Module Descriptor

Title	Fires and Explosives		
Session	2025/26	**Status**	Published
Code	CHEM09011	**SCQF Level**	9
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Callum McHugh		

Summary of Module

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.

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.

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	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	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
L4	
L5	

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** Broad integrated knowledge of the chemical and thermochemical properties of fuels and explosive materials, and of the classes of fires and their investigation. A critical understanding of a selection of the methods used to analyse for explosives and their post explosive residues

[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** Carrying out a detailed calculation of the thermochemical parameters used to describe some properties of fuels and explosive materials
Generic Cognitive skills	**SCQF 9** Integrating information from various sources to analyse critically fire scenes and explosive materials
Communication, ICT and Numeracy Skills	**SCQF 9** 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. Using appropriate numerical skills to evaluate thermodynamic data in relation to fires and explosives
Autonomy, Accountability and Working with Others	**SCQF 9** Working effectively with others in an investigative environment. Identifying and addressing individual learning needs in the subject area associated with the module

Prerequisites	**Module Code**	**Module Title**
	Other CHEM08004, Chemical Analysis & Evaluation or CHEM08001, Physical Chemistry 2, or, suitable appropriate background	
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), 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	
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
Please select	

Please select	
TOTAL	200

Indicative Resources

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

J. Yinon and S. Zitrin, Moden Methods and Applications in the Analysis of Explosives, Wiley (1996).ISBN:0-471-96562-6.

J. Yinon. Forensic And Environmental Detection of Explosives. Wiley (1999). ISBN:0-471-98371-3

J. Akhavan. The Chemistry of Explosives. RSC 3rd Edition (2011). ISBN:978-1-84973-330-4

P. White. Crime Scene to Court: The Essentials of Forensic Science. RSC 2nd Edition(2004), ISBN: 0-85404-656-9

http://www.pml.tno.nl/homepage.html http://www.interfire.org/features/NCFS_overview.htm http://www.interpol.int/Public/Forensic/IFSS/meeting13/Reviews/Explosives.pdf

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:

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	Alastair Marr
External Examiner	M. Paterson
Accreditation Details	This module is accredited by the Chartered Society of Forensic Sciences (CSFS) as part of the BSc (Hons) Forensic Science programme
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2.21 Attendance and Engagement statements updated Equality statement updated

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Unseen class test (50 %)
Assessment 2
Continuous assessment (50%)
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 class test	☒	☒	☒	☐	☐	50	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Essay Laboratory/Clinical/Field notebook Review/Article/Critique/Paper	☒	☒	☒	☐	☐	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
Attendance and Engagement statements updated	March 2025	C. McHugh
Equality statement updated	March 2025	C. McHugh