Sci	2
RWS 1302	Rhetoric & Composition 2 +	3
UNIV 1301	Seminar/Critical Inquiry	3
SOPHOMORE		
Fall		
CE 2326	Econ for Engrs & Scientists +	3
HIST 1302	History of U.S. Since 1865 +	3
MATH 2313	Calculus III +	3
MME 2303	Intro to Materials Sci & Engrg +	3
PHYS 2320	Introductory Mechanics	3
PHYS 2120	Laboratory for PHYS 2320	1
Spring		
MATH 2326	Differential Equations +	3
MME 2305	Material & Energy Balance +	3
MME 2434	Mechanics of Materials +	4
PHYS 2321	Introductory Electromagnetism	3
PHYS 2121	Laboratory for PHYS 2321	1
Visual & Performing Arts Elective [2, +]		3
JUNIOR		
Fall		
MME 3195	Junior Professional Orintati +	1
MME 3308	Appl Chemical Thermodynamics +	3
MME 3309	Circuits, Elect Mat & Devices +	3
MME 3406	Nanofuctnl Physical Metallurgy +	4
POLS 2310	Introduction to Politics +	3
Spring		
COMM 1302	Business/Profession Comm	3
MME 3306	Rate Processes +	3
MME 3407	Mechanical Behavior of Matls +	4
MME 3413	Materials Characterization +	4
POLS 2311	American Gover & Politics +	3
SENIOR		
Fall		
MME 4303	Metals Processing	3
MME 4316	Failure Analysis	3
Concentration I [4]		3
Concentration II [4]		3
Language Philosophy & Culture [3, +]		3

Spring		
MME 4220	Senior Design Project 2	2
MME 4309	Corrosion	3
MME 4404	Mat. Synthesis & Manufacturing	4
Concentration III [4]		3
Concentration VI [4]		3
Notes:		
+ Grade "C" or better required. A "C" or better is required in MME courses through the junior level		
^ MATH 1508 or MATH 1310 do not count towards the 128-hour degree, but must be taken if not placed into MATH 1411.		
[1] Component Area: UNIV 1301 and COMM 1302		
[2] Visual and Performing Arts menu.		
[3] Language, Philosophy and Culture menu		
[4] Concentration Option from (1) Forensic Engineering and Materials Performance, (2) Extractive and Process Metallurgy, (3) Biomaterials and (4) General MME Concentrations.		
Total Hours		**126**