ICGEE Curriculum available for 2011/2012 Academic Year

Microsystems Engineering

Module Title:	Microsystems Engineering
Module Status:	Approved for ICGEE delivery. Available in January 2012

Generic Module Information:

Name of module owner/lecturer?	Martin Hill
Delivery mode: e.g. on-site, on-line, mixed-mode. For on-site specify contact hours per week	Delivery on-line via ICGEE VLE with 2-day workshop in CIT/Tyndall for experimental element. Final assessment in CIT.
Duration of the module:	13 weeks
Assessment methods and weightings where relevant:	20% Written Report 30% Workshop assessment 25% Presentation 25% Open-book Examination
Pass standard:	40%
Penalties for late submission of continuous assessment work:	Advised at course commencement
Number of ECTs or institutional credits assigned to the module:	5 ECTS
Course Content or Syllabus (Optional):	**Introduction to Microsystems** • Description of the design, fabrication and application of microsystems. The current and emerging business markets for microsystem technology. **Component Specification and Design** • System level specification of suitable components and technologies for real-world applications. Layout of ICs and MEMS components. **Modelling and Design** • Electrical, thermal and mechanical modelling and design of microtechnology components and sensors. Combined sensor and interface modelling. **Fabrication** • IC fabrication processes and industry. Microsystems fabrication options. Integration issues. **Microsystem testing** • Characterisation of MEMS system performance using FEM modelling combined with electrical, optical and thermal test equipment. **Case Studies** • Perform case studies in microelectromechanical systems engineering. Describe, model and characterise components with a comparison of system level specifications with modelled and measured performance.
Learning Outcomes	On successful completion of this module the learner will be able to: • Describe the emerging microsystems and embedded smart systems industries, the products they are beginning to

	bring to the market, how these products can be used in existing business and industry and the new businesses and industries springing up based on these products. • Realise integrated microsystem components by generating CAD layout files and relating those files to the fabrication process flow. • Evaluate process and design options for integration of microsystem components. • Identify packaging and interconnect options suitable for microsystems applications. • Derive component and system level specifications from the application description and develop application driven integrated microsystem designs
Recommended Text	None
Supplementary Texts	• Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim 2001, *Microsensors, MEMS, and Smart Devices*, John Wiley and Sons [ISBN: 047186109X] • Elena Gaura, Robert Newman 2006, *Smart MEMS and Sensors Systems*, Imperial College Press [ISBN: 1860944930] • Marc J. Madou 2002, *Fundamentals of Microfabrication*, 2nd. Ed., CRC Press [ISBN: 0849308267] • Mohamed Gad-el-Hak 2006, *MEMS Applications*, CRC Press [ISBN: 0849391393] • Tai-Ran Hsu 2004, *MEMS Packaging*, IET [ISBN: 0863413358] • Sergey Edward Lyshevski 2002, *MEMS and NEMS, Systems Devices and Structures*, CRC Press [ISBN: 0849312620]