E3 262 AUG 2:1

ELECTRONICS SYSTEMS PACKAGING

Instructor

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Teaching Assistant

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Department: Electronic Systems Engineering (ESE)

Course Time: Monday, Wednesday 12noon to 1pm

Lecture venue: ESE Auditorium

Detailed Course Page: http://esp.dese.iisc.ac.in/academics/

Announcements

1. Core Course for DESE MTech students.

2. ESE MTech should take this course only in their third term.

3. Other department students welcome to credit the course including PhD students.

4. Course in multi-disciplinary in nature.

5. Course is 2:1 with enough lab content.

Brief description of the course

**Whom will the course benefit:?

Engineers working in system development, manufacturing in electronics sector, Printed circuit board manufacturing, and assembly, packaging of electronic products with miniaturization.

**Course Outline and Objectives:

The course will sensitize the participants to the fundamentals of electronics systems packaging. The course is

multidisciplinary in nature. Todayâ€™s products in electronics industry need to be packaged to current state-of-art if it has to be in the leading edge market. Hence systems packaging is essential which the course will detail.

Prerequisites

No prerequisites.

Students from electrical and electronics, mechanical and instrumentation background can register for the course.

Course is highly process technology centric in the fields of semiconductor and chip packaging, board and system level packaging for various application areas.

Syllabus

Electronic systems and needs, physical integration of circuits, packages, boards and complete electronic systems; system applications like computer, automobile, medical and consumer electronics with case studies and packaging levels. Electrical design considerations - power distribution, signal integrity, RF package design and Power-delivery in systems. CAD for Printed Wiring Boards (PWBs) and Design for Manufacturability (DFM). PWB Technologies, Single-chip (SCM) and Multi-chip modules (MCM), flex circuits. Recent trends in manufacturing like microvias, sequential build-up circuits and high-density interconnect structures. Materials and processes in electronics packaging, joining methods in electronics; lead-free solders. Surface Mount Technology â€“ design, fabrication and assembly, embedded passive components; thermal management of PWBs, thermo-mechanical reliability, design for reliability, electrical test and green packaging issues, Assignments in PCB CAD; Hands-on lab sessions for board manufacturing and assembly.

Course outcomes

1. Student masters the fundamental knowledge of electronics packaging including package styles or forms, hierarchy and methods of packaging necessary for various environments.

2.Provide pathway for further studies in packaging if the student is inclined to do so.

3. Provide industry perspective

4. Ability to distinguish between engineering performance and economic considerations to develop cost-efficient and high performance packaging approaches. Students should be able to predict the reliability of electronic components and structures.

Grading policy

1. 30% for hand-written assignments and mid-term tests.
2. 20% for CAD assignments
3. 20% for mini-project and
4. 30% for final examination (3-hour paper).

Assignments

Assignments are given in PCB CAD and process technology, assembly and testing. Lab instructor gives feedback after each assignment to student especially in CAD assignments. CAD assignments are aimed to train students for the industry.

Resources

1. Rao R. Tummala, Fundamentals of Microsystems Packaging, McGraw Hill, NY, 2001
2. Rao R Tummala & Madhavan Swaminathan, Introduction to System-on-Package, McGraw Hill, 2008
3. R S Khandpur, Printed Circuit Boards, McGraw Hill, 2006
4. Class Notes and other references provided during the course
5. NPTEL lectures hosted in NPTEL website, lectures by G V Mahesh, titled "Fundamentals of Electronics Systems Packaging".