

## University of the West of Scotland

## Module Descriptor

Session: 2024/25

<b>Title of Module: Fires and Explosives</b>			
<b>Code: CHEM009011</b>	<b>SCQF Level: 9(Scottish Credit and Qualifications Framework)</b>	<b>Credit Points: 20</b>	<b>ECTS: 10 (European Credit Transfer Scheme)</b>
<b>School:</b>	School of Computing, Engineering and Physical Sciences		
<b>Module Co-ordinator:</b>	Callum McHugh		
<b>Summary of Module</b>			
<p>Basic thermodynamics will be revised and problems involving Hess's Law will be used to illustrate simple thermochemical calculations. The thermochemistry of explosive materials will be studied in detail and the empirical rules used to predict the products of explosive reactions will be introduced: determination of oxygen balance heat of explosion, volume of gaseous product explosive power and power index for explosives will be illustrated. Recent developments in explosives, such as green primary explosives and energetic polymers for explosive formulations, will be discussed. The analysis of explosives and their residues will be introduced. In addition, methods for the detection of hidden explosives bulk detection methods and vapour detection methods will be described.</p> <p>An introduction will be given to the chemistry and physics of fires and the fire triangle and tetrahedron. The classes of fires and the development of fires will be studied together with the forensic investigation of fires. This will cover topics such as safety at the fire scene, excavation and sampling techniques, location of seat of fire, various ignition sources including heating and cooking appliances. An introduction to electrical fires is given including supply from source to domestic and commercial properties, common causes, and identification of electrical ignition at fire scenes.</p> <p>The graduate attributes relevant to this module are given below:</p> <ul style="list-style-type: none"> <li>• Academic: Critical thinker, analytical, enquiring, knowledgeable, digitally literate, problem solver, autonomous, incisive, innovative</li> <li>• Personal: Effective communicator, influential, motivated, team player</li> <li>• Professional: Collaborative, research-minded, enterprising, ambitious, driven</li> </ul>			

Module Delivery Method					
Face-To-Face	Blended	Fully Online	HybridC	Hybrid 0	Work-Based Learning
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
See Guidance Note for details.					

Campus(es) for Module Delivery						
The module will <b>normally</b> 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:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	<input type="checkbox"/>	Term 2	<input checked="" type="checkbox"/>	Term 3	<input type="checkbox"/>

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 an integrated understanding of the basic chemical nature and characteristics of fires and explosives and apply this to the location of seat of fire and potential ignition sources.
L2	Display a critical appreciation of the aspects of thermodynamics associated with explosive reactions and fires.
L3	Demonstrate an appreciation of the specialised methods employed in the examination of fires, and in the detection and analysis of explosives, and an awareness of aspects such as safety and protocols at the scene.

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

	<p>Broad integrated knowledge of the chemical and thermochemical properties of fuels and explosive materials, and of the classes of fires and their investigation.</p> <p>A critical understanding of a selection of the methods used to analyse for explosives and their post explosive residues.</p>	
Practice: Applied Knowledge and Understanding	<p>SCQF Level <b>9</b></p> <p>Carrying out a detailed calculation of the thermochemical parameters used to describe some properties of fuels and explosive materials.</p>	
Generic Cognitive skills	<p>SCQF Level <b>9</b></p> <p>Integrating information from various sources to analyse critically fire scenes and explosive materials.</p>	
Communication, ICT and Numeracy Skills	<p>SCQF Level <b>9</b></p> <p>Bringing information together from a variety of sources, using information retrieval systems, and appropriate IT skills, to produce written reports for assignments and laboratory exercises.</p> <p>Using appropriate numerical skills to evaluate thermodynamic data in relation to fires and explosives.</p>	
Autonomy, Accountability and Working with others	<p>SCQF Level <b>9</b></p> <p>Working effectively with others in an investigative environment.</p> <p>Identifying and addressing individual learning needs in the subject area associated with the module.</p>	
<b>Pre-requisites:</b>	Before undertaking this module, the student should have undertaken the following:	
	<b>Module Code:</b>	<b>Module Title:</b>
	<b>Other:</b>	CHEM08004, Chemical Analysis & Evaluation or CHEM08001, Physical Chemistry 2, or, suitable appropriate background.
<b>Co-requisites</b>	<b>Module Code:</b>	<b>Module Title:</b>

\*Indicates that module descriptor is not published.

<b>Learning and Teaching</b>	
<p><b>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.</b></p> <p>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), practical exercises to develop skills in the interpretation of spectroscopic information and in incident investigation, completion and submission of written coursework making use of appropriate forms of IT and VLE, and independent study.</p>	
<b>Learning Activities</b>	<p><b>Student Learning Hours</b> (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)</p>
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12
Laboratory/Practical Demonstration/Workshop	12
Independent Study	152
	200 Hours Total
<p><b>**Indicative Resources: (eg. Core text, journals, internet access)</b></p>	
<p>The following materials form essential underpinning for the module content and ultimately for the learning outcomes:</p> <p>J. Yinon and S. Zitrin, <i>Modern Methods and Applications in the Analysis of Explosives</i>, Wiley (1996). ISBN:0-471-96562-6.</p> <p>J. Yinon. <i>Forensic And Environmental Detection of Explosives</i>. Wiley (1999). ISBN:0-471- 98371-3</p> <p>J. Akhavan. <i>The Chemistry of Explosives</i>. RSC 3rd Edition (2011). ISBN:978-1-84973-330-4</p> <p>P. White. <i>Crime Scene to Court: The Essentials of Forensic Science</i>. RSC 2nd Edition(2004), ISBN: 0-85404-656-9</p> <p><a href="http://www.pml.tno.nl/homepage.html">http://www.pml.tno.nl/homepage.html</a>  <a href="http://www.interfire.org/features/NCFS_overview.htm">http://www.interfire.org/features/NCFS_overview.htm</a>  <a href="http://www.interpol.int/Public/Forensic/IFSS/meeting13/Reviews/Explosives.pdf">http://www.interpol.int/Public/Forensic/IFSS/meeting13/Reviews/Explosives.pdf</a></p>	

E. Beveridge, Forensic Investigation of Explosions, CRC Press (2011) ISBN 9781420087253

D. Drysdale, An Introduction to Fire Dynamics, Wiley 3rd Edition (2011)

M.Pickett, Explosives Identification Guide. Publisher: Delmar Learning; 1 edition (1998). ISBN: 0-76680-490-9

J.D. DeHaan, Kirk's Fire Investigation, New Jersey, 5th edition (2002) ISBN: 0-13060-458-5

J.G. Quintiere, Principles of Fire Behavior, Delmar (1997) ISBN: 0-82737-732-0

R.A. Cooke and R.H.Ide, Principles of Fire Investigation, The Insitute of Fire Engineers (1996) ISBN: 0-90334-507-2

(\*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:

Attendance of all on-campus sessions (classes and laboratories), and submission of assessments.

### 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](#).

This module is suitable for any student with appropriate chemistry background, however it should be noted that in order for you to complete this module the laboratory element of coursework will require to be undertaken, disability support can be provided where necessary, consequently, if disability support is needed to complete this part of the module, then the University's Health and Safety Officer should be consulted to make sure that safety in the laboratory is not compromised.

(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

<b>Divisional Programme Board</b>	Physical Sciences
<b>Assessment Results (Pass/Fail)</b>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<b>School Assessment Board</b>	Physical Sciences
<b>Moderator</b>	Alastair Marr
<b>External Examiner</b>	M. Paterson
<b>Accreditation Details</b>	This module is accredited by the Chartered Society of Forensic Sciences (CSFS) as part of the BSc (Hons) Forensic Science programme.
<b>Changes/Version Number</b>	2.20 Module Delivery: From Hybrid-C to Face-to-Face Assessment: Change from “unseen open book” to “unseen class test” Moderator: Updated to Alastair Marr Accreditation Details: Updated to include CSFS accreditation

<b>Assessment: (also refer to Assessment Outcomes Grids below)</b>
Assessment 1: Unseen class test (50 %)
Assessment 2: Continuous assessment – (50%)
(N.B. (i) <b>Assessment Outcomes Grids</b> 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 <b>indicative schedule</b> listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

### Assessment Outcome Grids (See Guidance Note)

<b>Component 1</b>					
<b>Assessment Type (Footnote B.)</b>	<b>Learning Outcome (1)</b>	<b>Learning Outcome (2)</b>	<b>Learning Outcome (3)</b>	<b>Weighting (%) of Assessment Element</b>	<b>Timetabled Contact Hours</b>
Unseen class test	✓	✓	✓	50	2

<b>Component 2</b>
--------------------

<b>Assessment Type (Footnote B.)</b>	<b>Learning Outcome (1)</b>	<b>Learning Outcome (2)</b>	<b>Learning Outcome (3)</b>	<b>Weighting (%) of Assessment Element</b>	<b>Timetabled Contact Hours</b>
Essay	✓	✓	✓	30	0
Laboratory/ Clinical/Field notebook			✓	10	0
Review/Article/ Critique/Paper	✓	✓	✓	10	0
<b>Combined Total for All Components</b>				<b>100%</b>	<b>2 hours</b>