Module Descriptor

Title	Clean Technology & Resource Management		
Session	2025/26	**Status**	Published
Code	CEWM11008	**SCQF Level**	11
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	A Hursthouse		

Summary of Module

The public awareness of the 'climate emergency' has drawn people's attention to what we do in our day to day lives in terms of how products are made and the impact on the wider environment. The need for cleaner, more innovative products has been seen by the increase in hybrid and electric vehicles, and the increased use of renewables in our energy mix. As such there is a continued need for innovation within different sectors whilst ensuring our natural resources are protected.

This module develops your skills and knowledge in the field of clean technologies, i.e. those processes that can enhance sustainable resource use and minimise pollution during resource extraction, processing, and the manufacturing process. The central objectives of the module are to raise awareness of the drivers and opportunities for development of clean technologies and to enhance CT-relevant scientific, engineering and management skills across a range of industrial sectors.

The module examines the economic, societal and environmental drivers for innovation in CT and reviews points in industrial processes where opportunities exist for such applications.

Principles of concept development, design and engineering in CT are then introduced. These concepts and principles are then applied to a range of industrial and utility sectors, whilst including resource recovery and recycling.

On completion of this module you will gain the following Graduate Attributes:

- Critical thinking as you work collaboratively on a research- minded assignments
- Problem solving and effective communication
- Your research will be innovative and creative producing resilient clean technology solutions to environmental challenges.

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	Make critical, informed and reasoned arguments regarding the drivers for application of clean technologies in the context of managing resources in a sustainable manner
L2	Be able to explain in detail comprehension of the general principles of concept development, design and engineering relevant to the application of clean technologies.
L3	Demonstrate an ability to apply CT concept development and design principles at an appropriate level across a range of industrial, utility and agricultural sectors and to innovate in at least one such sector ensuring resources are management in a sustainable manner.
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 11** Reasoned and rigorously argued explanation of the drivers for innovation in clean technologies. Detailed explanation of the principles of concept development and engineering design of clean technology applications.

[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

	Reasoned and rigorously argued explanation of current practice and the potential for future innovation in clean technology over a range of common industrial and utility sectors.
Practice: Applied Knowledge and Understanding	**SCQF 11** Apply clean technology design and engineering principles to the solution of real-world problems and the exploitation of entrepreneurial and socially beneficial opportunities. Synthesise information and gain a coherent understanding of principles and practices in framing a technological solution to an environmental problem or opportunity.
Generic Cognitive skills	**SCQF 11** Effectively conceive, plan and execute a programme of design for a clean technology application. Seek, acquire and synthesise relevant information from the primary technical literature in support of a clean technology application.
Communication, ICT and Numeracy Skills	**SCQF 9** Effectively communicate the results of technically complex design and engineering applications to audiences of diverse technical levels as appropriate to the professional setting, using a range of oral, written and graphical media. Comprehend and apply relevant mathematical principles and software systems to the conception, design and development of clean technology applications.
Autonomy, Accountability and Working with Others	**SCQF 9** Work co-operatively as part of a professional team to analyse information, formulate a solution and present it to stake-holders, superiors and the wider population. In both leadership and team-member roles, apply skills in motivation, conflict resolution, mutual respect and collegiate decision-making. Work independently towards a set goal in a timely and efficient manner. Apply safe working practices in the context of appropriately-formulated risk assessment.

Prerequisites	**Module Code**	**Module Title**
	Other There are no pre-requisites for this module, however students may find it helpful to have done chemistry at SCQF level 7	
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	30
Laboratory / Practical Demonstration / Workshop	6
Independent Study	164
n/a	
n/a	
n/a	
TOTAL	200

Indicative Resources

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

James R. Mihelcic, Julie B. Zimmerman (2010) Environmental Engineering: Fundamentals, Sustainability, Design. John Wiley & Sons. ISBN 978-0-470-16505-8. 720 pages

T. E. Graedel, B Allenby (2009) Industrial Ecology and Sustainable Engineering International Version. Pearson Education. ISBN13: 9780138140342

Ron Pernick, Clint Wilder (2007) The Clean Tech Revolution. 1st edition. Harper Business. ISBN-10: 006089623X, ISBN-13: 978-0060896232. 320 pages

Daniel A. Vallero, Chris Brasier (2008) Sustainable design: the science of sustainability and green engineering. John Wiley. ISBN 0470130628. 332 pages.

David Allen, David Shonnard (2012) Green Engineering: Environmentally Conscious Design of Chemical Processes (2nd Edition). Prentice Hall. ISBN-10: 0132657074, ISBN-13: 978-0132657075. 704 pages.

Documents and other resources available on the UWS Virtual Learning Environment.

On-line peer-reviewed academic journals available through the UWS Library and Learning Resource Centre e-journal list.

(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	Physical Sciences
Moderator	L Sun
External Examiner	A Oke
Accreditation Details	
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2.20 Update of Learning Outcome 1 Attendance and Engagement Requirement update Equality and Diversity update

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
30%: data gathering and analysis - plastic footprint
Assessment 2
40%:review and presentation - product design in CT
Assessment 3

30%: case study CT in industrial sectors
(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**
data gathering and review	☒	☐	☐	☐	☐	30	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
clean tech design project and presentation	☐	☒	☒	☐	☐	40	0

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
case study - sector analysis	☒	☒	☒	☐	☐	30	
Combined total for all components						100%	2 hours

Change Control

What	**When**	**Who**
Update of Learning outcome 1	12/03/2025	Andrew Hursthouse
Attendance & Engagement Requirements	12/03/2025	Andrew Hursthouse
Equality and Diversity update	12/03/2025	Andrew Hursthouse