The University Of Sheffield.

Electronic & Electrical Engineering.

EEE6393 MICROSYSTEM PACKAGING

Credits: 10

Course Description including Aims

The unit describes methods to enable functional microsystems to be built from electronic, optical and micro-electromechanical components. The course explains the key challenges within the area of microsystem packaging. Students are provided with a detailed description of three key aspects of electronic device packaging, components, integration and manufacture. Emphasis is given to practical solutions to modern microsystem packaging challenges.

The course covers three topic areas:
Components. The packaging of individual devices, including silicon integrated circuits, radio-frequency Si and compound semiconductor ICs, optical sources and detectors and micro-electromechanical devices, such as sensors and actuators.
Integration: The use and choice of substrates, component–substrate interconnection and system level assembly.
Manufacture: The industry of packaging, with emphasis on issues such as manufacturability, reliability and test.

Outline Syllabus

Introduction. Brief resume of semiconductor components and issues in electronic systems. General principles of component and systems packaging. **Components.** Issues in the packaging of Integrated circuits, RF devices, MEMS and Optoelectronics. **Integration**.Issues in substrate choice, Component – Substrate Interconnection and System Level assembly. **Manufacture**. Thermal behavior, Electrical noise and crosstalk. The need to test and testing methods. Component and system reliability, electronic systems design, economics, the environment and current legislation.

Time Allocation

16 hours of lectures plus 6 hours of additional contact time.

Recommended Background Knowledge

A first degree in EEE, Physics or equivalent. Knowledge of basic semiconductor theory, elementary thermal physics and elementary optics would be an advantage.

Assessment

2 hour formal examination

Recommended Books

Tummala R	*Fundamentals of Microsystem Packaging*	McGraw Hill, 2001
Wu B, Kumar A and Ramaswami S	*3D IC Stacking Technology*	McGraw Hill 2011
Sergent JE	*Hybrid Microelectronics Handbook*	McGraw Hill, 1995

Other books

Hannermann RJ	*Physical Architecture of VLSI Systems*	Wiley, 1994
Lau JH	*Flip Chip Technologies*	McGraw Hill, 1995

Objectives

On completion of the module successful students will be able to

1. Demonstrate an understanding of the range of technologies available for microsystem design and manufacture.
2. Assess the needs of a particular design – being able to choose and justify packaging options (both technologically and economically)
3. Understand the thermal and electrical (or optical) signal behavior of component – interconnect – substrate combinations.