Module Descriptor

Title	Computer Aided Process Analysis and Design		
Session	2025/26	**Status**	Published
Code	ENGG09049	**SCQF Level**	9
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	L Sun		

Summary of Module

This module concentrates on both introductory and advanced concepts of computer aided process simulation, analysis, process design and optimisation.

The module discusses the concept of a process system and its significance in chemical and process engineering. Examples and exercises will be included to show the importance of "System" approach to process design and problem solving in general.

The module explores process design and optimization and equips the students with the tools necessary for the simulation and analysis of chemical processes and individual equipment.

Process simulation software (Aspen HYSYS and ASPEN PLUS) are applied for simulation, analysis, design and optimisation of equipment, unit operations, and chemical processes.

Computation Fluid Dynamics tools (Fluent/CFX) are used for the analysis and design of representative equipment such as heat exchangers.

I am UWS (https://www.uws.ac.uk/current-students/your-graduate-attributes/): Upon completing this module the students will be equipped with tools that will help them in their journey to be work-ready, successful and universal. The module develops critical thinking and analytical skills that enhance the students' ability to deal with complicated issues and make them problem solvers. It encourages them to become motivated, innovative, autonomous, inquisitive, creative and imaginative. The module and the teaching approach encourage collaborative working, effective communications, resilience and perseverance, and development of research and inquiry skills. The aim is to produce graduates who are knowledgeable with excellent digital skills fit for the 21st century and aware of the global context in which they operate and the challenges that face humanity in the 21st century in the areas of water, food, energy, environment and well-being, who strive to lead, influence and dare to make transformational changes while being ethically-minded, socially responsible, critically aware of the environmental and social impacts of their decisions and actions, and culturally sensitive.

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	Equip the students with the necessary tools for process simulation, analysis, design and optimisation.
L2	Encourage the proper use of computers for solving chemical engineering problems.
L3	Develop the skills for critical analysis of design decisions and process choices when using process simulation tools with basic economic evaluation.
L4	Develop good working knowledge of systematic approach to solve process problems.
L5	N/A

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 9** Demonstrating a broad and integrated knowledge and understanding of the main areas of process analysis, design and optimisation. Demonstrating a critical understanding of the selection of process parameters. Demonstrate critical understanding of the role of simulation tools in process analysis, design and optimisation.
Practice: Applied Knowledge and Understanding	**SCQF 9** Use a selection of the principal skills, techniques, practices and/or materials associated with industrial tasks

[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

	Use iterative multivariable techniques in design and sizing of equipment Practice routine searches for process data and thermodynamic models for process simulation.
Generic Cognitive skills	**SCQF 9** Be able to compare suggested solutions with expected values.
Communication, ICT and Numeracy Skills	**SCQF 9** Make formal presentations of process design outcomes to an audience of peers. Use a range of IT applications to facilitate calculations and provision of report and presentations. Interpret, use and evaluate numerical and graphical data to realize calculations in sizing of equipment.
Autonomy, Accountability and Working with Others	**SCQF 9** Take some responsibility for use of appropriate data resources. Practice in ways which take account of own role and responsibilities. Work under guidance with qualified practitioners.

Prerequisites	**Module Code** ENGG08024	**Module Title** Process Modelling and Simulation
	Other ENGG08022 Chemical Engineering Fundamentals	
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. This module covers a wide variety of theoretical, conceptual and practical areas, which require a range of knowledge and skills to be displayed and exercised. Delivery of its syllabus content involves a diversity of teaching and assessment methods to achieve the learning outcomes of the module. These include formal lectures, structured tutorials (work closely integrated with the lecture material), laboratory exercises to develop practical skills and familiarisation with equipment and experimental techniques, completion and submission of written coursework making use of appropriate forms of IT and VLE, and independent study. The hours for Lecture/Core Content Delivery include the exam and the class tests.	
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	12
Tutorial / Synchronous Support Activity	12
Laboratory / Practical Demonstration / Workshop	24
Independent Study	152
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:

R K Sinnott and G Towler (2019) Chemical Engineering Design: SI Edition, 6th Edition, Butterworth-Heinemann.

W Luyben (2011) Principles and Case Studies of Simultaneous Design, Wiley.

J Haydary (2019) Chemical Process Design and Simulation: Aspen Plus and Aspen HYSYS Applications, New York: Wiley.

J Anderson (1995) Computational Fluid Dynamics: the Basics with Applications, McGraw Hill.

J Tu, GH Yeoh, and C Liu (2018) Computational Fluid Dynamics: A Practical Approach,3rd Edition, Amsterdam: Butterworth-Heinemann.

(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. You will scan your attendance via the scanners each time you are on-campus and you will login to the VLE several times per week. Where you are unable to attend a timetabled learning session due to illness or other circumstance, you should notify the Programme Leader that you cannot attend. Across the School an 80% attendance threshold is set. If you fall below this, you will be referred to the Student Success Team to see how we can best support your 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 lab-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	Engineering
Moderator	A Durrant
External Examiner	P Weston
Accreditation Details	This module is part of the BEng(Hons) Chemical Engineering programme accredited by the IChemE
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2.02 External Examiner updated- Peter Weston Attendance and Engagement Requirement updated Equality and Diversity updated

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
The module is 100% continuous assessed. The continuous assessment is dividing into: Class Test 10% Process design, simulation and design exercises 40% Case study 50%
Assessment 2
Assessment 3
(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 Class test (written) Design/ Diagram/	☒	☒	☒	☒	☒	100	2

Drawing/ Photograph/ Sketch							

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	2 hours

Change Control

What	**When**	**Who**
External Examiner updated- Peter Weston Attendance and Engagement Requirement updated Equality and Diversity updated Indicative Resources updated	March 2025	L Sun