Module Descriptor

Title	Physical Chemistry 3		
Session	2025/26	**Status**	Published
Code	CHEM09003	**SCQF Level**	9
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and 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	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	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	Demonstrate an understanding of the significance of the basic Quantum Mechanics concepts, and display competence in solving related problems in this topic.
L4	Identify and analyse problems involving experimental, tabulated and other numerical information.
L5	Demonstrate competence in areas of mathematics relevant to physical 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 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 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

[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

Generic Cognitive skills	**SCQF 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 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 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

Prerequisites	**Module Code** CHEM08001	**Module Title** Physical Chemistry 2
	Other or 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), laboratory exercises to develop practical skills and familiarisation with equipment and experimental techniques, completion and submission of written coursework, including. regular short tests, 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	18
Tutorial / Synchronous Support Activity	8
Laboratory / Practical Demonstration / Workshop	12
Practice-based Learning	10

Independent Study	152
Please select	
TOTAL	200

Indicative Resources
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:** he 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	**Please select**
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	Dr A Marr
External Examiner	Prof M Paterson
Accreditation Details	This module is accredited by the Royal Society of Chemistry (RSC) as part of the BSc (Hons) Chemistry programme
Module Appears in CPD catalogue	☒ **Yes** ☐ **No**
Changes / Version Number	3.0 Updated T&L to include to the use of short tests in CW. Updated Att & Eng Req as well as Eq & Div Reqs.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Unseen, invigilated class test (55%)
Assessment 2
Coursework and lab work (45%)
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**
Class Test	☒	☒	☒	☐	☐	55	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Coursework & Labs	☒	☒	☒	☒	☒	45	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**
Updated T&L to reflect use of STs Updated Att & Eng Reqs Updated Eq & Div Reqs	March 2025	Dr A McLean