University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Design & Applications			
Code: ENGG09021	**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 Tony Murmu		

Summary of Module

This module will enable the student to select and size appropriate machine components to satisfy a component or system design.

Fundamental engineering theory is used to develop expressions that describe the function and operation of the machine component enabling correct sizing to be undertaken

During the course of this module, students will develop their UWS Graduate Attributes (https://www.uws.ac.uk/current- students/your-graduate-attributes/).

Universal: Academic attributes (critical thinking and analytical & inquiring mind);

Work-Ready: Academic attributes (knowledge of design of machine components; problem solver); Personal (motivated);

Successful: Academic attributes (autonomous), Personal (imaginative and resilient), Professional (Driven)

Scope of the module:

Straight cut spur gears, helical gears, bevel gears will be considered, expressions for speed, torque and gear tooth forces will be developed. Gear tooth stressing for straight cut spur gears. Bearing types along with their theory, applications and limitations will be introduced and discussed. Selection of suitable bearings and sizing will be undertaken for appropriate applications.

Power screws will be discussed with their theory of operation being derived, and applied to solve suitable design problems.

The design of bolted and welded connections will be considered for direct, shear, and combined loading conditions with design calculations being undertaken to determine bolt numbers, size and factors of safety.

The factors affecting shaft design will be discussed including location features, stress concentration effects, stiffness and life considerations.

Brakes and clutches will be introduced and discussed. Appropriate theory to describe their operation will be developed and applied to solve design problems. Flexible drive elements will be introduced and discussed. . Appropriate theory to describe their operation will be developed and applied to solve design problems. Flat , vee and poly-vee belts will be

considered along with chain drives. Helical extension, compression and torsional spring theory will be developed and applied to the designing of such elements.

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**
☒	☐	☐	☐	☐	☐
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:
☒	☐	☐	☐	☐	☐	

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	☒	Term 2	☐	Term 3	☐

Learning Outcomes: (maximum of 5 statements) At the end of this module the student will be able to:	
L1	Apply comprehensive knowledge of machine components to satisfy the specification of a component or complex system
L2	Formulate and analyse complex problems to reach substantiated conclusions by using applicable theory to obtain appropriate formulae that describe the operation of the machine component.

L3	Select appropriate machine components by reviewing advantages, disadvantages and limitations of each of the machine components.
L4	Use engineering analysis and standard spread sheets for the analysis, including technical literature, selection and sizing of suitable machine components for a component or system.

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)	SCQF Level **9** A broad knowledge and understanding of the core theories, principles and concepts of machine component design.
Practice: Applied Knowledge and Understanding	SCQF Level **9** Use a range of theories and solution techniques for the design and analysis of machine components with in system design. 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 Apply an integrated or systems approach to the solution of complex problems
Generic Cognitive skills	SCQF Level **9** Use a range of approaches to formulate solutions to routine engineering design problems.
Communication, ICT and Numeracy Skills	SCQF Level **9** Ability to solve and present the solution and information of a solution to an engineering design scenario. Use of standard ICT software to assist in the solving and presentation of solutions and results of a design solution.
Autonomy, Accountability and Working with others	SCQF Level **9** Identify solution routes and strategies using their own initiative and informed judgments. Contribute to a collective solution of a problem or design case scenario.
Pre-requisites:	Before undertaking this module the student should have undertaken the following:

	Module Code: ENGG08017	**Module Title:** Design Analysis 1
	Other:	
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	18
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: “Mechanical Engineering Design”, J. E. Shigley, McGraw Hill, 6th metric Ed. “Fundamentals of Machine Component Design”, R. C. Juvinall, Wiley,4th Ed “Mechanics of Machines – Advanced Theory and Examples”, J. Hannah & R. C. Stephens, Arnold, 2nd Ed.
(**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 ☐No ☒
School Assessment Board	Engineering
Moderator	Asraf Uzzaman
External Examiner	M Ghaleeh
Accreditation Details	This module is part of the IMechE accredited programmes BEng/Meng (Hons) Mechanical Engineering.
Changes/Version Number	2.12 (was 2.11) Module Delivery Changed to Face-To-Face from Hybrid C. Unseen Closed Book Class Test replaces Class Test (written) as per the intention to return to on campus assessment.

Assessment: (also refer to Assessment Outcomes Grids below)
Class Test 1 (written)- Unseen Closed Book (Class test)- 35%
Class Test 2 (written)- Unseen Closed Book (Class test)- 35%
Case Study- 30%
(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)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Unseen Closed Book (Class Test)	✓	✓			35	2

Component 2						
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Unseen Closed Book (Class Test)			✓	✓	35	2

Component 3						
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Case study	✓	✓	✓	✓	30	0
Combined Total for All Components					**100%**	**4 hours**