Course descriptor B31TB

Course code	**B31TB**
Course title	Advanced Packaging and Integration
Credits	15
School	Engineering and Physical Sciences
SCQF Level	11
Semester	1
Aims	• Develop detailed knowledge and critical understanding of the core skills in the area of packaging issues related to smart systems and devices • Develop and use a significant range of principle and specialist skills, techniques and practices in the modelling, packaging and design of Microsystems. • Be able to apply this knowledge directly to complex applications • Critically review existing practice and develop original and creative solutions to problems within the domain. Communicate and work effectively with peers and academic staff in a variety of tasks, demonstrating appropriate levels of autonomy and responsibility.
Syllabus	Basis of mechanics, Young's modulus, shear rate, Poisson's ratio, yield strength, fracture, examples; Extrapolation to non-isotropic materials, notion of tensor, stiffness matrix, compliance, examples; Plane statics, bending and elastic forces, Dynamics of vibrating structures, and stress and strain of elastic structure, non-linear elasticity theory, visco-elasticity, basics of fracture and theory, surface tension effects. Packaging hierarchy and functions; Mechanical and thermal stress in Microsystems packaging, wire bonding, flip chip bonding, wafer level bonding, Hermeticity and stiction; Examples of MEMS packaging, Testing of Microsystems, Characterisation techniques for MEMS, Thin film mechanical characterisation.

Learning Outcomes	
Subject Mastery	• Critical understanding of the principal theories, principles and concepts relating to the use of packaging and testing of Microsystems and smart systems and applications • Extensive, detailed and critical understanding of some specialist areas within the domain of micromechanics and packaging of microsystem and smart system devices. • Understanding and use of a significant range of the principal skills, techniques and practices in micromechanics, packaging and testing and a range of specialised skills,

	research and investigation techniques, and practices informed by leading-edge research and development • A broad knowledge of the main areas of packaging and testing technology, including terminology, conventions, underpinning theory techniques and practices • Application based knowledge and skills relating to the broad range of activities within the packaging domain, and specialist knowledge and skills in applications relating to a number of specialist areas within the domain. • Fundamental knowledge and skills to deal with diverse and complex technological packaging problems that exist in microsystems engineering and related disciplines and a critical understanding of the range of tools and techniques available to support this process. • A critical understanding of the relationships and interactions between the various components in a microsystem and smart system to achieve the overall goal of the systems structure and operation.
Personal Abilities	• Develop and apply skills in critical analysis, evaluation and synthesis in consideration of the range of theories, concepts and techniques in use within the domain of packaging and related issues, and in the design of projects and experimental models. • Abilities to critically understand and apply relevant theories and technologies to developing analytical and design skills. • Develop and utilise advanced problem solving skills and techniques in the development of original and creative solutions to general and specialist issues within the domain of packaging problems for Microsystems and smart systems. • Develop and demonstrate skills and techniques in communication with peers and academic/industrial staff, using a range of appropriate methods to suit different levels of knowledge and expertise within the audience. • Develop and demonstrate critical knowledge and skills in the planning and usage of software tools and numerical techniques to develop, present and communicate information on projects and processes. • Demonstrate critical awareness of the current issues within the discipline, and make informed judgements with incomplete or inconsistent data, or where there are no professional/ethical codes or practices for guidance. • Work autonomously and within teams, as appropriate, demonstrating a capability for both taking and critically reflecting on roles and responsibilities

Assessment method	80% written examination, 20% continuous assessment