ECE414/514 MICROSYSTEM INTEGRATION & PACKAGING

Instructor: Prof. J. E. Morris Office: FAB160- 13 Tel: (503)725-9588
Office hours: Mon 4-5pm; Wed 10-11am jmorris@cecs.pdx.edu
Lectures: Mon/Wed 2.00 - 3.50pm in FAB-40-09
Download course info/notes from: http://www.ece.pdx.edu/~jmorris/ECE 414 & 514 Electronics Packaging/
Prerequisite: Senior or graduate standing in ECE or MME

Week		Monday Lecture	Wednesday Lecture
1	April 02/04	1 Introduction A [1,2]	2 Introduction B [4]
2	April 09/11	3 Electrical A: CMOS, RLC, ΔI [2]	4 Electrical B: Transmission lines [3,5]
3	April 16/18	5 Electrical C: Reflections [3]	6 Electrical D: Crosstalk
4	April 23/25	7 Electrical E: Electromagnetic	8 Mechanical A: Basics; vibrations [13]
5	Apr30/May2	9 Mechanical B: Thermomech [12]	10 Mechanical C: Viscoelasticity
6	May 07/09	11 Thermal A: Conduction [9]	12 Thermal B: Convection/Rad'n [10]
7	May 14/16	13 Materials A: Metals & solder [6,7]	14 Materials B: Ceramics & polymers
8	May 21/22	15 Reliability A: Theory [14]	16 Reliability B: Failure modes I [15]
9	May 28/30	Memorial Day	Final Exam
10	June 04/06	17 Graduate project presentations	No lecture
		Exam Week	

Electronics packaging covers all technologies involved in device manufacture and design from the chip to the board. In modern devices, it is usually the package which limits system performance, and its cost can greatly exceed the cost of the silicon chip it supports. Packaging engineers are therefore much in demand, due also to the fact that the field's inherently multi-disciplinary nature creates a shortage of qualified people. Modern practice calls for chip/package co-design, making an understanding of packaging principles a must for all IC designers. The primary objective of the course will be to develop the underlying principles and theory relevant to packaging applications.

Text: Dally, Lall & Suhling "Mechanical Design of Electronic Systems" College House (2008)
Reference texts: Rao Tummala (editor) "Fundamentals of Microsystems Packaging" McGraw-Hill (2001)
R. Ulrich & W.D.Brown (editor) "Advanced Electronic Packaging, 2nd edition" IEEE Press (2005)

Supplementary reading:

- Suhir, Lee, Wong "Micro- & Opto-electronic Materials & Structures, Vols 1&2" Springer (2007)
- Pecht et al "Integrated Circuit, Hybrid, & MCM Packaging Design Guidelines" Wiley (1994)
- J.E. Morris (editor) "Electronics Packaging Forum: Vols 1 & 2" VNR (1990) (now Springer)
- J.E. Morris (editor) "Electronics Packaging Forum: MCM Issues" IEEE Press (1994)
- J.E. Morris (editor) "Nanopackaging: Nanotechnologies & Electronics Packaging" Springer(2008)
- S. Liu & Y. Liu "Modeling & Simulation for Microelectronic Packaging Assembly" Wiley (2011)
- Download book: Happy Holden http://hdihandbook.com/
- Download book: Joseph Fjelstad http://www.flexiblecircuittechnology.com/third.php

See also ITRS and iNEMI packaging roadmaps www.itrs.net & www.inemi.org
IEEE Components, Packaging & Manufacturing Technology (CPMT) Society www.cpmt.org
International Microelectronics & Packaging Society (IMAPS) www.imaps.org

	ECE414	ECE514
Assignments (8, assigned & due Wed)	50%	40%
Mid-term (take home: lectures 1-9)	25%	20%
Final exam (lectures 10-16)	25%	20%
514 project	XXXX	20%

Students are encouraged to collaborate in preparation for homework problem assignments, but all work finally turned in must be the product of the individual student. Evidence of cheating can result in grade penalties and severe disciplinary action, in accordance with PSU policies. In this regard, a satisfactory (non-zero) performance on all assignments and projects is a requirement for course completion. There will be no "make-up" or "extra-credit" assignments. Late assignments will not be accepted. Previously excused absences on test dates and those supported by medical documentation will be handled on an ad hoc basis.

Seminars (attendance is expected at two of these seminars in lieu of three less lectures than usual):
ECE507 Seminar: Microelectronics Monday 12.00-13.30 FAB155
(will include ECA and Package Reliability seminars ….. dates TBA)
Wed April 25th CPMT DL seminar: "Design of 3D Specific Systems" Paul Franzon, NCSU
& SMTA speaker: "Printing Fine Detail" Rick Love, Cookson Electronics