University of the West of Scotland

Module Descriptor

Session: 2022/23

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Title of Module: Industrial Manufacture of Fine Chemicals

Code: CHEM11008	**SCQF Level: 11** (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:	Callum McHugh		

Summary of Module

This module covers key issues relating to the manufacture of industrial fine chemicals and their intermediates, such as pharmaceuticals, cosmetics, agrochemicals and pigments. Synthetic planning involved in producing these different types of materials will be covered. Different manufacturing routes to key industrial intermediates will be compared and contrasted in terms of their potential. The aims of chemical development in scaling up manufacturing processes will be described with a comparison of the different priorities involved in designing a synthesis for the research lab versus a synthesis designed to produce materials on the large scale. Various case studies from important areas of industrial chemistry will be presented, illustrating these concepts.

The graduate attributes relevant to this module are given below:

- Academic: Critical thinker, analytical, enquiring, knowledgeable, digitally literate, problem solver, autonomous, incisive, innovative
- Personal: Effective communicator, influential, motivated, team player
- Professional: Collaborative, research-minded, enterprising, ambitious, driven

Module Delivery Method

Face-To-Face	Blended	Fully Online
	✓	

Face-To-Face
Term used to describe the traditional classroom environment where the students and the lecturer meet synchronously in the same room for the whole provision.

Fully Online
Instruction that is solely delivered by web-based or internet-based technologies. This term is used to describe the previously used terms distance learning and e learning.

Blended
A mode of delivery of a module or a programme that involves online and face-to-face delivery of learning, teaching and assessment activities, student support and feedback. A programme may be considered “blended” if it includes a combination of face-to-face, online and blended modules. If an online programme has any compulsory face-to-face and campus elements it must be described as blended with clearly articulated delivery information to manage student expectations

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)

Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
✓						

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	✓	Term 2		Term 3	

Learning Outcomes: (maximum of 5 statements)
On successful completion of this module the student will be able to: L1. Demonstrate a critical understanding of the theoretical principles and concepts surrounding traditional and modern manufacturing methods and planning used in the production of fine chemicals. L2. Demonstrate theoretical proficiency in defining typical advanced manufacturing processes that are used in the preparation of fine chemicals. L3. Demonstrate an integrative understanding of synthesis in a specific area of industrial chemistry

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 11. Gaining a critical understanding of the principal theories and concepts surrounding traditional and modern synthetic methods and planning used in the production of industrial chemicals Acquiring a critical understanding of the theories, concepts and principles of synthetic strategy. Gaining a detailed knowledge of the synthesis of clinically useful agents within a specific area of medicinal chemistry.
Practice: Applied Knowledge and Understanding	SCQF Level 11. Demonstrating theoretical understanding of the modern processes involved in the production of fine chemicals.
Generic Cognitive skills	SCQF Level 11. Undertaking a critical review of the advantages and disadvantages of different synthetic routes in a current area of industrial manufacture.
Communication, ICT and Numeracy Skills	SCQF Level 11. Interpreting and evaluating information gained from a variety of sources in order to prepare background material for a review on a specific topic area in industrial manufacture of fine chemicals.
Autonomy, Accountability and Working with others	SCQF Level 11. Exercising autonomy and initiative in practical exercises and problem based learning.

Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code:	**Module Title:**
	Other:	A relevant module covering organic
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 at a more advanced level to be displayed and exercised. Delivery of the syllabus content therefore involves a diversity of teaching and assessment methods suitable to the learning outcomes of the module; these include formal lectures, guided reading, structured tutorials (work closely integrated with the lecture material), laboratory demonstrations, 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
Independent Study	164
	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:

G L Patrick, Medicinal Chemistry, 4rd Edition 2009, Oxford University Press.

Stuart Warren and Paul Wyatt, 'Organic Synthesis, The Disconnection Approach', 2nd Edition, 2008, Wiley Blackwell

Paul Wyatt and Stuart Warren, 'Organic Synthesis: Strategy and Control', 2007, Wiley.

Chemistry and Technology of Agrochemical Formulations, 1998, Springer

Polymers for Personal Care Products and Cosmetics, 2016, RSC

Industrial Organic Pigments, Third Edition, Willy Herbst & Klaus Hunger, 2004, WILEY-VCH

High Performance Pigments, H. M. Smith, 2002, WILEY-VCH

Journals
Dyes and Pigments (Elsevier)
CrystEngComm (RSC)
Journal of Materials Chemistry (RSC)
Crystal Growth and Design (ACS)
Chemistry of Materials (ACS)
Industrial and Engineering Chemistry and Chemical Research (ACS)
Applied Materials and Interfaces (ACS)
Surface and Coatings Technology (Elsevier)
Focus on Pigments (Elsevier)

(**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)

Engagement Requirements

Students are academically engaged if they are regularly engaged with timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time. Please refer to the Academic Engagement and Attendance Procedure at the following link: Academic Engagement and Attendance Procedure

For the purposes of this module, academic engagement equates to the following:
n line with the Academic Engagement and Attendance Procedure, Students are defined as academically engaged if they are regularly engaged with timetabled teaching sessions, course-related learning resources including those in the Library and on Moodle, and complete assessments and submit these on time.

Supplemental Information

Programme Board	Physical Sciences
Assessment Results (Pass/Fail)	No
Subject Panel	Physical Sciences
Moderator	TBC
External Examiner	M Symes
Accreditation Details	N/A
Changes/Version Number	2.09 KIS updates

Assessment: (also refer to Assessment Outcomes Grids below)

Continuous Assessment - 100 %

(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
Case study		✓	✓	20	0
Class test (written)	✓			60	0
Review/ Article/ Critique/ Paper		✓	✓	20	0
			Combined Total For All Components	100%	0 hours

Footnotes
A. Referred to within Assessment Section above
B. Identified in the Learning Outcome Section above

Note(s):
1. More than one assessment method can be used to assess individual learning outcomes.
2. Schools are responsible for determining student contact hours. Please refer to University Policy on contact hours (extract contained within section 10 of the Module Descriptor guidance note).
   This will normally be variable across Schools, dependent on Programmes &/or Professional requirements.

Equality and Diversity

This module is suitable for any student with appropriate chemistry background.

Current University Policy on Equality and Diversity applies.
UWS Equality and Diversity Policy

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)