



# NEW – Graduate Certificates

Starting Fall 2024, The Materials Science and Engineering Department (MSE) at the University of Arizona is pleased to offer three new Graduate Certificates, providing participants a state-of-the-art experience on a path to enhanced opportunity in the semiconductor industry. The three certificates focus on: Microelectronics Packaging; Semiconductor Processing; and Materials Science and Engineering Fundamentals. Each certificate offers a streamlined educational experience for established professionals while providing a distinguishing credential for degree-seeking students interested in focusing their career path.

**Microelectronics Packaging:** The certificate provides a comprehensive overview of advanced electronic packaging technology with a focus on innovations in chiplet design, heterogenous integration and reliability engineering. The courses are specifically curated to address critical materials concepts, packaging principles, packaging architectures for multiple technological applications, advanced metrology, reliability analysis, and characterization methods and equipment.

- ◆ **MSE/ECE565 (3 units) – Microelectronic Packaging Materials**
- ◆ **MSE/ECE554 (3 units) – Electronic Packaging Principles**
- ◆ **MSE 580 (3 units) – Advanced Characterization Methods in Materials Science & Engineering**



*Christina Dinh, Materials Science and Engineering Master of Science graduate student at UA Nano Fabrication Center*

**Semiconductor/Microelectronics Processing:** The certificate incorporates a curriculum that bridges Materials Science and Engineering, Chemical Engineering, and Electrical and Computer Engineering. Courses address semiconductor material preparation, materials fabrication methodologies, multimaterial patterning and assembly leading to microelectronic device fabrication, as well as semiconductor processes that have direct environmental implications. As part of the certificate, learners get hands-on training within UA's recently updated and equipped NanoFab and Processing Facility (NF&P), enabling an immersive experience with state of the art semiconductor processing modules.

- ◆ **MSE/ ECE 546 (3 units) – Semiconductor Processing**
- ◆ **MSE/ECE 547L (2 units) – Semiconductor Processing Lab**
- ◆ **MSE/ECE/CHEE 515 (3 units)–Microelectronics Manufacturing and the Environment**
- ◆ **MSE 595A (1 unit) – Materials Colloquium**

**Materials Science and Engineering Fundamentals:** The certificate offers courses that focus on the kinetic and thermodynamic concepts central to the development and application of new and existing materials and processes that enable semiconductor technology, optics, advanced manufacturing, and space science. Students coming to the certificate with limited MSE experience may include a course addressing Engineering Materials: Properties and Selection that provides an introduction to multiscale structural concepts and their impact on properties.

- ◆ **MSE 510 (3 units) – Thermodynamic Characterization of Materials**
- ◆ **MSE 572 (3 units)– Kinetics Processes in Materials Science**  
Required – select one of the following:
- ◆ **MSE 502 (3 units) – Research Proposal Preparation**
- ◆ **MSE 531a (3 units)– Engineering Materials: Properties and Selection**

To apply please visit [www.grad.arizona.edu](http://www.grad.arizona.edu)  
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