

Microelectronics



# Semiconductor Packaging, Assembly, and Test

## Overview

Gain proficiency in applications and core principles driving semiconductor manufacturing operations and packaging, assembly, and testing. Empower yourself with the essential skills demanded by today's semiconductor industry and revolutionize your understanding of semiconductor technology. This level 2 badge equips you with practical skills to thrive in a rapidly evolving landscape.

## Key Skills Covered

- 2D electronic packaging processes, chip packages, PC board assembly, and JEDEC/IPC standards.
- Thermo-mechanical and electrical performance evaluation
- Electrical and thermo-mechanical modeling
- Quality and reliability testing and harness powerful tools for data analysis

- Live instruction by Hongbin Yu, David Theodore, Terry Alford, and Chris Bailey
- Earn an ASU Engineering Badge to showcase your new skills
- See each micro-badge for student pricing
- Live via Zoom

Take one micro-badge or complete all four to earn the badge! More details about each micro-badge below.

<p><b>2D Packaging and Assembly</b> Oct. 7-10, 2024   5:30–9:00 p.m. MST Scroll down for more info</p>	<p>Explore the intricacies of 2D packaging and assembly, from wafer processing to chip packaging and PC board assembly, and understand their applications in thermal management, stress mitigation, and electrical performance, which are cornerstones of modern semiconductor packaging.</p>
<p><b>Materials Selection for Thermo-Mechanical and Electrical Performance</b> Oct. 14–17, 2024   5:30–9:00 p.m. MST Scroll down for more info</p>	<p>Uncover the intricacies of material properties and understand the applications of thermal and electrical characteristics, which are cornerstones of modern semiconductor manufacturing. Dive into key topics such as thermal conductivity, electrical conductivity, mechanical strength, and thermal expansion coefficients, and harness the power of advanced tools and platforms.</p>
<p><b>Application of Electrical and Thermo-Mechanical Modeling</b> Oct. 21–24, 2024   5:30–9:00 p.m. MST Scroll down for more info</p>	<p>Understand the core principles and applications behind semiconductor operations and advanced modeling techniques. Equip yourself with the vital skills required by today's electronics industry and transform your approach to package modeling.</p>
<p><b>Test and Data Analysis for Quality and Reliability</b> Oct. 28–31, 2024   5:30–9:00 p.m. MST Scroll down for more info</p>	<p>Acquire a comprehensive understanding of how data analysis drives quality, performance, and reliability in modern electronics. Master essential testing techniques, delve into effective failure analysis methods, including both destructive and non-destructive techniques, and harness powerful tools for statistical data analysis.</p>

## What you'll earn!

Participants will earn a digital micro-badge from the Ira A. Fulton Schools of Engineering for each micro-badge completed and the full badge when completing all four micro-badges. Participants will also qualify for Continuing Education Units (CEU).



Start your **Semiconductor Packaging** journey today!

## 2D Packaging & Assembly



### Overview

Develop expertise in the applications and core principles driving semiconductor manufacturing operations and 2D packaging and assembly utilization. Enhance your skillset with the essential skills demanded by today's semiconductor industry and elevate your knowledge of packaging technologies.

### Course Description

Embark on a journey into semiconductor packaging with the 2D Packaging and Assembly micro-badge. Explore the intricacies of material properties and understand their applications in thermal management, stress mitigation, and electrical performance, which are cornerstones of modern semiconductor packaging.

Tailored for forward-thinking individuals ready to embrace the future of semiconductor packaging, this micro-badge equips you with practical skills to thrive in a rapidly evolving landscape. Dive into key topics such as lead frames, wire bonding, flip chip technology, underfill substrates, and PCB assembly. Understand the terminology, key processes, and tools essential for 2D packaging and assembly, and harness the power of advanced materials to optimize package performance.

### Session Topics:

- Importance of 2D packaging techniques
- Types of lead frames and their applications
- Lead frame materials and manufacturing processes
- Fundamentals of wire bonding
- Common failure modes in wire bonding
- Advantages and challenges of flip chip technology
- Introduction to PCB assembly, inspection and quality control in PCB assembly

### Key Skills Covered:

- Lead frame assembly
- Wire bonding techniques
- Flip chip technology
- PCB assembly processes

**Instructional sessions will be held via Zoom:**

- Monday, Oct. 7, 2024, 5:30–9:00 p.m.
- Tuesday, Oct. 8, 2024, 5:30–9:00 p.m.
- Thursday, Oct. 10, 2024, 5:30–8:30 p.m



**\$499-\$75 for current ASU students**

**20 SWAP Hub scholarships are available to make this program free! Click here to complete your application.**

**SWAP Hub Scholarship**

**No prior experience is required!**

**Spots are limited!**

**Register today**

# Materials Selection for Thermo-Mechanical & Electrical Performance



## Overview

Master the applications and core principles driving semiconductor manufacturing operations and advanced materials selection for thermo-mechanical and electrical performance. Equip yourself with the essential skills demanded by today's semiconductor industry and revolutionize your knowledge of material properties.

## Course Description

Step into the semiconductor industry with the Materials Selection for Thermo-Mechanical & Electrical Performance micro-badge. Explore the intricacies of material properties and understand the applications of thermal and electrical characteristics, which are cornerstones of modern semiconductor manufacturing.

Designed for forward-thinking professionals ready to embrace the future of semiconductor manufacturing, this micro-badge equips you with practical skills to thrive in a rapidly evolving landscape. Dive into key topics such as thermal conductivity, electrical conductivity, mechanical strength, and thermal expansion coefficients, and harness the power of advanced tools and platforms.

## Session Topics:

- Thermal conductivity, electrical conductivity, mechanical strength, and thermal expansion coefficients
- Impact of Material Properties on Package Performance and Reliability
- Thermo-mechanical Challenges in Semiconductor Packaging
- Electrical Challenges and Isolation Requirements
- Material Evaluation Techniques for Semiconductor Packages
- Traditional and Advanced Materials in Semiconductor Packaging
- Practical Application of Material Selection

## Key Skills Covered:

- Understanding fundamental thermo-mechanical and electrical properties
- Analyzing thermo-mechanical and electrical challenges in packaging
- Evaluating and selecting appropriate materials for specific applications
- Applying material science principles to enhance package performance

~~\$499~~ \$75 for current ASU students



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SWAP Hub Scholarship

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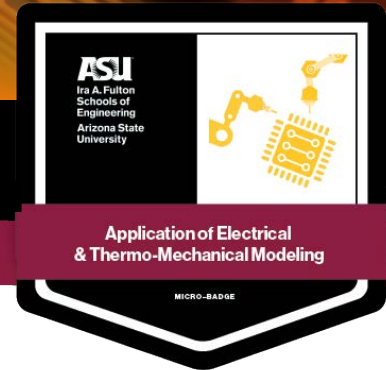
## Instructional sessions will be held via Zoom:

- Monday, Oct. 14, 2024, 5:30–9:00 p.m.
- Tuesday, Oct. 15, 2024, 5:30–9:00 p.m.
- Thursday, Oct. 17, 2024, 5:30–8:30 p.m

Spots are limited!

Register today

# Application of Electrical & Thermo-Mechanical Modeling



## Overview

Understand the core principles and applications behind semiconductor operations and advanced modeling techniques. Equip yourself with the vital skills required by today's electronics industry and transform your approach to package modeling.

## Course Description

Enter the semiconductor industry with the Application of Electrical & Thermo-Mechanical Modeling Mirco badge. Delve into the complexities of electronic package modeling and grasp the applications of electrical, thermal, and mechanical modeling, essential to modern electronics. Whether you're an aspiring engineer or a seasoned professional, this online course will unlock the potential of advanced modeling techniques in semiconductor packaging.

Tailored for forward-thinking professionals, this course provides practical skills needed to excel in a rapidly evolving field. Master modeling techniques, explore thermal management solutions, and utilize powerful simulation tools.

## Session Topics:

- Electrical Properties and Design Considerations
- Thermal Design and Analytical Models
- Process and Mechanical Design and Models
- Electrical, Thermal, and Thermo-Mechanical Analysis and Optimization
- Key material parameters and their significance in Semiconductor Packaging
- Practical Application: Simulation and Optimization Techniques

## Key Skills Covered:

- Understand image convolution techniques
- Design and structure CNN models
- Train and evaluate CNNs in TensorFlow
- Debug and customize CNN code

**\$499 \$75 for current ASU students**



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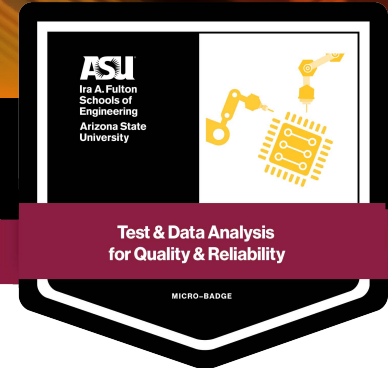
**Instructional sessions will be held via Zoom:**

- Monday, Oct. 21, 2024, 5:30–9:00 p.m.
- Tuesday, Oct. 22, 2024, 5:30–9:00 p.m.
- Thursday, Oct. 24, 2024, 5:30–8:30 p.m.

**Spots are limited!**

**Register today**

# Test & Data Analysis for Quality & Reliability



## Overview

Cultivate a deep understanding of the applications and core principles driving semiconductor operations and advanced modeling techniques. Obtain yourself with the vital skills required by today's electronics industry and transform your approach to package modeling.

## Course Description

Immerse yourself in the semiconductor industry with the "Test & Data Analysis for Quality & Reliability" course, where you will explore the intricacies of electronic package testing. Acquire a comprehensive understanding of how data analysis drives quality, performance, and reliability in modern electronics.

Tailored for forward-thinking individuals, this course equips you with practical skills to thrive in a dynamic field. Master essential testing techniques, delve into effective failure analysis methods, and harness powerful tools for data analysis.

## Session Topics:

- Testing Electronic Packages
- Manufacturing Data and Statistical Process Control (SPC)
- Techniques for Conducting Failure Modes, Mechanisms, and Criticality Assessment (FMECA)
- Test standards like JEDEC, Mil-Spec, and IPC for quality and reliability tests, including Electrical Performance, Thermal Cycling, Preconditioning, and Accelerated Life Tests (HALT and HAST)
- Techniques for failure analysis, including both destructive and non-destructive methods such as CSAM, FIB, cross-sectioning, microscopy, and CT tomography
- Techniques for analyzing test data, including statistical distributions like Weibull Analysis

## Key Skills Covered:

- Data collection and analysis from packaging processes
- Application of Failure Modes, Effects, and Criticality Analysis (FMECA)
- Interpretation of test conditions for quality and reliability assessment
- Statistical analysis of test data, such as HALT and HAST, using statistical methods like Weibull distributions

**\$499 \$75 for current ASU students**



**20 SWAP Hub scholarships are available to make this program free! Click here to complete your application.**

**SWAP Hub Scholarship**

**No prior experience is required!**

**Instructional sessions will be held via Zoom:**

- Monday, Oct. 28, 2024, 5:30–9:00 p.m.
- Tuesday, Oct. 29, 2024, 5:30–9:00 p.m.
- Thursday, Oct. 31, 2024, 5:30–8:30 p.m.

**Spots are limited!**

**Register today**