

University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Design Prototyping & Testing			
Code: ENGG09001	SCQF Level: 9 (Scottish Credit and Qualifications Framework)	Credit Points: 20	ECTS: 10 (European Credit Transfer Scheme)
School:	School of Computing Engineering and Physical Sciences		
Module Co-ordinator:	Dr Balaji Aresh		
Summary of Module			
<p>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.</p> <p>The first area will focus on execution and analysis of data collected from physical testing.</p> <p>The second area will focus on the fundamentals of the design process including project planning and evaluation of technical literature.</p> <p>Analytical and physical prototypes will be introduced. With the aim of engaging students using hands-on practical experience, different activities will be conducted.</p> <ol style="list-style-type: none"> 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. <p>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.</p> <p>Graduate Attributes:</p> <ol style="list-style-type: none"> 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

Face-To-Face	Blended	Fully Online	HybridC	Hybrid 0	Work-Based Learning
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

See Guidance Note for details.

Campus(es) for Module Delivery

The module will **normally** be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)

Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Term(s) for Module Delivery

(Provided viable student numbers permit).

Term 1	<input type="checkbox"/>	Term 2	<input checked="" type="checkbox"/>	Term 3	<input type="checkbox"/>
--------	--------------------------	--------	-------------------------------------	--------	--------------------------

Learning Outcomes: (maximum of 5 statements)

At the end of this module the student will be able to:

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:
Knowledge and Understanding (K and U)	<p>SCQF Level 9</p> <p>A broad and integrated knowledge and understanding of prototyping, rapid prototyping technologies and mechanical testing methodology.</p> <p>A critical understanding of the selection and principal theories and principles of prototyping, rapid prototyping and mechanical testing.</p>
Practice: Applied Knowledge and Understanding	<p>SCQF Level 9</p> <p>Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.</p> <p>Select and critically evaluate technical literature and other sources of information to solve complex problems.</p> <p>Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.</p> <p>Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.</p>
Generic Cognitive skills	<p>SCQF Level 9</p> <p>Appraise and critically evaluate the suitability and needs to prototype and test a component or design.</p>

Communication, ICT and Numeracy Skills	SCQF Level 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 Level 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.	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code:	Module Title:
	Other:	Completion of equivalent HN qualification or other equivalent module.
Co-requisites	Module Code:	Module Title:

*Indicates that module descriptor is not published.

Learning and Teaching	
The learning and teaching activity for this module include lectures, tutorials and problem based learning.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	Student Learning Hours (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	18
Tutorial/Synchronous Support Activity	26
Laboratory/Practical Demonstration/Workshop	2
Independent Study	164
	Hours Total 200

****Indicative Resources: (eg. Core text, journals, internet access)**

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.

Product Design and Development, Ulrich K T and Eppinger S D, 4th Edition, Irwin McGraw-Hill, 2007

Rapid Prototyping: Principles & Applications in Manufacturing, Chua C K and Leong K F, John Wiley & Sons, Inc., 2003

Rapid Prototyping: The Management of Software Risk, Maude T, Pitman, London, 1991

Product and Process Design Principles: Synthesis, Analysis, and Evaluation, Seider, W D, Seader, J D , Lewin, D R, John Wiley, 2nd Edition, 2003

User's Guide to Rapid Prototyping, Grimm T, Society of Manufacturing Engineers, 2004

Click or tap here to enter text.

(*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.

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](#).

(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 and Physical Sciences
Assessment Results (Pass/Fail)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

School Assessment Board	Engineering
Moderator	Tony 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.
Changes/Version Number	3.08 (3.07) Module Delivery Changed to Face-To-Face from Hybrid C. Delivery of module on Paisley Campus only (Lanark removed) Assessment 3 added which is an individual report thus allowing greater mark differentiation between students. LO1 changed to include an individual literature review assessment. The weightings of assessments changed. Grammar improvements

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 Design Report (Group)
Assessment 2 Test Analysis Report (Group)
Assessment 3 Project Plan including literature review (Individual)
(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.)

Assessment Outcome Grids (See Guidance Note)

Component 1							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Case Study			✓	✓		35	0
Component 2							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Report of practical/field/ clinical work		✓			✓	35	0
Component 3							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Essay	✓					30	0
Combined Total for All Components						100%	0 hours