Materials Science and Engineering, PhD

Program Description

Degree Awarded: PHD Materials Science and Engineering
The PhD program in materials science and engineering prepares students for professional careers in materials science and engineering and related fields in industry, government and educational institutions.

This field draws upon a fundamental base of knowledge, with underpinnings in physics, chemistry and engineering. The program extends that knowledge to address a broad range of materials-driven challenges, such as energy efficiency, sustainability, functional nanostructures, electronic materials, biomaterials and polymers.

Interdisciplinary in nature, the curriculum offers required courses in four core subjects:

- advanced thermodynamics
- kinetics and phase transformations
- physics of materials
- structure and properties of materials

At a Glance

- College/School: Ira A. Fulton Schools of Engineering
- Location: Tempe campus

Degree Requirements

84 credit hours, a written comprehensive exam, an oral comprehensive exam, a prospectus and a dissertation
**Required Core (12 credit hours)**
MSE 523 Structural and Mechanical Properties of Materials (3)
MSE 524 Advanced Thermodynamics (3)
MSE 525 Fundamentals of Electrical, Optical, and Magnetic Materials and Device Applications (3)
MSE 561 Phase Transformations, Kinetics and Diffusion in Solids (3)

**Electives (3-18 credit hours)**

**Research (24-39 credit hours)**
MSE 792 Research

**Other Requirement (3 credit hours)**
MSE 591 Seminar (3)

**Culminating Experience (12 credit hours)**
MSE 799 Dissertation (12)

**Additional Curriculum Information**
Students entering with a bachelor's degree are required to complete a minimum of 18 credit hours of elective coursework. Graduate elective courses may be selected from any of the graduate courses in the materials science and engineering curriculum as well as elective courses from related disciplines (e.g., chemistry, physics, electrical engineering), subject to approval by the faculty advisor. These courses should comprise a focused plan of study with emphasis in a particular area of materials science, organized in consultation with faculty supervisory committee.

Students entering the doctoral program with a master's degree need to complete 24 credit hours of research (MSE 792). Students entering with a bachelor's degree are required to complete 39 credit hours of research (MSE 792).

MSE 591 is a one credit hour course to be taken in three semesters. The seminar course consists of a series of seminars presented by invited speakers and graduate students. Doctoral students are required to give a seminar presentation once during the academic year after they have begun their research.

When approved by the student's supervisory committee and the Graduate College, this program allows 30 credit hours from a previously awarded master's degree to be used for this degree. If students do not have a previously awarded master's degree, the 30 hours of coursework is made up of electives and research coursework as specified by the academic unit. If the master's degree has not been completed, a maximum of 12 credit hours of graduate work may be applied with program approval.

**Admission Requirements**
Applicants must fulfill the requirements of both the Graduate College and the Ira A. Fulton Schools of Engineering.
Applicants are eligible to apply to the program if they have earned a bachelor's or master's degree in any field from a regionally accredited U.S. or international institution.

Applicants must have a minimum cumulative GPA of 3.00 (scale is 4.00 = "A") in the last 60 hours of their first bachelor's degree program, or applicants must have a minimum cumulative GPA of 3.00 (scale is 4.00 = "A") in an applicable master's degree program.

Admission to the materials science and engineering doctoral program is highly competitive. All applicants must submit:

1. graduate admission application and application fee
2. official transcripts
3. GRE scores
4. personal statement
5. resume or curriculum vitae
6. three letters of recommendation
7. proof of English proficiency

**Additional Application Information**
An applicant whose native language is not English must provide proof of English proficiency regardless of current residency.

Once the application file is complete, the file is forwarded to the faculty admissions committee for evaluation and recommendation.

The admission process considers all aspects of the student's application. The typical successful applicant has at least a 3.25 cumulative GPA (scale is 4.00 = "A") in engineering and science coursework in a bachelor's or master's degree program and has high GRE scores as well as high TOEFL scores for those whose native language isn't English.

Financial aid is available to highly qualified students. The most common type of financial aid is teaching and research assistantships, which are accompanied by tuition waivers and major medical insurance benefits. Other types of financial aid include Ira A. Fulton Schools of Engineering fellowships and Science Foundation Arizona fellowships.

**Application Deadlines**

**Career Opportunities**

Professionals with a materials science and engineering doctoral degree have strong opportunities at all levels in material design, selection, synthesis and characterization for a wide range of applications including electro-optical-magnetic systems, environmental systems, energy conversion and storage, manufacturing and construction. Materials jobs are available at a large number of high tech and manufacturing companies of all sizes as well as national (DOE, DOD, NASA) laboratories and
universities. Analytical skills learned in materials engineering are also valued for other non-engineering positions.

Career examples include:

- engineer
- engineering manager or director
- engineering professor
- research engineer

**Contact Information**

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Admission Deadlines