Module Descriptor

Title	Physical & Inorganic Chemistry 4		
Session	2025/26	**Status**	Published
Code	CHEM10004	**SCQF Level**	10
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Andrew McLean		

Summary of Module

Advanced topics in Physical & Inorganic Chemistry will be covered, including some aspects of currently active research in the discipline. This will be broken down into three components;

(i) Aspects of photochemistry explored including light absorption and excited states, singlet and triplet states, lifetimes, shapes, dipole moments. Photophysical and photochemical pathways, fluorescence and phosphorescence, lifetime measurements and quenching will be related to the Jablonski diagram. (ii) Aspects of theory and the application of rotational, infrared and RAMAN spectroscopy will be developed. (iii) Aspects of Inorganic Chemistry explored at level 3 will be developed to a higher level; transition metal carbonyl compounds, their bonding and vibrational spectra and reactions of the carbonyl moiety, quantification of the relative rates of substitution reactions of transition metals complexes, review of NMR spectroscopy including expansion to more exotic nuclei pertinent to Inorganic chemistry, metallic bonding, common properties of both main group and transition metals in the zero oxidation state as well as differences between these two groups of metallic elements, noble gases will be included thereby completing aspects of the chemistry of the remainder of the periodic table (outside the Lanthanide / Actinide Series).

The graduate attributes relevant to this module are;

- Academic: Critical thinker, analytical, inquiring, knowledgeable, literate, problem solver, autonomous.
- Personal: Effective communicator, influential, motivated, team-worker.
- Professional: collaborative.

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 knowledge of theory and applications in some of the more recent significant advances in photochemistry, in advanced spectroscopy including rotational, IR and RAMAN theory and applications and in a range of topics within inorganic chemistry.
L2	Present written accounts of dry-lab type studies in advanced areas of physical & inorganic chemistry
L3	
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 10** Demonstrate a knowledge and integrative understanding of major aspects of physical & inorganic chemistry and of established techniques of enquiry including research methodologies. Display a critical understanding of a range of principal theories and concepts in physical & inorganic chemistry. Show a detailed knowledge and understanding of specialist material, informed by forefront developments in aspects of photochemical reaction kinetics and applications of NMR, IR, RAMAN and laser spectroscopy.

[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 10** Use a selection of principal skills, practices and materials including some at an advanced / specialised level, associated with physical & inorganic chemistry. Execute defined, advanced dry-lab exercises or investigations and identify and implement relevant outcomes. Practise a range of professional level skills in physical & inorganic chemistry, including a degree of unpredictability and specialism..
Generic Cognitive skills	**SCQF 10** Critically identify, define and analyse complex professional level problems and issues in physical & inorganic chemistry. Consolidate and critically review knowledge, skills and practices and thinking in aspects of physical & inorganic chemistry. Demonstrate some originality and creativity in dealing with professional level issues in physical & inorganic chemistry. Make judgments where information is limited or where a range of sources is involved
Communication, ICT and Numeracy Skills	**SCQF 10** Communicate with peers, senior colleagues and specialists in areas of physical & inorganic chemistry. Use a range of software and IT applications to enhance work. Interpret, use and evaluate a range of numerical and graphical data in setting goals and achieving targets.
Autonomy, Accountability and Working with Others	**SCQF 10** Exercise autonomy and initiative in activities at a professional level. Show awareness of own and others' roles and responsibilities. Work effectively under guidance with qualified practitioners.

Prerequisites	**Module Code** CHEM09003 CHEM09001	**Module Title** Physical Chemistry 3 Inorganic Chemistry 3
	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 at a more advanced level 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), an extended

dry-lab exercise, 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:

P Atkins and J de Paula, Atkins' Physical Chemistry, Oxford University Press, 12th Edition, 2022

D F Shriver and P W Atkins Inorganic Chemistry, OUP, 5th Edition 2013, 0199236178

Fundamentals of Molecular Spectroscopy C.N. Banwell (UWS Library Code 543.54 BAN)
Inorganic Chemistry D. F. Shriver & P. W. Atkins (UWS Library Code 546 SHR)

Chemistry of the Elements N. N. Greenwood & A Earnshaw (UWS Library Code 546 GRE)
Advanced Inorganic Chemistry F. A. Cotton & G. Wilkinson (UWS Library Code 546 COT)

(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. If 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	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	4.1 Attendance and Engagement statements updated Accreditation statement updated Equality statement updated

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Unseen class test (60 %)
Assessment 2
Coursework and dry-lab (40%)
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	☒	☐	☐	☐	☐	60	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
CW & dry labs	☒	☒	☐	☐	☐	40	0

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	hours

Change Control

What	**When**	**Who**
Attendance and engagement statements updated. Equality statement updated.	March 2025	Dr A McLean