Module Descriptor

Title	Unit Operations 2		
Session	2025/26	**Status**	Published
Code	ENGG10032	**SCQF Level**	10
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	M Mirzaeian		

Summary of Module

In this module: Different separation processes will be considered as follow:

• Liquid-liquid extraction (LLE) covers choice of solvents (considering hazards such as toxicity and flammability as well as ability to dissolve), immiscible and partially missible solvents, determination of number of stages, use of transfer unit approach, and use of triangular diagrams.

• Gas absorption examines the calculation of the number of ideal stages required for the separation of dilute solutions, the calculation of packed height for dilute solutions and the calculation of pressure drop across the packed bed. The topic then extends into the calculation of packed height for concentrated solutions.

• Filtration covers the derivation of the Ruth equation, cloth resistance, constant rate and constant pressure filtration. Application of filtration theory to common types of industrial filters. Application of Ruth's equation to centrifuges.

• Drying covers both batch and continuous processes with relation to the changing drying rate of a solid as time progresses. Various items of drying equipment are also discussed.

• Size classification and size reduction of solids covers mass balances over a screen to determine the oversize effectiveness, undersize effectiveness and overall effectiveness of the screen. Von Rittinger's, Kick's and Bond's laws to calculate required power for size reduction, mechanical and crushing efficiencies are introduced and work index, energy of size reduction and size reduction equipment are discussed.

This module will work to develop a number of the key 'I am UWS' Graduate Attributes to make those who complete this module: Universal (Critical Thinker, Ethically minded, Research-minded); Work Ready (Problem-Solver, Effective Communicator, Ambitious); Successful (Autonomous, Resilient, Driven).

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	Understand how to select an appropriate separation process for a given multiphase separation problem considering the principles of equilibrium, mass transfer and their application to phase behaviour, equipment sizing and performance.
L2	Produce a design for one of the fluid-fluid or fluid particle separation processes described using published data/information to quantify the effect of processing steps on the state of the material being processed, and its transformation to the end product.
L3	Understand the limitations of approximate design methods and how these can be improved/extended by use of computer software packages and digital techniques to solving Chemical Engineering Problems.
L4	Appreciate the characteristics of masses of particulate solids and understand how to determine the screen effectiveness as a measure of the successes of a screen in separating solid particles.
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 10** Demonstrating a broad and integrated knowledge and understanding of fluid-fluid staged separation processes and fluid particle separation processes.

[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** Being able to use design procedures to size/specify fluid/fluid staged separators and fluid-particle separators. Understand the limitations of these design methods.
Generic Cognitive skills	**SCQF 10** Be able to compare calculated designs with expected /realistic values.
Communication, ICT and Numeracy Skills	**SCQF 10** Interpret, use and evaluate numerical /graphical data to design a given separator.
Autonomy, Accountability and Working with Others	**SCQF 10** Judging the relevance and accuracy of published numerical /graphical data used. Adopting an inclusive approach to engineering practice, recognizing the responsibilities, benefits and importance of supporting equality, diversity and inclusion.

Prerequisites	**Module Code** ENGG09038	**Module Title** Unit Operations 1
	Other or 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.	
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
Practice-based Learning	12
Independent Study	152
n/a	0
n/a	0
TOTAL	200 Hours Total

Indicative Resources
The following materials form essential underpinning for the module content and ultimately for the learning outcomes: C.J. Geankoplis (2016) Transport Processes and Separation Process Principles, Pearsons Education Ltd., 5th Edition, ISBN: 978-0134181028.

E. R. Henley, J. D. Seader, and D. K. Roper (2016) Separation Process Principles, Wiley, 4th Edition.

W.L. McCabe, J.C. Smith and P. Harriott (2014) Unit Operations of Chemical Engineering, McGrawHill, 7th Edition.

R.K. Sinnott and G. Towler (2019) Chemical Engineering Design, SI Edition, Butterworth Heinemann, 6th 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 BEng (Hons) Chemical Engineering Programme, accredited by IChemE.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	4.6 -Updated module summary. - Updated Attendance and Engagement Procedure. - Updated Equality and Diversity. - Updated external examiner. - Updated Assessment section. - Upated indicatives resources.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Unseen Closed Book written Class Test worth 70% of the final mark.
Assessment 2
Continuous assessment worth 30% of the final mark. This includes a class test worth 5% of the final mark, a written assignment worth 10% of the final mark and laboratory reports worth 15% of the final mark. Further details, and the academic calendar when assessment is likely to feature, will be provided within the Module Information Pack
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	☒	☒	☐	☒	☐	70	3

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Continuous assessmen	☐	☒	☒	☒	☐	30	1

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
N/A	☐	☐	☐	☐	☐		
Combined total for all components						100%	4 hours

Change Control

What	When	Who
4.6 -Updated module summary. - Updated Attendance and Engagement Procedure. - Updated Equality and Diversity. - Updated external examiner. - Updated Assessment section. - Upated indicatives resources.	March 2025	M Mirzaeian