University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Programming for Engineers			
Code: ENGG07016	**SCQF Level: 7 (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:	Balaji Aresh		

Summary of Module

The module aims to introduce students to the fundamental principles of engineering programming and the use of engineering simulation tools. Students will be introduced to programming languages such as; C++, VBA, Matlab
and degree specific simulation platforms, where practical steps in programming and simulation process will be taught and practised.

Students will learn to create algorithms for programmes, write scripts to solve engineering problems and generate/produce data. As well as programming and simulation skills, students will develop an understanding of how engineering problems can be simulated and/or solved within computer-based numerical environment. Also, developing an understanding of and applying the obtained data (information) to practical problems in fluid dynamics, mechanics and dynamics. Students will also be introduced to the concept of cybersecurity and its importance in storing, protecting and sharing engineering and personal data.

Through problem based learning the student will develop understanding on how to program through a few languages in order to obtain information from source of data.

This module will work to develop a number of the key 'I am UWS' Graduate Attributes to make those who complete this module:

Universal:

- academic: analytical, critical thinker, inquiring

- professional: collaborative

Work-ready:

- academic: Knowledgeable, digitally literate

- personal: motivated

- professional:

enterprising

Successful:

- academic: autonomous, incisve, innovative

- personal: creative, imaginative, resilient

- professional: driven, daring

- 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 programming and simulation problems/activities, development of digital intelligence meta-skills, recorded lecture content supporting students to organise their own study time and the use of integrated group activities supporting learning communities- particularly useful as this is a programme entry level module.

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:
☒	☐	☐	☐	☐	☐	Add name

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

Learning Outcomes: (maximum of 5 statements) **These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module.** At the end of this module the student will be able to:	
L1	Develop computer algorithms and programmes to solve engineering problems.
L2	Develop and run simulation cases for engineering problems.
L3	Generate, handle and analyse programming and simulation data.
L4	Demonstrate how security measures are used to protect data, networks and software.

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 **7** Basic knowledge of the structure of a high level language. Structuring problems in a suitable format for program development and presentation. General knowledge and understanding of security measures are used to protect data, networks and software.	
Practice: Applied Knowledge and Understanding	SCQF Level **7** Develop limited computer applications using a high level language. Present information using commonly available media techniques. Demonstrate how security measures are used to protect data, networks and software. Select and critically evaluate technical literature and other sources of information to solve complex problems. Through the development of algorithms, programs and simulations apply an integrated or systems approach to the solution of complex problems presented. Use practical computer laboratory skills to investigate complex problems. Adopt a holistic and proportionate approach to the mitigation of security risks.	
Generic Cognitive skills	SCQF Level **7** Use appropriate quantitative science and engineering tools to gather data in an appropriate format.	
Communication, ICT and Numeracy Skills	SCQF Level **7** Demonstrate the ability to communicate ideas and concepts through the use of presentation software. Demonstrate the use of programming languages to communicate product information to a selected audience. Demonstrate an understanding of the computer techniques available to enhance the communication of engineering ideas and concepts.	
Autonomy, Accountability and Working with others	SCQF Level **7** Develop and enhanced level of transferable skills that will be of value in working with others in more complex situations. Function effectively as an individual, and as a member or leader of a team demonstrating the effectiveness of own and team's performance.	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code:	**Module Title:**
	Other:	
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

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.

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
	200 Hours Total

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

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

Kelley, Al.; Pohl, Ira. A book on C : programming in C. Redwood City, Calif. ; Harlow : Addison-Wesley, 1995. 3rd ed.

King, Melvyn.; Pardoe, John.;Vickers, Paul. A first course in computer programming using C. London : McGraw-Hill, 1995.

Hanly, Jeri R.; Koffman, Elliot B.;Horvath, Joan C. C program design for engineers. Reading, Mass. ; Harlow : Addison- Wesley, 1995.

Gookin, Dan. C for dummies. Vol. 1. San Mateo, Calif. : IDG Books,

c1994. Gookin, Dan. C for dummies. Vol. 2. Foster City, Calif. : IDG

Books, c1997.

Hahn, Brian D.; Valentine, Daniel T., Essential MATLAB for engineers and scientists [electronic book]. 4th ed. / Brian Hahn, Dan Valentine. London : Academic, c2010.

Attaway, Stormy. MATLAB [electronic book] : a practical introduction to programming and problem solving. 3rd ed. Waltham, MA : Butterworth-Heinemann Ltd, 2013.

Gdeisat, M. and Lilley, F. Matlab by example : programming basics. Amsterdam :

Elsevier. Blundell, Barry, Computer hardware. London : Thomson/Middlesex University

Press, 2008.

White, Ron, and Downs, Timothy Edward. How computers work. Indianapolis, Ind. : Que, c2008. 9th 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
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Engineering
Moderator	Esther Smith
External Examiner	P Lewis
Accreditation Details	
Changes/Version Number	1.06 Module Coordinator Updated Hybrid C Selected in lieu of Blended/Face-To-Face Equality and Diversity Statement Updated. v1.05 Terminology in module descriptor updated to reflect IMechE accreditation feedback. This change is to ensure clearer links between AHEP4 Learning Outcomes and module descriptor are evident. v1.04 Module coordinator updated to Bassam Rakhshani from Luc Rolland. Module summary updated to reflect a more generic and contemporary summary and to reflect Curriculum Framework principles. Module delivery changed to include blended. Learning outcomes rephrased to capture AHEP 4 intent. Employability Skills and Personal Development Planning (PDP) Skills updated to reflect the additional module learning outcome. Learning and Teaching text added, omitted in error from previous revisions. Learning Activities updated to reflect Curriculum Framework contact hours. Module Moderator updated to Esther Smith.

	Assessment updated to two coursework tasks 50% each to reflect Curriculum Framework authentic assessment, assessment grids correspondingly updated

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1: Programming Coursework 50%
Assessment 2: Simulation Coursework 50%
(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**
Report of Practical/Field/Clinical work	✓		✓	✓	50	0

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**
Laboratory/ Clinical/Field notebook		✓	✓	✓	50	0
Combined Total for All Components					**100%**	**0 hours**