University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Computer Aided Design 3			
Code: ENGG10085	**SCQF Level: 10 (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 Parag Vichare		

Summary of Module

Advances in CAD over the past 20 years have facilitated huge increases in product design complexity. This module will introduce students to the advanced geometry modelling trends and tools used in engineering industry. Students will exploit advanced functionalities in Solidworks to configure complex design scenarios. Students will be given an overview of the technologies and approaches required to manipulate complex assemblies with large number of components. Advanced surface modelling techniques including free-form surface manipulation and editing will be introduced. Animation and visualisation techniques will be utilised for creative content production.

This module will introduce students to the current state-of-the-art technologies and approaches (e.g. explicit/direct modelling, non-native geometric data manipulation) while undertaking Multi-CAD, collaborative design projects. Various Product Data Management (PDM) aspects covered under this module will prepare students for industrially focused complex design scenarios, with a view to gain practical experience of the current CAD technologies adopted by engineering industries.

During the course of this module students will develop their UWS Graduate Attributes. Academic Universal and Work-ready attributes: Students will gain knowledge and understanding of this important discipline as well as having the opportunity to develop a broad range of ICT, technical and transferable skills.

This module has been reviewed and updated, taking cognisance of the University's Curriculum Framework principles. For example, module will be delivered mainly by an innovative laboratory demonstrations, recorded lecture content supporting students to organise their own study time and the use of real-world practical problems, industry standard Computer Aided Engineering activities developing digital intelligence meta-skills.

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	Create, manipulate and edit complex surface geometry and convert surface models into solid models.
L2	Demonstrate applicability of different assembly structures for given re/design case scenario.
L3	Demonstrate ability to undertake direct / synchronous modelling approaches for implementing design changes in collaborative product development.
L4	Demonstrate ability to undertake design optimisation studies.

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 **10** A specialised knowledge and understanding of computer aided design (CAD) methods and techniques and how these fit into engineering and design strategies. A specialised knowledge and understanding of the application, techniques and practices associated with CAD in the engineering and design environment. To gain specialised knowledge of the appropriateness of methods and techniques for different CAD related problems/scenarios.

	Knowledge and understanding of health & safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards when undertaking and evaluating design activity. Understanding of mitigation of security risks in relation to accessing and storing data and digital equipment.
Practice: Applied Knowledge and Understanding	SCQF Level **10** Applying specialised knowledge and understanding to develop solid and surface modelling solutions for a range of mechanical and aircraft design problems. Assessing and analysing advanced design options with respect to obtaining a suitable design solution. Making use of specialised 3D modelling techniques to produce efficient design solutions. Making use of design productivity techniques to configure and complete design tasks. 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. 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 **10** Undertaking, evaluating and assessing critical CAD methods. Making judgements on appropriateness of CAD solution strategies. Being able to develop advanced modelling solutions and strategies to CAD related problems and activities. Critically discuss solution strategies and issues associated with advanced CAD techniques. Bringing information together from a variety of sources during problem solving and being able to perceive potential

	problems with methods and strategies. Formulate and analyse complex design problems to reach substantiated conclusions using CAD systems.	
Communication, ICT and Numeracy Skills	SCQF Level **10** Ability to perform, interpret and evaluate complex numerical, geometrical and graphical data and using it to solve problems. Ability to use variables and equations. Ability to integrate existing software with other applications such as spread sheets. Make use of multi-purpose integrated software systems to solve or provide solutions to complex CAD related activities. Using communications skills to write detailed, technical reports, including text and illustration. Communicate using multiCAD systems through animated sequences and other standard presentation media. Using CAD hardware and software and associated ICT equipment and systems such as networks to support and perform a wide range of problem solving and CAD related tasks. Communicate effectively on complex engineering matters with technical and non-technical audiences using multi-CAD and mixed-reality tools	
Autonomy, Accountability and Working with others	SCQF Level **10** Identifying and addressing their own learning needs both during and out with class time. Identifying solution routes and strategies using their own initiative and informed judgements. Team-working with peers and support staff.	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: ENGG09057	**Module Title:** Computer Aided Design 2
	Other:	Or equivalent
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

Learning and Teaching

This module will be delivered via a blend of online pre-recorded lectures and classroom tutorial. A range of formative video tutorials will ensure engagement on all topic areas with video recordings of the software for support out of class. Use of discussion forums will be encouraged.

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	12
Tutorial/Synchronous Support Activity	24
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.

Hardware/Software: Solidworks software + 40 seat PC Lab with corresponding network facilities and suitable PCs. Software site licences required.

C. McMahon J. Browne, 'CAD/CAM from Principles to Practice', Addison-Wesley Publishing Co, ISBN 0-201-56502-1

Chang, Kuang-Hua (2015). e-Design. Academic Press, Boston, ISBN: 978-0-12-382038-9

David M, Rowe F (2016) What does PLMS (product lifecycle management systems) manage: Data or documents? Complementarity and contingency for SMEs.

Computers in Industry 75:140-150. doi:http://dx.doi.org/10.1016/j.compind.2015.05.005

Cantamessa M, Montagna F, Neirotti P (2012) An empirical analysis of the PLM implementation effects in the aerospace industry. Computers in Industry 63 (3):243-

251. doi:http://dx.doi.org/10.1016/j.compind.2012.01.004

Pottmann H, Leopoldseder S, Hofer M, Steiner T, Wang W (2005) Industrial geometry: recent advances and applications in CAD. Computer-Aided Design 37

(7):751-766. doi:http://dx.doi.org/10.1016/j.cad.2004.08.013

Fuh JYH, Li WD (2005) Advances in collaborative CAD: the-state-of-the art. Computer-Aided Design 37 (5):571-581. doi:http://dx.doi.org/10.1016/j.cad.2004.08.005

Tran, P., SOLIDWORKS 2022 Advanced Techniques: Mastering Parts, Surfaces, Sheet Metal, SimulationXpress, Top-Down Assemblies, Core & Cavity Molds.

2021: SDC Publications.

Tran, P., SOLIDWORKS 2021 Advanced Techniques. 2021: SDC Publications.

Chang, K.H., Motion Simulation and Mechanism Design with SOLIDWORKS Motion 2021. 2021: SDC Publications (Schroff Development Corporation).

(**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	Balaji Aresh
External Examiner	F Inam
Accreditation Details	N/A

Changes/Version Number	1.01 (was 1.00 - Original) Module Delivery Changed to Face-To-Face from Hybrid C.

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 - Class test (Essay)
(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**
Essay	✓	✓	✓	✓	100	
Combined Total for All Components					**100%**	**0 hours**