# Course descriptor B31TB

<table>
<thead>
<tr>
<th>Course code</th>
<th>B31TB</th>
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<tbody>
<tr>
<td>Course title</td>
<td>Advanced Packaging and Integration</td>
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<tr>
<td>Credits</td>
<td>15</td>
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<tr>
<td>School</td>
<td>Engineering and Physical Sciences</td>
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<tr>
<td>SCQF Level</td>
<td>11</td>
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<tr>
<td>Semester</td>
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## 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 |