University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Chemical Process Principles			
Code: ENGG09037	**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:	Li Sun		

Summary of Module

This module is a general introduction to chemical processes.

Steady state mass and energy balances for processes involving chemical reactions are developed further and later applied to industrial processes including recycle, by-pass and purge streams.

Mass transfer describes equimolar counter diffusion, stagnant layer diffusion and convective mass transfer, and two- phase mass transfer with diffusivity measurement from experiment and diffusivity prediction from liquid phase activity coefficients and gas critical temperature and pressure.

Phase equilibrium revises Henry's and Raoult's Laws, examines the Clapeyron Clausius equation, the Antoine equation and psychrometric behaviour. Retrieve the phase equilibrium data from different sources: handbooks, experiments, databanks, and by simulation using software like Aspen.

The course will include practical activities, software application, and laboratory experiments.

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 - safe laboratory working; Successful: autonomous, driven and resilient.

Module Delivery Method

Face-To-Face	Blended	Fully Online	HybridC	Hybrid0	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	Demonstrate a broad and integrated knowledge of mass & energy balances and their relevance to the chemical process industries.
L2	Solve simple problems involving combined mass & energy balances for chemical processes.
L3	Solve problems involving mass transfer and phase equilibrium.

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. Understanding mass & energy balances as applicable to the chemical process industries.
Practice: Applied Knowledge and Understanding	SCQF Level 9. Be able to use available experimental/ published data to solve simple mass & energy balances and mass transfer problems.
Generic Cognitive skills	SCQF Level 9. Appreciate that economics and safety are secondary reasons for carrying out mass & energy balances in the chemical process industries.
Communication, ICT and Numeracy Skills	SCQF Level 9. Demonstrate confidence in carrying out basic calculations relevant to chemical process industries.
Autonomy, Accountability and Working with others	SCQF Level 9. Collaborate with other students to produce laboratory reports/works visits reports.
Pre-requisites:	Before undertaking this module the student should have undertaken the following:

	Module Code: ENGG08022	**Module Title:** Chemical Engineering Fundamentals
	Other:	or equivalent
Co-requisites	**Module Code:**	**Module Title:**

* Indicates that module descriptor is not published.

Learning and Teaching

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 therefore involves a diversity of teaching and assessment methods suitable to 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.

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	24
Tutorial/Synchronous Support Activity	12
Laboratory/Practical Demonstration/Workshop	12
Independent Study	152
	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:

C.J. Geankoplis, A H Hersel and D H Lepek, Transport Processes and Separation Process Principles, Prentice Hall, 5th Edition, 2018

R. Felder and R. Rousseau, Elementary Principles of Chemical Processes, Wiley (New York; Chichester), 4th Edition, 2016

D.M. Himmelblau, Basic Principles and Calculations in Chemical Engineering, Prentice-Hall International, 9th Edition, 2022

Regina M. Murphy, Introduction to Chemical Processes: Principles, Analysis and Synthesis, McGraw-Hill, 1st Edition, 2007

K.A. Solen and J.N. Harb, Introduction to Chemical Processes-Fundamentals and Design,McGraw-Hill, 4th Edition,2005

(**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. Please ensure any specific requirements are detailed in this section. Module Co-ordinators should consider the accessibility of their module for groups with protected characteristics..
(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

Programme Board	Engineering
Assessment Results (Pass/Fail)	Yes ☐No ☒
Subject Panel	Engineering
Moderator	Andy Durrant
External Examiner	R Ocone
Accreditation Details	This module is part of the BEng (Hons) Chemical Engineering programme accredited by the IChemE
Version Number	5 Assessment updated

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment for the module includes both formative and summative assessment. Formative assessment is provided during lectures in the form of class exercise problems, during tutorial sessions, during laboratory sessions and as part of the preparation for written submissions. Summative assessment will be based on the following: (a) Unseen Closed Book Class Test worth 70% of the final mark,

and (b) continuous assessment worth 30% of the final mark. The continuous assessment component in this module will consist of the following elements: (i) laboratory reports and (ii) an assignment.

Further details, and the academic calendar when assessment is likely to feature, will be provided within the Module Information Pack.

(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 Handbook.)

Assessment Outcome Grids (Footnote A.)

Component 1

Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Unseen Closed Book Class Test	✓	✓	✓	70	2

Component 2

Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Case study			✓	5	0
Report of practical/ field/ clinical work	✓	✓	✓	25	0
Combined Total for All Components				100%	2 hours