IME 156 - Basic Electronics Manufacturing – Spring 2019 Lecture Syllabus

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Welcome to the IME 156 Lecture! Here we'll explore how modern electronics are manufactured from engineered materials into systems like cell phones, spacecraft and medical systems. We generally refer to this as electronic *packaging*, which encompasses the interconnections and protective enclosures built into and around electronic devices.

Electronics are shrinking while becoming faster and more power efficient, largely due to improvements in the way they are *packaged*. Manufacturing precision is now on the scale of tens of nanometers and the surrounding packaging systems interconnecting it all has had to follow. This lecture course will highlight how design and manufacturing of packaging has progressed to bring practical, useful and life-saving devices into everyday life in even the remote villages of the world.

Some of the learning outcomes of this course are:

- Collaborate in groups to solve manufacturing-related problems using understanding of concepts.
- Identify the corresponding packaging level from a description of an electronic component or assembly process.
- Describe the materials of construction, order of fabrication and key components of a PCB.
- Name several of the Integrated Circuit (IC) package types found in electronics devices.
- Identify electrically conductive, insulating, and semiconducting materials and applications in various devices.
- Describe the semiconductor types given a list of their materials of construction.
- Rank the performance of component packages and lead styles given descriptions of their features.
- Discern between various testing and troubleshooting methods and how they are applied.
- Choose appropriate inspection methods for electronics assemblies and the environmental impacts.

Given ten brief meetings to explore a vast area of technology, we'll use a combination of videos, short reading assignments and lectures along with in-class discussions and quizzes. There are group activities (quizzes) in most or all lecture meetings so attendance is critical for success. Some modules will have a pre-class assignment and quiz to prepare for the activities in lecture. The activities are organized by week on the PolyLearn (PL) site for the lecture.

On day 1, groups of 2-3 will be selected for participation in class activities, quizzes and midterms throughout the quarter. Attendance is mandatory for credit on in-class quizzes and group participation with activities.

Pre-class individual assignments on PL (reading, videos, short video lectures, quizzes) are due before each class or **AS NOTED ON PL**. **These are your individual responsibility to complete**. There are no extensions or make-ups for these quizzes. Your learning and your participation are your responsibility. Success is best accomplished by: **attending class, checking PolyLearn and your email regularly for updated assignments for this course.**

The tentative schedule of weekly topics and pre-assignments are as follows (see PolyLearn for assignments):

Session	LECTURE TOPICS / EXAMS	PRE-CLASS ASSIGNMENT
1	Course Overview & intro Microsystems Packaging	Pre-read Syllabus, videos & take pre-quizzes on PL
2	PCB Fabrication	Pre-read lec notes & take in-class quiz on PL
3	PCB Assembly	Pre-read PCB Assembly & Hand soldering video & quiz
4	IC Fabrication	Watch from Sand to Si Video & take quiz on PL
5	**In-class Group Quiz**	Review notes and bring questions to class
6	**Midterm I – Group Exam**	Pre-Watch IC Assy Video & take quiz on PL
7	IC Assembly	Pre-read IC Assy notes & take quiz on PL
8	Electrical Testing & Systems Packaging	Pre-Watch Testing Video & take quiz on PL
9	Advanced Packaging	TBD
10	**Midterm II - Group Exam**	TBD

Attendance: In-class quizzes and activities contribute significantly toward grade. **Missed in-class quizzes can only be made up if notification of absence is made before the end of the class missed and only in office hrs.**

Grade: The lecture portion of IME156 counts for 40% of the total course grade (lab contributes 60%). Final course grade is assigned by your lab instructor. Students are responsible for on-time attendance and assignments in lab and lecture.

~65% Midterms & review quiz: Two team-based midterms 25% each & quiz 15% (total **65%**). Questions are based on lectures, videos and in-class activities. Midterms are NOT returned, but you are encouraged to review them during office hours. Extra credit points may be awarded after exams if reviewed in-person.
~35% Assignments on PolyLearn: There are quizzes with firm deadlines or in-class worth approximately 35% of points on PolyLearn. Check PolyLearn every week of the quarter for details. **Missed quizzes affect grade**.