MTSCEG:PHD - Doctor of Philosophy in Materials Science and Engineering

Overview

Degree Offered
PHD - Doctor of Philosophy

Program Title
Materials Science and Engineering

The PhD in Materials Science and Engineering will prepare graduates for industrial and/or academic research, as well as for higher-level jobs in materials-related industry. Advanced materials are the foundation of manufactured products and many of the technological advances of this century were enabled by the development of new materials. The Materials Science and Engineering program offers specialization in metallurgy, ceramics, electronic materials, nanomaterials, and biomaterials. Because everything is made of materials and new materials, such as nanomaterials, are rapidly being developed, materials science and engineering is a growth field in engineering. This program provides an opportunity for students to enhance their technical knowledge and to conduct advanced research that can aid in their professional development and pursuit of research-related employment in the material science field.

For more information, visit the College of Engineering and Computing website.

To explore more about this program, visit the website below:
Program Website

Academic Group
College of Engineering and Computing

Diploma Title
Doctor of Philosophy in Materials Science and Engineering

Total Credits
75

CIP Code
14.1801

Requirements

Simple Requisites

Subplan

No Requirement Level

The requirements for admission to the doctoral program in Materials Science and Engineering for applicants having a Bachelor's degree in Materials Science and Engineering or in a related field, e.g. Mechanical Engineering, Electrical Engineering, Physics, Chemistry, and Geophysics from an accredited institution are the following:

(1) GPA of at least 3.0/4.0 in the last 60 credit hours attempted.

(2) Three letters of recommendation.

(3) International graduate student applicants whose native language is not English are required to submit a score for the Test of English as a Foreign Language (TOEFL) or for the International English Language Testing System (IELTS). A total score of 80 on the iBT TOEFL (equivalent to 550 on the paper-based version, or 213 on the computer-based version of the Test of English as a Foreign Language) or 6.5 overall on the IELTS is required.

(4) Applicants having a Master's degree in Materials Science and Engineering from an accredited institution must also satisfy the above requirements for admissions to the doctoral program; however, a GPA of at least 3.3/4.0 in the Master's program is also required.

Credentials of all other applicants will be examined by the Graduate Admission Committee on a case-by-case basis. In addition to the departmental requirements, all students must satisfy the University's Graduate Policies and Procedures.

The Ph.D. in Materials Science and Engineering will prepare graduates for industrial and/or academic research as well as for higher level jobs in materials related industry in one (or more) of five areas of specialization:

--Electronic Materials

--Nanotechnology

--Metals and Alloys

--Ceramics

--Polymer Science and Biomaterials

Applicants with a Bachelor's Degree

Applicants with a Bachelor's Degree are required to complete at least 75 credit hours, out of which at least 45 hours must be coursework and 15 hours dissertation. The credit hours earned towards the Ph.D. program have the following requirements:

(1) At least 21 credits at the 5000 level or higher, not to include dissertation.

(2) At least 12 credits at the 6000 level or higher, not to include dissertation.

(3) EML6908 Ind Studies counts for a maximum of 6 credit hours of coursework.

(4) EML6910 Supervised Research counts for a maximum of 6 credit hours of coursework.

(5) EML6935 Graduate Seminar (zero credits) should be registered every semester until the advancement to candidacy (D-2).

Applicants with a Master's Degree in Materials Science, Materials Engineering, and Metallurgical Engineering

Applicants having a Master's Degree in Materials Science, Materials Engineering, and Metallurgical Engineering are required to complete at least 45 credit hours, out of which at least 24 hours must be coursework and 15 hours dissertation. The credit hours earned towards the Ph.D. program have the following requirements:

(1) At least 12 credits at the 6000 level or higher, not to include dissertation.

(2) EML6908 Ind Studies counts for a maximum of 6 credit hours of coursework.

(3) EML6910 Supervised Research counts for a maximum of 6 credit hours of coursework.

(4) EML6935 Graduate Seminar (zero credits) should be registered every semester until the advancement to candidacy (D-2).

Applicants having a Master's Degree in any other Engineering discipline from an accredited institution may transfer a maximum of 24 semester hours from their previous course of study.

There are no majors associated with this program.

There are no tracks, specializations, concentrations, areas of emphasis, or other curricular offerings associated with this program.

Degree Program Credits
Type
Completion Requirement

Materials Science and Engineering Fundamentals Courses

These 3 or equivalent courses should be taken by all PhD students in Materials Engineering

Complete ALL of the following Courses:

- EMA5001 - Physical Properties of Materials
- EMA5106 - Thermodynamics and Kinetics of Materials
- EMA5507C - Analytical Techniques of Materials Science

Elective Courses

Possible elective courses from the Materials Engineering department include:

Fulfill ANY of the following requirements:

Metals and Alloys

Complete ANY of the following Courses:

- EMA5104 - Advanced Mechanical Properties of Materials
- EMA5295 - Principles of Composite Materials
- EGM6570 - Fracture Mechanics

OR

Electronic Materials

Complete ANY of the following Courses:

- EEE6315 - Advanced Solid-State Electronics
- EEE6399C - Electronic Prop Mat
- EMA5016 - Nanoelectronic Materials
- PHZ6426 - Advanced Solid State Physics
- PHZ5405 - Solid State Physics

OR

Ceramics

Complete ANY of the following Courses:

- EMA5140 - Introduction to Ceramic Materials
- EMA5646 - Ceramic Processing

OR

Polymers

Complete ANY of the following Courses:

- BME5105 - Biomaterial Science
- EMA6165C - Polymer Physics and Analytical Techniques
- EMA6264 - Mechanical Properties of Polymers
- EMA6665 - Polymer Processing and Engineering

OR

Analytical Techniques in Materials Science

Complete ANY of the following Courses:

- EMA6516 - Crystallography and X-ray Diffraction
- EMA6518 - Transmission Electron Microscopy
- GLY5287C - Scanning Electron Microscopy with EDS Analysis
- PHZ6437C - Surface Physics

OR

Nano Structured Materials

Complete ANY of the following Courses:

- EEE6315 - Advanced Solid-State Electronics
- EEE6332 - Thin Film Engineering
- EMA5015 - Introduction to Nanomaterials Engineering
- EMA5016 - Nanoelectronic Materials
- EMA5017 - Nanoparticle Technology
- EMA5018 - Nanoscale Modeling of Materials
- EMA5200 - Nanomechanics and Nanotribology

OR

Other Materials and Mechanical Courses

Complete ANY of the following Courses:

- EGM5354 - Finite Element Method Applications in Mechanical Engineering
- EGM6355 - Nonlinear Finite Element Analysis
- EMA5605 - Fundamentals of Materials Processing

- EML5103 - Intermediate Thermodynamics
- EML5562 - Advanced Electronic Packaging (Inactive)

Additional Comments:
It is important that there will be three 6000 level courses developed for each specialization.