ENME 473/ENME 690
Mechanical Fundamentals of Electronic Systems
Fall 2017

MW 2:00 – 3:15                JMP 2121

Instructor:
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Teaching Assistant:
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                                E-mail: byklife@gmail.com

Office Hrs: Monday and Wednesday 12:00 PM– 1:00 PM (or by appointment)

Philosophy of the Course:
There has never been a more exciting time to be involved in the integration and packaging of
electronics. Electronics are embedded in every facet of our lives and their influence in our lives
continues to grow. Clever packaging has created the tabletop display, wearable electronics, and
implantable biological control systems. The design of these electronic systems requires
engineering expertise from many different disciplines. In fact, cost, performance, size,
manufacturability, quality, reliability, and even commercial success of electronic systems are often
more a function of mechanical design than electrical design. The objective of the course is to
introduce seniors and first year graduate students to the principles of mechanical engineering
required for designing reliable electronic systems and to lay the groundwork for further study in
this area. Students will master the necessary background science and mathematics to become
proficient designers of electronic enclosures. Furthermore, interpersonal, teamwork, and
communication skills will be developed through practical design projects. Course topics will
include fundamental principles of active and passive electronic devices; MEMS and microsystems;
electrical signal theory, design and manufacturing of components, circuit boards, connectors, and
assemblies; and vibration, shock, fatigue, and thermal analysis of assemblies. The course will
culminate in the deconstruction analysis of actual electronic systems and the design of improved
packaging for these products.
Reference books:


Course Outline (subject to change):

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<tr>
<th>LECTURE TOPICS</th>
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<tr>
<td>Introduction to Electronic Packaging</td>
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<tr>
<td>Semiconductor Device</td>
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<td>Wafer Level Processing Technology</td>
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<tr>
<td>Plastic Encapsulated Microelectronics (Materials)</td>
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<td>Plastic Encapsulated Microelectronics (Fabrication Process)</td>
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<td>Plastic Encapsulated Microelectronics (Assembly &amp; Handling)</td>
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<td>Printed Wiring Board Technology (Fabrication)</td>
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<td>Printed Wiring Board Technology (Reliability)</td>
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<td>Fundamentals of Flip Chip Technology</td>
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<td>Advanced Flip Chip Technology</td>
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<td>Ball Grid Array Technology</td>
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<td>Through-Silicon-Via (TSV) Technology</td>
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<td>Light Emitting Diode (LED)</td>
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<td>SOC-SIP-SOP</td>
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<td>IGBT and its reliability</td>
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<td>Automotive Electronics</td>
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<td>Accelerated Life Testing</td>
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<td>Failure analysis</td>
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<td>Cost analysis</td>
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Attendance: Sitting in or auditing the class will not be permitted without the consent of the instructor. Attendance will be taken periodically.

Website: Course notes, homework assignments, homework and exam answers, and discussion questions will be posted at the CANVAS.

Grading Policy

Undergraduate Grading: Out of 100%

- Mid-term: 40%
- Final exam: 40%
- Group project presentation: 10%
- Final report: 10%

Graduate Grading: Out of 120%

- Mid-term: 40%
- Final exam: 40%
- Group project presentation: 10%
- Final report: 10%
- Graduate Project: 20%

Final exam is Saturday, December 16 1:30-3:30pm

Class Project and Graduate Project will be announced around the end of September.

Academic Honesty:

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu.