MS IN MATERIALS ENGINEERING

Overview

The MS program in Materials Engineering offers students a robust education within a world-class research environment delivered by faculty members across the College of Engineering conducting multidisciplinary materials engineering research in a vibrant collaborative culture. The 30 credit, 1 year MS program will deliver a fundamental understanding of materials science and engineering (through core classes), provide access to state-of-the-art research and teaching laboratories and instrumentation (through supervised Masters' project), and exposure to a broad spectrum of concepts and skills (through tremendous flexibility and choice of electives).

Students apply directly to the College of Engineering for the Graduate Program. Students must have a related undergraduate degree in Engineering, Physics, Chemistry, or other technical fields, and seek to diversify their career opportunities by acquiring an advanced engineering degree in Materials.

Curriculum Requirements

Code	Title	Credit Hours
Core Courses		
CAE 729	Molecular Simulation of Materials	3
MAE 616	Introduction to Composite Materials	3
ECE 698	Special Topics in Electrical Engineering (* ECE 698 will have topics of relevance to Materials Engineering.)	3
BME 635	Advanced Biomaterials	3
Engineering Skill/Experiential Course (1 course)		**3**
Students chose one of the following options:		
Statistics (chosen from):		
ECE 730	Statistical Learning	
MTH 642	Statistical Analysis (Student would have to demonstrate that pre-requisite requirements (MTH 210, Linear Algebra, and MTH 224, Probability and Statistics) have been sufficiently met.)	
MTH 625	Introduction to Mathematical Statistics (Students would have to demonstrate that pre-requisite (MTH 624, Introduction to Probability) has been sufficiently met.)	
Scientific Writing and Communication (chosen from):		
ECE 792	Professional Communications Skills for Engineering Grad Students (* ECE 792 would be offered as a 3 credit elective.)	
BME 780	Graduate Scholarship in Biomedical Engineering (* BME 780 will evolve to include training relevant to Materials Engineering students, in addition to BME graduate students.)	
Electives or Concentration		**12**
Students can either choose a concentration in Structure & Fabrication, Characterization, or Devices & Application, or elect to take classes across concentrations.		
Materials Structure & Fabrication Concentration (chosen from):		
CHM 653	Modern Quantum Chemistry	
ECE 606	Microfabrication	
MAE 631	Scientific and Engineering Foundations of Additive Manufacturing	
MAE 632	Additive Manufacturing of Engineering Materials	
MAE 733	Additive Manufacturing Lab	
RSM 611	Principles of Mass Spectrometry and Applications to Marine, Atmospheric, and Environmental Science	
Materials Characterization Concentration (chosen from):		
BME 622	Scanning Electron Microscopy for Engineers	
BME 675	Tissue Mechanics	
BME 687	Finite Element Analysis for Engineers	
MAE 607	Advanced Mechanics of Solids	
CAE 716	Fracture Mechanics	
MAE 762	CAD and FEM for Stress Analysis of 3D Printed Structures	

Devices & Applications Concentration (chosen from):		
CET 6## Aerosol Science and Technology (NEW COURSE)		
ECE 642	MEMS: Sensors and Electronics	
ECE 643	BioNanotechnology	
ECE 605	Semiconductor Photonic Devices	
BME 702	Organs on Chips	
CAE 720	Concrete Materials Science	
Capstone		**3**
Students choose to complete a Master's Project or Industry Project.		
Master's Project		
One semester project supervised by a faculty member in an appropriate academic unit culminating in a report that's approved by the supervisor.		
Industry Project		
A three-month summer industry project, culminating with an internship report detailing the work done and knowledge gained. Project will be supervised by a faculty member in an appropriate academic unit culminating in a report that's approved by the supervisor.		
Total Credit Hours		**30**

Sample Plan of Study

Typical plan for MS is to be one year (2 semesters and 1 summer).

Year One		
Fall		**Credit Hours**
MAE 616	Introduction to Composite Materials	3
CAE 729	Molecular Simulation of Materials	3
Elective or Concentration Course		3
Elective or Concentration Course		3
Engineering Skill/Experiential Course		3
	Credit Hours	**15**
Spring		
BME 635	Advanced Biomaterials	3
ECE 698	Special Topics in Electrical Engineering	3
Elective or Concentration Course		3
Elective or Concentration Course		3
Master's Project		3
	Credit Hours	**15**
	Total Credit Hours	**30**

Mission

- Provide high-quality graduate education in basic and translational materials engineering that will prepare graduates for professional careers and a lifetime of learning.
- Conduct high-quality research that will advance the current body of knowledge and engage in new discoveries, and
- Serve the engineering profession and society through active involvement in professional organizations and contribution of professional expertise.

The program mission will be accomplished by providing an integrated and multidisciplinary scientific and technical education.

Graduates will be involved in translating scientific discoveries to modern technologies and novel products that benefit materials industry. The graduates will be trained in computational and experimental materials design, fabrication, characterization, and integration into devices.

Goals

The educational objectives of the Materials Engineering program are to produce graduates with:

- advanced technical knowledge in materials science and materials engineering
- advanced capability to apply scientific, technical and clinical knowledge to engineering problems
- potential to make significant contributions in Materials Structure & Fabrication, Materials Characterization, or Devices & Applications.

Student Learning Outcomes

- Students will demonstrate an advanced knowledge of the discipline (Structure & Fabrication, Characterization, or Devices & Application)
- Students will demonstrate an advanced ability to identify, formulate, and solve engineering problems to carry out supervised research.
- Students will demonstrate an advanced ability to generate technical contributions and effectively communicate them to the scientific community.