Module Specification

Module Title	Solid State and Inorganic Chemistry (Sem B)					Module Code	CHE203B
Credit Value	15	Level	5	Mode of Delivery	On Campus		Semester B
Module Organiser	Prof. A. Vlcek						

Pre-requisite modules	Co-requisite modules	Overlapping modules
		CHE203

1) Content Description

Provide a description of the module, as it will appear in the Module Directory and on the Student Information System (approx. 70-80 words).

This module introduces key aspects of transition metal chemistry. Periodic trends in the transition metals are considered. Synthesis, structure and bonding are discussed in transition metal complexes. In addition, characterisation techniques such as optical absorption spectroscopy are introduced, and d-d transitions and spectroscopic term symbols discussed.

2) Module Aims

Specify the aims of the module, i.e. the broad educational purposes for offering this module.

This module aims to provide students with an understanding of a number of basic, but extremely important ideas, concerning synthesis, structure and properties of of inorganic compounds, with emphasis on transition metal compounds, including transition metal complexes and solid oxides.
The module additionally aims to give a firm understanding of periodic relationships between structure, bonding and reactivity in transition metal chemistry using appropriate theories to model behaviour.

3) Learning Outcomes

Identify the learning outcomes for this module, i.e. knowledge, skills and attributes to be developed through completion of this module. Outcomes should be referenced to the relevant QAA benchmark statements and the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (2008). The SEEC Credit Level Descriptors for Further and Higher Education 2003 and Queen Mary Statement of Graduate Attributes should also be used as a guiding framework for curriculum design.

Academic Content:	
A1	Transition metal complexes: ligand field theory, ligand field stabilisation energy (LFSE) and the concept of strong and weak field ligands.
A2	Optical and magnetic properties of transition metal complexes (spectroscopic term symbols, d-d transitions, effects of orbital contributions and spin-orbit coupling effects).
A3	Reactions of transition metal complexes (e.g. ligand substitution reactions and redox processes).
A4	General periodic relationships in the 3d/4d/5d transition elements.

A5	Aqueous transition metal chemistry and general strategies for synthesis of transition metal complexes.
A6	Transition metal oxide chemistry; compounds and clusters with metal-metal bonding.

Disciplinary skills - able to:	
B1	Determine the electronic configurations and oxidation states of transition metal ions.
B2	Deduce the ligand field stabilisation energy for transition metal complexes of varying geometries.
B3	Rationalize the effects of the presence of strong and weak–field ligands (π–acceptors and π–donors) on the ligand field stabilisation energy (LFSE).
B4	Derive molecular orbital (MO) diagrams for complexes of varying geometry (tetrahedral, square planar etc.).
B5	Deduce free-ion ground state term symbols and show how these behave in different ligand field geometries.
B6	Use Tanabe-Sugano diagrams to deduce the energy of electronic transitions and interelectronic repulsion parameters for complex ions.
B7	Predict when orbital contributions and spin-orbit coupling contributions to magnetic moments are likely to be significant for complexes with simple geometries.
B8	Rationalise differences in the patterns of chemistry found for 3d elements compared to 4d/5d elements.

Attributes:	
C1	Acquire and apply knowledge relating to the principles and practices of solid state and inorganic chemistry.
C2	Produce analyses which are grounded in experimental evidence (e.g. spectroscopic and diffraction data).
C3	Apply existing knowledge and skills to investigate unfamiliar problems.
C4	Able to conduct calculations of intermediate complexity, in a confident and reliable manner.

4) Reading List

Provide an indicative reading list for the module. This should include key texts and/or journals but should not be an exhaustive list of materials.

C.E. Housecroft and A.G. Sharpe, Inorganic chemistry (4th ed.), Pearson.
M. Weller, T. Overton, J. Rourke, F. Armstrong, “Inorganic Chemistry,” 6th Edition, OUP, 2014
M.J. Winter, d-block chemistry, OUP.

Teaching and Learning Profile

Provide details of the method of delivery (lectures, seminars, fieldwork, practical classes, etc.) used to enable the achievement of learning outcomes and an indicative number of hours for each activity to give an overall picture of the workload a student taking the module would be expected to undertake. This information will form the Key Information Set for each undergraduate programme and will be used to populate the KIS widget found on the QMUL programme information pages. More information can be found online about KIS. You may also wish to refer to the QAA guidance on contact hours when completing this section.

Activity Type	KIS Category	Time Spent (in hours)

Lecture	Scheduled	22
Practical Classes and workshops	Scheduled	8
Guided independent study	Independent	120
	Total	150

Specify the total module notional study hours. This should be a total of the hours given for each activity. The notional study hours for each academic credit point is 10. A 15 credit point module therefore represents 150 notional study hours.

Activity Type	Total Time Spent (in hours)	Percentage of Time Spent
Scheduled learning and teaching	30	20
Placement		
Independent Study	120	80
Total	150	100

Use the information provided in the box above to specify the total time spent and the percentage time spent in each category of teaching and learning activity.

Assessment Profile

Provide details of the assessment methods used to assess the achievement of learning outcomes.

Description of Assessment	Assessment Type	KIS Category	Duration / Length	Percentage Weighting	Final element of assessment?	Qualifying Mark
Coursework	Written assignment, inc Essay	Coursework		20%	No	
Examination	Written Exam	Written	2 h	80%	Yes	

Qualifying mark: A specified minimum mark that must be obtained in one or more elements of assessment in order to pass a module. This is in addition to, and distinct from, the requirement to achieve a pass in the module mark to pass the module.

Reassessment

Provide details of the reassessment methods used, specifying whether reassessment is either standard reassessment or synoptic reassessment.

○ Standard Reassessment ◉ Synoptic Reassessment

Synoptic reassessment details (if you have indicated synoptic reassessment above, please give details)		
Brief Description of Assessment	Assessment Type	Duration / Length of Examination / Coursework
Resit Examination	Written Exam	2 h