Module Descriptor

Title	Unit Operations 1		
Session	2025/26	**Status**	Published
Code	ENGG09038	**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 aims to give students of the chemical engineering degrees a broad appreciation of several separation processes that are key to the process industry.

The separation processes studied here are:

Evaporation (including single- effect and multi-effect evaporators, boiling point rise, and other designs for energy saving, such as vapour recompression and vacuum operation, with basic economic analysis).

Crystallisation.

Binary and multicomponent distillation in continuous mode, including vapour/liquid equilibrium (VLE), Gibbs' phase rule, bubble and dew point calculations for ideal and non-ideal mixtures, the use of the isothermal flash equation, and shortcut and rigorous distillation calculations.

Various solid separation processes, including sedimentation, elutriation, and centrifugation, and thickening.

Membrane separations.

Mixing of liquids examines the calculation of power requirements of mixers via dimensionless analysis, the use of baffles and choice of impellers.

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	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	Identify, analyse and size separation processes using experimental, tabulated, literature and other numerical data.
L2	Discuss critically the selection of appropriate equipment for the separation of materials in process plant, with appreciation that the products may present hazards that the original materials did not.
L3	Demonstrate ability to obtain and critically evaluate experimental data by set procedures and safety guidelines.
L4	N/A
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** Use algebraic techniques to design appropriate separators with the correct dimensions. Use graphical techniques to design appropriate separators with the correct dimensions. Use iterative numerical techniques to design appropriate separators with the correct dimensions. Practice routine searches for thermophysical data of fluids.

[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 9** Use algebraic techniques to design appropriate separators with the correct dimensions. Use graphical techniques to design appropriate separators with the correct dimensions. Use iterative numerical techniques to design appropriate separators with the correct dimensions. Practice routine searches for thermophysical data of fluids.
Generic Cognitive skills	**SCQF 9** Undertake critical analysis and derivation of distillation formulae from first principles. Be able to compare suggested solutions with expected values.
Communication, ICT and Numeracy Skills	**SCQF 9** Make formal presentations on pilot plant data 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** ENGG09037	**Module Title** Chemical Process Principles
	Other suitable alternative	
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 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, industrial process plant visit trip, completion and submission of written and oral 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** (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
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: C.J. Geankoplis, A H Hersel and D H Lepek (2018) Transport Processes and Separation Process Principles Prentice Hall, 5th Edition. W. McCabe, J. C. Smith, and P. Harriott (2014) Unit Operations of Chemical Engineering, McGraw Hill, 7th Edition. J. F. Richardson, J. R. Harker, and J. R. Backhurst (2002) Chemical Engineering Particle Technology and Separation Processes-Volume 2, Butterworth Heinemann, 5th Edition. R. Sinnott and G. Towler (2019) Chemical Engineering Design: SI Edition, Butterworth-Heinemann, 6th Edition. G. F. C.Rogers and Y. R. Mayhew (1994) Thermodynamic and Transport Properties of Fluids, Blackwell, 5th Edition. E. R. Henley, J. D. Seader, and D. K. Roper (2016) Separation Process Principles, Wiley, 4th Edition.
(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	C Rodriguez
External Examiner	P Weston
Accreditation Details	This module is part of the BEng (Hons) Chemical Engineering accredited by IChemE.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	4.1 External Examiner updated- Peter Weston Attendance and Engagement Requirement updated Equality and Diversity updated

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Unseen Closed Book Class Test worth 50% of the final mark
Assessment 2
Continuous assessment worth 50% of the final mark. The continuous assessment component will consist of the following elements:

(i) written assignment worth 25% of the final mark, (ii) laboratory reports worth 25% of the final mark
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**
Unseen Closed Book Class Test	☒	☒	☐	☐	☐	50	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Written assignment laboratory reports	☒	☒	☒	☐	☐	50	0

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 Updated Indicatives Resources	March 2025	L Sun