ECE/ME 4754 Electronics Packaging Assembly (Elective)

Catalog Description: ECE/ME 4754 Electronics Packaging Assembly (3-0-3)
Prerequisites: ECE 3040 Microelectronic Circuits or ECE 3710 Circuits and Electronics
Crosslisted with ECE, ME, and MSE.
The course provides hands-on instruction in electronics packaging, including assembly, reliability, thermal management, and test of next-generation microsystems.


Topics Covered:
1. Introduction to System-On-Package
2. Introduction to packaging and assembly and its interdisciplinarity: electrical, mechanical, thermal, materials, chemical processes
3. Thermo-mechanical modeling and design for reliability of interconnections
4. Flip-chip assembly materials and processes
5. Heat transfer and thermal management
6. Non-destructive inspection
7. Failure analysis
8. Laboratory safety

Course Outcomes:

Outcome 1: Students will understand why and how any semiconductor device is packaged and assembled.

Outcome 2: Students will understand interdisciplinarity of packaging involving electrical, mechanical, thermal, materials, and processes.

Outcome 3: Students will understand the role of interconnection and assembly materials to meet electrical and mechanical requirements.

Outcome 4: Students will understand the need for thermal management and various heat transfer mechanisms.

Outcome 5: Students will understand the electrical failure mechanisms due to fatigue behavior of metals.

Outcome 6: Students will understand chemical safety in handling a variety of chemicals.
Correlation between Course Outcomes and Student Outcomes:

<table>
<thead>
<tr>
<th>Course Outcomes</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Outcome 1</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Course Outcome 2</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Course Outcome 3</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Course Outcome 4</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Course Outcome 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Course Outcome 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

GWW School of Mechanical Engineering Student Outcomes:

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Prepared by: Rao Tummala