Module Descriptor

Title	Design, Prototyping and Testing		
Session	2025/26	**Status**	Published
Code	ENGG09001	**SCQF Level**	9
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	B Aresh		

Summary of Module

This module is divided into two areas to gain an understanding of testing procedures and design process, from market need, product specification, concept generation, project planning, testing and prototyping.

The first area will focus on execution and analysis of data collected from physical testing.

The second area will focus on the fundamentals of the design process including project planning and evaluation of technical literature.

Analytical and physical prototypes will be introduced. With the aim of engaging students using hands-on practical experience, different activities will be conducted.

1. Three physical tests conducted on a can with the aim of finding a factor of safety. Testing includes: temperature test, tensile test and burst test. These utilise different data collection and analysis techniques and the students are encouraged to critically review the results.

2. An extensive group work where students will follow the design process from market need through to product specification and concept generation.

Through the two themes within the module, test and design, and groupwork as the assessment activity, the module activities encourage problem solving, critical thinking, communication, creativity and leadership (meta-skills). The student groups are intentionally of multidiscipline in nature thus creating a real-world team working environment mirroring industry.

Graduate Attributes:

1. Students will have a good grasp of product design and development processes and procedures to be useful as a design engineer in industry.

2. They will be able to work in groups in order to develop a product from market research through to concept generation, selection and prototyping that is a norm in industry.

3. They will gain a broad knowledge of rapid prototyping methods, which are currently showing increased uptake in mainstream manufacturing industry.

4. They have obtained a great understanding of product testing processes and are using their engineering knowledge to analyse test results.

This module has been reviewed and updated, taking cognisance of the University's Curriculum Framework principles. Examples of this are found within the module such as active and engaging laboratory and tutorial activity, module assessment which reflects industry design activities, learning synergies across modules and levels of study, recorded

lecture content supporting students to organise their own study time and the use of integrated group activities supporting learning communities.

Module Delivery Method	**On-Campus**[1] ☒	**Hybrid**[2] ☐	**Online**[3] ☐	**Work -Based Learning**[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Select and critically evaluate technical literature and other sources of information to solve complex problems.
L2	Use practical laboratory and workshop skills to investigate complex problems.
L3	Evaluate the environmental and societal impact of solutions to complex problems (to include the entire life-cycle of a product or process) and minimise adverse impacts.
L4	Design solutions for complex problems that evidence some originality and meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health & safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.
L5	Formulate and analyse complex problems to reach substantiated conclusions. This will involve evaluating available data using first principles of mathematics, statistics, natural science and engineering principles, and using engineering judgment to work with information that may be uncertain or incomplete, discussing the limitations of the techniques employed.

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	**During completion of this module, there will be an opportunity to achieve core skills in:**

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

Knowledge and Understanding (K and U)	**SCQF 9** A broad and integrated knowledge and understanding of prototyping, rapid prototyping technologies and mechanical testing methodology. A critical understanding of the selection and principal theories and principles of prototyping, rapid prototyping and mechanical testing.
Practice: Applied Knowledge and Understanding	**SCQF 9** Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed. Select and critically evaluate technical literature and other sources of information to solve complex problems. Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights. Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.
Generic Cognitive skills	**SCQF 9** Appraise and critically evaluate the suitability and needs to prototype and test a component or design.
Communication, ICT and Numeracy Skills	**SCQF 9** Ability to generate and analyse data using standard ICT software to produce reports detailing physical test results. Use of CAD software and rapid prototype machines to produce a rapid prototype model.
Autonomy, Accountability and Working with Others	**SCQF 9** Identify and implement solution strategies using their own initiative and informed judgments. Contribute to a collective solution of a design/testing problem/case study. Function effectively as an individual, and as a member or leader of a team.

Prerequisites	**Module Code**	**Module Title**
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours. The learning and teaching activity for this module include lectures, tutorials and lab based problem solving.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	18

Tutorial / Synchronous Support Activity	18
Laboratory / Practical Demonstration / Workshop	2
Independent Study	162
n/a	0
n/a	0
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

Course notes, presentations and case studies will be provided.

Chua, C.Kai., Leong, K.Fai. and Lim, C.S. (2003) Rapid Prototyping : Principles and Applications. 2nd edn. Singapore, London: World Scientific. Available at: https://uws-primo.hosted.exlibrisgroup.com/permalink/f/va1p8n/44PAI_ALMA2121930170003931 (Accessed: 24 March 2025).

Grimm, T. (2004) User's Guide to Rapid Prototyping, Rapid prototyping. Edited by Society of Manufacturing Engineers and Rapid Prototyping Association. Dearborn, Mich.: Society of Manufacturing Engineers. Available at: https://uws-primo.hosted.exlibrisgroup.com/permalink/f/1a10t95/44PAI_ALMA2122109910003931 (Accessed: 24 March 2025).

Maude, T.I. (Tim I.) (1991) Rapid Prototyping : The Management of Software Risk. Edited by G. Willis. London: London : Pitman, 1991. Available at: https://uws-primo.hosted.exlibrisgroup.com/permalink/f/1a10t95/44PAI_ALMA2117861780003931 (Accessed: 24 March 2025).

Seider, W.D., Seader, J.D. and Lewin, D.R. (2010) Product and Process Design Principles : Synthesis, Analysis, and Evaluation. 3rd ed.. Edited by J.D. Seader and D.R. Lewin. Hoboken, N.J.: Hoboken, N.J. : Wiley, c2010. Available at: https://uws-primo.hosted.exlibrisgroup.com/permalink/f/va1p8n/44PAI_ALMA2123630610003931 (Accessed: 24 March 2025).

Ulrich, K.T. and Eppinger, S.D. (2012) Product Design and Development. 5th edn. New York, N.Y.: McGraw-Hill. Available at: https://uws-primo.hosted.exlibrisgroup.com/permalink/f/va1p8n/44PAI_ALMA2118490010003931 (Accessed: 24 March 2025).

(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. Students will scan their attendance, via the attendance scanners, each time they are on-campus, they will have their attendance recorded in class and they will be expected to login to the VLE several times per week. Students who are unable to attend a timetabled session,

due to illness or other circumstance, should notify their Programme Leader. Across the School an 80% attendance threshold is set. Students who fall below this, will be referred to the Student Success Team to see how they can be best supported in their studies.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code. Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has laboratory-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Engineering Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Design
Moderator	T Murmu
External Examiner	M Ghaleeh
Accreditation Details	This module is part of the IMechE accredited programmes BEng/Meng (Hons) Aircraft and BEng/Meng (Hons) Mechanical Engineering.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	3.09 Module Descriptor copied to 2025/26 template, Learning and Teaching, Attendance and Engagement and EDI statements updated. Student learning hours corrected to reflect 200 hours. Indicative Resources updated to correct citation format.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Case Study-Design Report (Group) 35% weighting
Assessment 2

Report of Practical Work- Test Analysis Report (Group) 35% weighting
Assessment 3
Essay- Project Plan including literature review (Individual) 30% weighting
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Case Study	☐	☐	☒	☒	☐	35	0

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Report of pratical work	☐	☒	☐	☐	☒	35	0

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Essay	☒	☐	☐	☐	☐	30	0
Combined total for all components						100%	0 hours

Change Control

What	**When**	**Who**
Module Descriptor copied to 2025/26 template, Learning and Teaching, Attendance and Engagement and EDI statements updated. Student learning hours corrected to reflect 200 hours. Indicative Resources updated to correct citation format.	March 2025	B Aresh