Module Descriptor

Title	Chemical Engineering Design Study		
Session	2025/26	**Status**	Published
Code	ENGG10031	**SCQF Level**	10
Credit Points	40	**ECTS (European Credit Transfer Scheme)**	20
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	C Rodriguez		

Summary of Module

This double module develops a student's ability to design multi-step chemical processes, the ability to work with limited data the exploration of innovative and challenging designs and their use according to the commercial, economic and social demands placed on industry wherever in the world it may be.

This module will supplement students' knowledge of chemical engineering gained at levels 8 and 9 of the Chemical Engineering programme and take in concepts from level 10 during the course of two terms, acting as a capstone module to the degree up to this point.

In addition to the independent work undertaken by the students, the module is augmented with one hour formal scheduled weekly group project supervision meetings, outwith which students may request additional support from the supervisor . In addition to this a programme of formal lectures, practical sessions and workshops on topics and techniques relevant to the design process is delivered, including:

Plant location and layout; systematic approach with considerations of plant siting, safety and hazardous area classification, environmental and social impact, operation, transport and storage of raw materials and products. Statutory requirements; outline of planning methods, project management, regulations and approvals required. Introduction to the design of pressure vessels and piping systems. Using stress analysis to investigate stress concentrations. Selection of materials of construction for process piping, vessels and equipment. Role of Design Codes including those for pressure vessels, storage tanks, piping and composite structures. Design for fabrication; examination of designs to simplify/optimise fabrication and minimise costs. HYSYS process modeling and simulation. Inspection and in-service observations. Use of computer software packages in design, simulation and modelling using process simulation packages. Economic costing and project evaluation.

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	Produce a design of a chemical plant to meet a specific industrial requirement in a safe and economical operational manner while minimising environmental impact over the plant life cycle.
L2	To apply process engineering principles to the design of a chemical plant and to demonstrate both creative and critical thinking in design synthesis and the ability to use judgement with design problems in situations where either novel processes or of limited information on existing technology leads to published intellectual property and technical literature not giving full coverage.
L3	To work as part of a design team, participating in team meetings, and producing work to the schedule decided by the team.
L4	To use available process design, simulation, and modelling computer software packages where relevant to improve/optimise the design.
L5	To appreciate the wider aspects of mechanical engineering practice and design as well as economics and marketing, along with consideration of the needs and pressures of a business in modern industrial society.

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 10** Develop a broad knowledge and understanding of the myriad issues involved in the design of a chemical process.

[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

Practice: Applied Knowledge and Understanding	**SCQF 10** Integrate the use of chemical engineering knowledge and understanding to design chemical processes.
Generic Cognitive skills	**SCQF 10** Use of information retrieval techniques to access and critically use published information/data in design studies.
Communication, ICT and Numeracy Skills	**SCQF 10** Develop verbal and written communication skills and group working skills by members of the design studies team. Use available computer software packages (described above) in design studies and presentation of final reports.
Autonomy, Accountability and Working with Others	**SCQF 10** Participate in group meetings and in efficient work scheduling for members of the design studies team. Take turns in playing leading roles within the team to collate meeting minutes and publish its findings.

Prerequisites	**Module Code** ENGG09037 ENGG09036	**Module Title** Chemical Process Principles Process Design, Control and Safety
	Other Any other suitable prior learning.	
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. The learning and teaching for this module will be delivered via a series of lectures, tutorials and group discussions.	
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	24
Tutorial / Synchronous Support Activity	48
Independent Study	328
n/a	0
n/a	0
n/a	0
TOTAL	400

Indicative Resources

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

Seider, W. D., Lewin D. R., Seader J. D., Widagdo S., Gani R., and Ming NG K.A. NG (2019) Product & Process Design Principles: Synthesis, Analysis and Evaluation. N.J.: Wiley.

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

Crowl, D. A. and Louvar J. F. (2019) Chemical Process Safety: Fundamentals with Applications. 4th Edition. Boston, Mass.; London: Prentice Hall.

El-Halwagi, M. (2017) Sustainable design through process integration : fundamentals and applications to industrial pollution prevention, resource conservation, and profitability enhancement. 2nd Edition, Amsterdam : Elsevier.

Wiley-VCH Publishers (2004) Ulmann's Process and Process Engineering, Volumes 1,2 and 3.

R. Smith (2016) Chemical Process Design and Integration,Revised 2nd edition, Wiley.

(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. Specialist assistive equipment, support provision and adjustment to assessment practice 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	M Mirzaeian
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	V3.1

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Design Stage 1 Report which is 35% of the final mark.
Assessment 2
Design Stage 2 Report which is 45% of the final mark.
Assessment 3
Coursework: Design Stage 1 Oral Presentation (10%): LO1, LO4, LO5 Design Stage 2 Oral Presentation (10%): LO1, LO4, LO5
(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**
Report	☒	☒	☐	☒	☐	35	12

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Report	☒	☒	☒	☒	☐	45	12

Component 3

Assessment Type	LO1	LO2	LO3	LO4	LO5	Weighting of Assessment Element (%)	Timetabled Contact Hours
Coursework	☐	☐	☐	☒	☒	20	4
Combined total for all components						100%	28 hours

Change Control

What	When	Who
Updated Module Summary, Indicatives Resources, Attendance and Engagement Procedure, Equality and Diversity, and Assessment sections.	March 2025	Cristina Rodriguez