University of the West of Scotland

Module Descriptor

Session: 24/25

Title of Module: Physical Chemistry 3			
Code: CHEM09003	**SCQF Level: 9 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing Engineering & Physical Sciences		
Module Co-ordinator:	Dr A McLean		

Summary of Module

The lecture course will cover major aspects of Physical Chemistry – thermodynamics, kinetics, spectroscopy. Thermodynamics will be investigated both from a “first principles” investigations of scientific laws and of the nature of matter, and from the viewpoint of applications to practical and technologically important systems: from an atomic / molecular approach to deductions from macroscopic observations. Applications to ideal and real systems will be considered.
Reaction kinetics will consider simple collision theory, transition state theory, elementary gas phase reactions, the steady state approximation and chain reactions. There will a particular emphasis on the application of theory, on numerical problem solving and on experimental measurement.
Quantum Mechanics provides the theoretical foundation upon which a full understanding of the structures and properties of substances must be based. This module attempts to establish, as straightforwardly as possible, some of the basic concepts and calculations which are required to demonstrate such an understanding.
The theories and principles covered in this course underpin many aspects of chemical science, from fundamental understanding and advanced research through to industrial production, and are therefore important in their own right to a very wide range of interests. In addition, these studies promote scientific rigour, together with skills in data handling and investigation.
The Graduate Attributes relevant to this module are listed below:
Academic: Critical thinker: analytical, inquiring, knowledgeable, digital and numerical literate, problem solver, autonomous, incisive, innovative.

Personal: Effective communicator, influential, motivated Professional: Collaborative, research minded, ambitious, driven.

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**Hybrid 0**	**Work-Based Learning**
☒	☐	☐	☐	☐	☐
See Guidance Note for details.					

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) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
☒	☐	☐	☐	☐	☐	Add name

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

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	Display a critical appreciation of how thermodynamic properties may be approached from the basis of the atomic / molecular descriptions of matter, and from the study of macroscopic properties
L2	Demonstrate a broad and integrated understanding of how a knowledge of molecular structure, and the use of statistical approaches, can lead to predictions of reaction rates.
L3	Identify and analyse problems involving experimental, tabulated and other numerical information
L4	Demonstrate competence in areas of mathematics relevant to physical chemistry.
L5	Demonstrate an understanding of the significance of the basic Quantum Mechanics concepts, and display competence in solving related problems in this topic.
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** A broad and integrated knowledge, and a critical understanding, of principal theories, concepts and terminology of physical chemistry	
Practice: Applied Knowledge and Understanding	SCQF Level **9** The use of practical and quantitative skills in core and advanced areas of physical chemistry. Practice routine methods of enquiry / investigation, including a degree of unpredictability	
Generic Cognitive skills	SCQF Level **9** Undertake critical analysis, evaluation and synthesis of ideas, concepts and information. Identify and analyse routine professional problems and issues. Draw on a range of sources in evaluating issues and problems and in reaching conclusions.	
Communication, ICT and Numeracy Skills	SCQF Level **9** Use a range of IT applications to obtain information and in its presentation in a variety of ways. Interpret, use and evaluate numerical and graphical data Use appropriate skills in the communication of information and conclusions.	
Autonomy, Accountability and Working with others	SCQF Level **9** Exercise some autonomy and initiative in some activities at a professional level. Take some responsibility for the work of others, and take account of others' roles and responsibilities. Work under guidance with qualified practitioners	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: CHEM08001	**Module Title: Physical Chemistry 2**
	Other:	or appropriate background
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

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), laboratory exercises to develop practical skills and familiarisation with equipment and experimental techniques, 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	18
Tutorial/Synchronous Support Activity	8
Laboratory/Practical Demonstration/Workshop	12
Practice Based Learning	10
Independent Study	152
	Hours Total 200

****Indicative Resources: (eg. Core text, journals, internet access)**

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

P Atkins and J de Paula, Atkins' "Elements of Physical Chemistry" Oxford University Press, 7th Edition, 2016.

P Atkins and J de Paula, Atkins' Physical Chemistry, Oxford University Press, 11th Edition, 2018.

Martin Cockett, J. Derek Woollins, A. G. Davies, David Phillips, E. W. Abel, and Graham Doggett, Maths for Chemists, 2nd Edition, Royal Society of Chemistry, 2012.

(**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: Attending classes/workshops and submitting coursework.

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

Divisional Programme Board	Physical Sciences
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Physical Sciences
Moderator	A Marr
External Examiner	M Paterson
Accreditation Details	This module is accredited by the Royal Society of Chemistry (RSC) as part of the BSc (Hons) Chemistry programme
Changes/Version Number	2.14 Updated format

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 ; Class test - unseen (55 %)
Assessment 2; Coursework and lab work (45%)
(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.)

Assessment Outcome Grids (See Guidance Note)

Component 1							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Unseen closed book	X	X	X		X	55	2

Component 2							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Shorts Tests/ Maths Test/Labs	X	X	X		X	45	0
Combined Total for All Components						**100%**	**XX hours**