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Offered Summer and Spring

**CIP Code**
15.9999 - Engineering/Engineering-Related Technologies/Technicians, Other.

**SOC Code**

<table>
<thead>
<tr>
<th>Standard Occupational Classification (SOC)</th>
<th>Standard Occupational Classification Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO MATCH</td>
<td>NO MATCH</td>
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</tbody>
</table>

**Course Level**
Technical

**Is this an international course?**
No

**Grading Basis**
Graded

**Grading Procedures**

<table>
<thead>
<tr>
<th>Graded Element</th>
<th>% of overall course grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Exercises</td>
<td>40</td>
</tr>
<tr>
<td>Assignments / Quizzes / Exams</td>
<td>40</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
</tr>
</tbody>
</table>

**Upload Sample Syllabus**

**Course Hours**

**Minimum Credit Hours**
3

**Maximum Credit Hours**
3

**Is this course repeatable for credit?**
No

**Course Components**

Lecture
Laboratory

**Component Hours, ILUs, and Seats**

Lecture:
Contact Hours
ILUs
2
Seats
12

Laboratory:
Contact Hours
2
ILUs
1.7
Seats
12

Total Course Contact Hours
4

Special Fees

Special Fee
Yes

Type of Fee
Credit Lab
Amount
75.00

Catalog Information

Crosslisted

Course Description
The course focuses on microelectronic integrated circuit (IC) and chip-on-board packaging. The student will be introduced to common packaging techniques and equipment used in the industry such as epoxy die attach, thermosonic wire bonding of 0.001” diameter wire, encapsulation, and microscope metrology.

Prerequisite
MEMS 122

Corequisite
None

Concurrent
None

Course Placement Policy
Topical Outline: Please enter each of the Topical Outline items as a bullet.

- Introduction to Microelectronic Packaging
- Application of MEMS vs. Microelectronic devices in the packaging industry
- Package types:
  - Die Attach –
    - General methods, materials, and quality standards
    - Equipment operation: Manual and semi-auto epoxy die attach
- Thermosonic wire bonding
  - Theory, general methods, materials, and equipment terminology
  - Wire bond metallurgy and intermetallic formation
  - Ball vs. Wedge bonding:
    - Equipment operation: Semi-auto thermosonic Au ball bonding
- Equipment operation: Semi-auto thermosonic Al/Au wedge bonding
- Wire bond Pull and Shear Testing
  - Methods and quality metric
  - Equipment operation: Semi-auto pull & shear tester
- Encapsulation
- Reliability testing via MilSTD 883

College Ready Requirement

English

Reading

Math

Course Outcomes and Assessment

Outcome Number:
1

Outcome
Explain terminology, processes, materials, and standards used in the manufacturing, testing, and application of microelectronic and MEMS packaging.

Domain
Cognitive

Assessment Tools
Examination
**Assessment Method**
Rubric

**Benchmark %**
70% of students will earn 70% or higher on selected instrument

**Other Benchmark**

**Corresponding GE Outcomes**

C1 English
C2 Mathematics
C3 Science
In1 Critical Thinking

**Outcome Number:**

2

**Outcome**

Assemble a functional Chip-on-Board PCB with sensors using standard packaging and PCB manufacturing equipment, processes, and materials.

**Domain**

Psychomotor

**Assessment Tools**

Laboratory exercise
Assessment Method

Rubric

Benchmark %

70% of students will earn 70% or higher on selected instrument

Benchmark %

Other Benchmark

Corresponding GE Outcomes

C1 English
C2 Mathematics
C3 Science
In1 Critical Thinking

Outcome Number:

3

Outcome

Operate a thermosonic ball bonder quickly and effectively including the full setup for wire bonding 0.001” diameter wire.
Domain

Psychomotor

Assessment Tools

Laboratory exercise
Skills Assessment

Assessment Method

Item Analysis
Rubric

Benchmark %

70% of students will earn 70% or higher on selected instrument

Benchmark %

Other Benchmark

Corresponding GE Outcomes

C1 English
C3 Science
In1 Critical Thinking
General Education/Other

Type of Course

Technical

Core Course Outcomes

Core Course Outcomes

Infused Course Outcomes

Infused Course Outcomes

Infused Course Outcomes

In1 Critical Thinking: Employ critical thinking skills in addressing issues and problems.

Experiential Learning

Does this course have an experiential component?

No

Suggested Instructional Method(s) and Technique(s)

Lectures: Explanation of concepts and applications

Demonstration: Presentation of analysis techniques

Lab Exercises: Conducting lab experiments

State Articulation and Transfer

Transfer Module:

None

Transfer Assurance Guide and Career Technical Credit Transfer

Accreditation/Licensure/Certification

Does this course prepare or substantially prepare a student for a license or certification?

Note: This section applies to an individual course that may have a certification and/or licensure. (e.g. CPR course)

No
Additional Resources

Required Materials
Materials/documentation provided by the instructor from a variety of current sources.

Optional Materials

Additional Notes

Rationale

Rationale and Dean's Statement of Support

Attach Additional Support Documentation

Reviewer Comments

Key: 1696

Select any proposals you would like to bundle together for approval. Only proposals you have saved are available to bundle.

Bundle Title:

Course:
Proposal A

Program:
Proposal B