

CH3513 Chemistry of Materials				
SCOTCAT Credits:	10	SCQF level 9	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module brings together a number of advanced concepts including advanced crystal chemistry, extended defects, semiconductor band theory and properties, phase equilibria and phase transformations. It is key to the understanding of many aspects of modern materials science.				
Pre-requisite(s):	Before taking this module you must pass CH2501 and pass at least 1 module from {CH2601, CH2603, CH2701}			
Learning and teaching methods of delivery:	Weekly contact: 2-3 lectures per week over weeks 1-7 online/in-person, 2-3 whole class tutorials delivered in person, 2 x 2h office hours provided by individual staff for online Q&A sessions			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr P A Connor			
Module teaching staff:	Dr P A Connor, Dr R T Baker			

CH3621 Organic Chemistry Laboratory				
SCOTCAT Credits:	15	SCQF level 9	Semester	Full Year
Academic year:	2021-2022			
Planned timetable:	9.00 am - 12.30 pm Mon to Fri (Weeks 1 - 5)			
Practical experiments involving synthesis, characterisation and measurements in organic chemistry. Skills will be developed in the use of spectroscopy, retrosynthetic analysis, literature searching, web based searching and design, synthesis, catalysis, mechanistic studies, and biological chemistry.				
Pre-requisite(s):	Before taking this module you must pass CH2501 and pass at least 1 module from {CH2601, CH2603, CH2701}			
Anti-requisite(s)	You cannot take this module if you take CH3622 or take CH3623			
Learning and teaching methods of delivery:	Weekly contact: 9 x 3.5h laboratory sessions across Semester 1 and 2.			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No Re-assessment available, requires lab attendance to complete coursework			
Module coordinator:	Dr I A Smellie			
Module teaching staff:	Dr I A Smellie, Dr N S Keddle, Dr A J B Watson			

Chemistry - Postgraduate - 2021/2 - August – 2021

CH3721 Physical Chemistry Laboratory				
SCOTCAT Credits:	15	SCQF level 9	Semester	Full Year
Academic year:	2021-2022			
Planned timetable:	9.00 am - 1.00 pm Mon to Fri (Weeks 7-10)			
This module comprises practical experiments involving physical measurements and the use of computational programmes in Chemistry.				
Pre-requisite(s):	Before taking this module you must pass CH2701 and pass at least 1 module from {CH2501, CH2601, CH2603}			
Learning and teaching methods of delivery:	Weekly contact: 9 x 3.5h laboratory sessions across Semester 1 and 2 Fewer lab hours per week available to students (on average, 3.5 hours scheduled per week over 9 weeks across the academic year). Normally the module would be scheduled in weeks 7-11 only. Temporary: 1 x 3.5h over nine weeks across the academic year Normally: Daily 3.5-hour morning practical classes over 5 weeks (Weeks 7 – 11, Semester 1)			
Assessment pattern:	100% continual assessment			
Re-assessment pattern:	No Re-assessment available, requires lab attendance to complete coursework			
Module coordinator:	Professor M Buck			
Module teaching staff:	Prof P A Wright, Prof M Buck, Dr R Schaub, Dr T van Mourik, Prof M Buehl, TBC			

CH4461 Integrating Chemistry				
SCOTCAT Credits:	10	SCQF level 10	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This is a general chemistry module aimed at developing and consolidating fundamental aspects of basic understanding. Students will be encouraged to gain a deeper understanding of elementary core material by a combination of discussion, general reading, essay work and problem solving at a more advanced level than previously required. Students will be expected to read externally on related topics. In addition, each student will be required to submit an essay which will be on a topic relevant to the broader issues of chemical study and knowledge. The problems will apply the knowledge gained in Level 2000 Chemistry modules.				
Pre-requisite(s):	Before taking this module you must pass at least 3 modules from {CH2501, CH2601, CH2603, CH2701}			
Anti-requisite(s)	You cannot take this module if you take CH5461			
Learning and teaching methods of delivery:	Weekly contact: 2 classes per week over 8 weeks (Weeks 3-11) and a total of 3 x 1-hour seminars			
Assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr R Schaub			
Module teaching staff:	All staff			

CH4514 Advanced Metal Chemistry				
SCOTCAT Credits:	10	SCQF level 10	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module covers the heavier d-block and f-block metals and also the theory behind bonding, magnetism and electronic spectroscopy in d-block metal complexes. At the end of the module students should be in a position to understand fully the nature of bonding in d- and f-block metal systems, to understand the electronic spectra of d-block complexes and to rationalise trends in chemical properties both down and across the periodic table. The module also aims to explore the role played by inorganic systems in biology and their growing importance in medicine. There will also be discussion of the mechanisms of action of some inorganic systems in biology.				
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr B E Bode			
Module teaching staff:	Dr J McNulty, Dr B E Bode			

CH4515 Advanced Main Group Chemistry				
SCOTCAT Credits:	10	SCQF level 10	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module discusses the importance of and structural similarities between rings, cages and clusters particularly in main group chemistry. The general rules for predicting geometry in cage/cluster systems will be introduced and used to provide a framework for the range of systems to be discussed e.g. boranes, Zintl anions, phosphides. Further advanced topics in s and p block chemistry will be introduced, for example the stabilisation of heavier main group multiple bonds, low coordinate main group element centres, biradicaloids and use of weakly coordinating anions.				
Pre-requisite(s):	Before taking this module you must pass CH2501 and pass at least 1 module from {CH2601, CH2603, CH2701}			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr P Kilian			
Module teaching staff:	Dr P Kilian, Dr A Stasch			

CH4612 Blockbuster Pharmaceuticals

SCOTCAT Credits:	10	SCQF level 10	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
The module will discuss case studies from the most successful pharmaceutical products. How the compounds came to be discovered, what diseases they are targeting, how they work and how they are made and delivered to the market. Compounds that will feature are aspirin, penicillin, AZT, 5-flourouracil, Zantac, viagra, β -blockers, prozac etc.				
Pre-requisite(s):	Before taking this module you must pass CH2501 and pass at least 1 module from {CH2601, CH2603, CH2701}			
Learning and teaching methods of delivery:	Weekly contact: 2hrs x 10 weeks (18 hrs), 1hr Tutorial lecture (1hr) Proposed, DOH 12 lectures Visitors (Astra Zeneca, Sygnature Chemicals, GSK), 3 x 2 = 6 lectures			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor D O'Hagan			
Module teaching staff:	Prof D O'Hagan and visiting industrial lecturers			

CH4614 Heterocyclic and Pericyclic Chemistry

SCOTCAT Credits:	10	SCQF level 10	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module covers the important areas of heterocyclic and pericyclic chemistry in detail. In heterocyclic chemistry, the nomenclature and numbering of single and fused ring systems, and structure, reactivity, synthesis and applications of the main five and six-membered ring systems with one and two heteroatoms will be covered. Selected industrial syntheses of heterocyclic medicinal compounds are used to illustrate the basic principles as well as the factors to be considered in large scale synthesis. In pericyclic chemistry, a frontier molecular orbital approach based on the Woodward-Hoffmann rules will be applied to pericyclic reactions and used to provide an understanding of the energetics and stereochemistry of Diels-Alder and 1,3-dipolar cycloaddition reactions as well as electrocyclic processes and sigmatropic rearrangements. Synthetic applications of these processes will also be illustrated.				
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total, plus a half-day site visit.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr E R Kay			
Module teaching staff:	Dr E R Kay, Dr A Watson			

CH4615 Fragrance, Food and Colour Chemistry				
SCOTCAT Credits:	10	SCQF level 10	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
<p>This module considers three areas where applications of organic chemistry have been able to benefit society and given rise to important industries. The fragrance, perfumery and food flavouring industry will be covered from the early extraction of essential oils to the modern marketplace with an overview of the key structural features required for perfumes and flavours and some major manufacturing processes. The chemical constituents of food will be considered with an emphasis on health effects and the molecular mechanism of antioxidants, vitamins and other food constituents. The chemistry of organic dyes and pigments will be discussed including the historical development of colour compounds and how these affected society and art. Coloured compounds in nature will also be discussed.</p>				
Pre-requisite(s):	Before taking this module you must (pass 1 module from {CH2601, CH2603} and pass at least 1 module from {CH2501, CH2701}) or (pass 2 modules from {CH2501, CH2701} and pass CH1601 or pass CH1202)			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor R J M Goss			
Module teaching staff:	Dr R A Aitken, Prof R J M Goss			

CH4715 Functional Materials and Electrons in Solids				
SCOTCAT Credits:	10	SCQF level 10	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
<p>The module introduces the physical concepts of dielectrics, semiconductors, and metals. Electronic properties of interfaces and thin films which are fundamental to devices such as microprocessors, lasers in CD players, or solar cells will be discussed.</p>				
Pre-requisite(s):	Before taking this module you must pass CH2701 and pass at least 1 module from {CH2501, CH2601, CH2603}			
Anti-requisite(s)	You cannot take this module if you take CH4458			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr F D Morrison			
Module teaching staff:	Dr F D Morrison, Prof M Buck			

CH4716 Electrochemistry and Computational Chemistry				
SCOTCAT Credits:	10	SCQF level 10	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
<p>One component of the module covers electrolyte solutions and ionic conductivity, equilibrium electrochemistry, electrode processes and applications of electrochemistry. The other component is a computational element, and will introduce aspects of modern computational chemistry related to the electronic structure of atoms, molecules and solids to achieve a basic understanding of the underlying approximations made in practical calculations, and consider applications of computed structures and energies in chemistry.</p>				
Pre-requisite(s):	Before taking this module you must (pass CH2701 and pass 1 module from {CH2501, CH2601, CH2603}) or (pass 2 modules from {CH2501, CH2701} and pass CH1601 or pass CH1202)			
Anti-requisite(s)	You cannot take this module if you take CH4458			
Learning and teaching methods of delivery:	Weekly contact: 2 hours of lectures (x 9 weeks) and 2 hours of tutorials over the semester.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor M Buck			
Module teaching staff:	Prof M Buck, Prof M Buehl			

CH4717 Fundamentals of the Spectroscopy of Molecules and Solids				
SCOTCAT Credits:	10	SCQF level 10	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
<p>This module describes the properties of matter relevant to their interaction with electromagnetic radiation. Absorption, transmission, reflection and diffraction of light across the electromagnetic spectrum are covered. There is a focus on microwave, infrared and NMR spectroscopy. Solid-state NMR spectroscopy will be compared with solution-state NMR and the advantages of solid-state NMR in obtaining structural information discussed.</p>				
Pre-requisite(s):	Before taking this module you must pass CH2701 and (pass CH2501 or pass CH2601 or pass CH2603)			
Learning and teaching methods of delivery:	Weekly contact: 2 hours of lectures (x 9 weeks) and 2 hours of tutorials over the semester.			
Assessment pattern:	2-Hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor S E M Ashbrook			
Module teaching staff:	Dr R Schaub, Prof S E M Ashbrook			

CH5442 Chemistry Research Project for First Year MPhil

SCOTCAT Credits:	60	SCQF level 11	Semester	Full Year
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
The research project for MPhil aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project will be selected and supervised by a member of the academic staff. It will contain a significant literature survey.				
Learning and teaching methods of delivery:	Weekly contact: 540 hours spread over both semesters and summer vacation.			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No Re-assessment available, requires lab attendance to complete coursework			
Module coordinator:	Professor M Buehl			
Module teaching staff:	all staff			

CH5461 Integrating Chemistry

SCOTCAT Credits:	10	SCQF level 11	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This is a general chemistry module aimed at developing and consolidating fundamental aspects of basic understanding. Students will be encouraged to gain a deeper understanding of elementary core material by a combination of discussion, general reading, essay work and problem solving at a more advanced level than previously required. Students will be expected to read externally on related topics. In addition, each student will be required to submit an essay which will be on a topic relevant to the broader issues of chemical study and knowledge. The problems will apply the knowledge gained in Level 2000 Chemistry modules.				
Anti-requisite(s)	You cannot take this module if you take CH4461			
Learning and teaching methods of delivery:	Weekly contact: 2 classes per week over 8 weeks (Weeks 3-11) and a total of 3 x 1-hour seminars.			
Assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr R Schaub			
Module teaching staff:	All staff			

CH5511 Homogeneous Catalysis

SCOTCAT Credits:	10	SCQF level 11	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module discusses the use of metal based systems in organic transformations and a detailed treatment of homogeneous catalysis. Important processes in the petrochemicals industry will be used to exemplify the principles described.				
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr P B Webb			
Module teaching staff:	Prof R P Tooze, Dr P Webb			

CH5517 Advanced Physical Inorganic Chemistry

SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module involves inorganic 'open shell' compounds including the synthesis, characterisation and applications of paramagnetic inorganic species. A number of examples including advanced electron paramagnetic resonance applications in homogeneous catalysis, bioinorganic chemistry and biophysics will be discussed.				
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr B E Bode			
Module teaching staff:	Dr Bela Bode and additional speakers from BSRC (St Andrews)			

CH5518 Blockbuster Solids

SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module covers two major topics. The first deals with modern materials which have a major impact on our lives, focusing on how the material's structure influences its electrical, magnetic and thermal properties. In the second section, emphasis will be placed on metal organic frameworks and how they can be used for the storage and release of gases.				
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor P Lightfoot			
Module teaching staff:	Prof P Lightfoot, Prof R E Morris			

CH5611 Asymmetric Synthesis

SCOTCAT Credits:	10	SCQF level 11	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module discusses the methods available for the synthesis of chiral compounds. After a detailed introduction to the specialised terminology and analytical methods used, the main methods using chiral auxiliaries, chiral reagents and chiral catalysts will be described. This will then be combined with a consideration of synthetic strategy and total syntheses of several complex chiral compounds will be discussed.				
Pre-requisite(s):	Before taking this module you must (pass 1 module from {CH2601, CH2603} and pass at least 1 module from {CH2501, CH2701}) or (pass 2 modules from {CH2501, CH2701} and pass CH1601 or pass CH1202)			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor A D Smith			
Module teaching staff:	Prof M L Clarke, Prof A D Smith			

CH5612 Natural Products, Biosynthesis and Enzyme Co-factors

SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
The module will investigate the biosynthesis of the main natural products groups (polyketides, terpenes, alkaloids). Unifying features of their structures and biosynthesis will be described and methods for studying the biosynthesis of natural products will be taught (isotope tracer methods). The common enzyme co-factors (PLP, TPP, NADH, co-enzyme B12) will be highlighted and their mechanistic role in mediating enzymatic transformations will be explored.				
Pre-requisite(s):	Before taking this module you must (pass 1 module from {CH2601, CH2603} and pass at least 1 module from {CH2501, CH2701}) or (pass 2 modules from {CH2501, CH2701} and pass CH1601 or pass CH1202)			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor D O'Hagan			
Module teaching staff:	Prof D O'Hagan, Prof T K Smith, Dr C Lancefield			

CH5613 Reactive Intermediates

SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
Aspects of the organic chemistry of the most important reactive intermediates viz.: carbo-cations, carbanions, free radicals, carbenes, nitrenes and arynes will be covered. Means of generating each type of reactive intermediate will be introduced. The key reactions of each intermediate will be reviewed and their characteristic reactions highlighted. An understanding of the use of each species in organic synthesis and of their significance in mechanistic analysis will be developed.				
Pre-requisite(s):	Before taking this module you must (pass 1 module from {CH2601, CH2603} and pass at least 1 module from {CH2501, CH2701}) or (pass 2 modules from {CH2501, CH2701} and pass CH1601 or pass CH1202)			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr R A Aitken			
Module teaching staff:	Dr R A Aitken, Dr I A Smellie			

CH5614 Chemical Biology				
SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module will examine new methodologies for drug discovery. An overview of the processes of target discovery, lead discovery and lead optimisation will be given. The use of structural biology (protein crystallography, NMR), computational chemistry and combinatorial chemistry in 'rational drug design' will be described. The module will look at the technologies behind combinatorial library design, synthesis and high throughput screening. Broad and focused libraries will be discussed. Several examples will be explored, such as the development of drugs against AIDS and influenza.				
Pre-requisite(s):	Before taking this module you must (pass 1 module from {CH2601, CH2603} and pass at least 1 module from {CH2501, CH2701}) or (pass 2 modules from {CH2501, CH2701} and pass CH1601 or pass CH1202)			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor N J Westwood			
Module teaching staff:	Prof N J Westwood, TBC			

CH5616 Molecular Recognition				
SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module offers a systematic introductory treatment of molecular recognition, emphasising fundamental concepts of intermolecular interactions and molecular recognition in solution. The nature, strength and directionality of orbital, hydrogen-bonding and hydrophobic interactions will be explored. Spectroscopic and other techniques for studying these interactions will be outlined with examples.				
Pre-requisite(s):	Before taking this module you must (pass 1 module from {CH2601, CH2603} and pass at least 1 module from {CH2501, CH2701}) or (pass 2 modules from {CH2501, CH2701} and pass CH1601 or pass CH1202)			
Learning and teaching methods of delivery:	Weekly contact: 2 lectures per week over 9 weeks; 2 class workshops; 2 revision classes.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr E R Kay			
Module teaching staff:	Prof D Philp, Dr E R Kay			

CH5711 Advanced Spectroscopic Methods

SCOTCAT Credits:	10	SCQF level 11	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module describes the importance of more advanced spectroscopic methods for the elucidation of structure and properties of increasingly complex molecules and materials. Particular attention will be paid to those techniques which exploit synchrotron radiation.				
Pre-requisite(s):	Before taking this module you must pass CH2501 and pass CH2701			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials per week.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor C J Baddeley			
Module teaching staff:	Prof C J Baddeley, Dr G Haehner			

CH5713 Surface Science and Heterogeneous Catalysis

SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
The module describes the Chemistry of solid surfaces with particular reference to the structure of metal, oxide and semiconductor surfaces. The techniques available to characterise the uppermost atomic layers of a solid are presented and the novel reactivity of surfaces is linked to applications in sensors, electronic devices, heterogeneous catalysis as well as the processes of corrosion, friction and wear.				
Pre-requisite(s):	Before taking this module you must pass CH2501 and pass CH2701			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor C J Baddeley			
Module teaching staff:	Prof C J Baddeley, Prof P A Wright			

CH5714 Chemical Applications of Electronic Structure Calculations

SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module will build on the foundations laid in CH2701 and CH3712 and introduce further aspects and methods of modern computational chemistry related to the electronic structures of atoms and molecules. It will be shown how results of such calculations can be used to complement, interpret, and guide experiments in many areas of chemistry.				
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor M Buehl			
Module teaching staff:	Prof M Buehl, Dr J B O Mitchell			

Chemistry - Postgraduate - 2021/2 - August – 2021

CH5715 Energy Conversion and Storage				
SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
In our efforts to mitigate global warming it is essential to develop new and improved methods of generation and storage of energy. Foremost among these methods are the electrochemical technologies of batteries and fuel cells. In this module we will discuss the technical details and applications of such devices. Particular emphasis will be placed on the underlying electrochemistry and materials chemistry.				
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Dr R T Baker			
Module teaching staff:	Dr R T Baker, Dr A R Armstrong, Dr Julia Payne			

CH5716 Processing of Materials				
SCOTCAT Credits:	10	SCQF level 11	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module focuses on the processing of materials, ceramics in particular. Fundamental properties such as crystallinity, composition, crystal phase, phase mixing, domain structure, grains and grain boundaries, as well as porosity will be covered. The main methods used to control these properties in order to develop and improve materials for specific applications will be addressed. Processes such as calcination, sintering, annealing, plasma treatments, mechanical working, crystallisation and dopant addition will be addressed. A discussion will be made on the influence of these processes on specific ceramic systems using phase diagrams. Specific techniques for preparation of bulk and thinner components, including sol-gel method, casting, extrusion, physical and chemical vapor deposition, screen printing or tape casting will be discussed. The role of various aspects of materials processing and their influence on the material and its integration in practical devices will be addressed.				
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor J T S Irvine			
Module teaching staff:	Prof J T S Irvine, Dr C Savaniu			

CH5717 Nanostructured Materials				
SCOTCAT Credits:	10	SCQF level 11	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
<p>This module will introduce the concepts and science behind the design and synthesis of a wide range of nanostructures and the application of these structures in functional materials and devices. The relationship between nanoscale structure and composition and macroscale properties and behaviour will be emphasised. Structures will be classified and introduced in terms of their number of dimensions: clusters, nanoparticles and quantum dots (0-D); nanotubes, nanowires and nanorods (1-D); nanosheets and films (2-D); and porous crystals, mesoporous structures and metal-organic frameworks (3-D). Other specific topics will include the science of clusters, molecular assemblies and assemblies of nanostructures. Novel carbon based materials, including simple and functionalised fullerenes, carbon nanotubes and graphene and related materials will be described and their physical and chemical properties related to their structure and bonding. Advanced characterisation techniques and applications related to nanotechnology, MEMs, biomaterials, catalysis, and optical and magnetic devices will be addressed.</p>				
Pre-requisite(s):	Before taking this module you must pass CH2501 and pass CH2701			
Learning and teaching methods of delivery:	Weekly contact: 2 - 3 lectures per week over 9 - 10 weeks (within Weeks 1-11) and 2 - 3 tutorials in total.			
Assessment pattern:	2-hour Written Examination = 100%			
Re-assessment pattern:	Oral Re-assessment = 100%			
Module coordinator:	Professor W Zhou			
Module teaching staff:	Prof W Zhou, Prof M Buck			

CH5811 Introduction to Metal Catalysis, Organocatalysis and Biocatalysis				
SCOTCAT Credits:	20	SCQF level 11	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
<p>An overview of current challenges and major achievements in current catalysis will be given in this module. The overarching theme is the role that catalysis plays in enabling the chemical industry to deliver a sustainable future. Teaching includes lectures, workshops and case studies.</p>				
Learning and teaching methods of delivery:	Weekly contact: 11 lectures (x4 weeks), 3 tutorials (x 3 weeks)			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	Oral Re-Assessment = 100%			
Module coordinator:	Professor M Buehl			
Module teaching staff:	all staff			

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CH5821 Research Skills in Chemistry				
SCOTCAT Credits:	10	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module involves gaining familiarity and expertise in specialised research techniques in the Chemical Sciences appropriate to the prospective Research Project. These will vary considerably according to the chosen area but may include running a computer modelling calculation, operation of spectrometers, diffractometers and similar instruments, searching for data in the chemical literature, manipulation of air-sensitive materials, conducting a high-pressure reaction etc.				
Learning and teaching methods of delivery:	Weekly contact: 7 hours of practical work.			
Assessment pattern:	Coursework (laboratory reports) = 100%			
Re-assessment pattern:	No Re-Assessment available, requires lab attendance to complete coursework			
Module coordinator:	Dr P Kilian			
Module teaching staff:	all staff			

CH5822 Research Skills in Chemistry				
SCOTCAT Credits:	20	SCQF level 11	Semester	2
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module involves gaining familiarity and expertise in specialised research techniques in the Chemical Sciences appropriate to the prospective Research Project. These will vary considerably according to the chosen area but may include running a computer modelling calculation, operation of spectrometers, diffractometers, and similar instruments, searching for data in the chemical literature, manipulation of air sensitive materials, conducting a high-pressure reaction etc.				
Learning and teaching methods of delivery:	Weekly contact: 14 hours practical classes (x 10 weeks), 1-hour one-to-one supervision (x 10 weeks)			
Assessment pattern:	Coursework (laboratory reports) = 100%			
Re-assessment pattern:	Oral Re-Assessment = 100%			
Module coordinator:	Professor M Buehl			
Module teaching staff:	all staff			

CH5831 Literature Review for MSc				
SCOTCAT Credits:	10	SCQF level 11	Semester	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module which forms part of the MSc programme in Chemical Science involves an in-depth survey of the published literature within a specified research area which is related to the prospective research project.				
Learning and teaching methods of delivery:	Weekly contact: 5 x 1-hour consultation and feedback sessions with supervisor over the semester.			
Assessment pattern:	Coursework (~4,000-word Literature Review)= 100%			
Re-assessment pattern:	Oral Re-Assessment = 100%			
Module coordinator:	Professor M Buehl			
Module teaching staff:	all staff			

CH5832 Contemporary Research Awareness				
SCOTCAT Credits:	20	SCQF level 11	Semester	Full Year
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
This module which forms part of the MSc programmes in Chemical Science and in Catalysis is based on Research Colloquia and Seminars delivered by external speakers and covering the whole range of areas within current chemical science research. Assessment is by two essays to be based on selected lecture(s) and additional reading, one to be submitted at the end of each semester.				
Learning and teaching methods of delivery:	Weekly contact: 20 hours in total over the whole year.			
Assessment pattern:	Coursework (2 x 3,000-word essays) = 100%			
Re-assessment pattern:	Oral Re-Assessment = 100%			
Module coordinator:	Professor M Buehl			

CH5833 Literature Review for MSc Catalysis				
SCOTCAT Credits:	20	SCQF level 11	Semester	Full Year
Academic year:	2021-2022			
Availability restrictions:	Limited to MSc in Catalysis students			
Planned timetable:	To be arranged			
This module aims to provide a comprehensive experience in sourcing and working with scientific literature related to a current topic of chemical research in the area of catalysis, and seeks to develop a number of important skills concerning the dissemination of complex ideas to a wider scientific audience. Via a short sequence of seminars, supervisory meetings, and on line resources, students are provided with detailed guidance on how to conduct a research literature search and evaluate critically scientific articles. In addition, students will develop skills relating to the communication of science, both written and oral. This module provides valuable experience and preparation for a the MSc Research Project. An insight into the academic peer review process is also provided.				
Learning and teaching methods of delivery:	Weekly contact: 2-hours seminar (x4 weeks), 1 hr weekly meeting with supervisor (x6 weeks), (1x 3hr) mini-symposium attendance			
Assessment pattern:	Coursework = 85%, Practical Examination = 15%			
Re-assessment pattern:	Coursework = 85%, Practical Examination = 15%			
Module coordinator:	Professor M Buehl			
Module teaching staff:	Dr Tanja Van Mourik			

CH5841 Research Project for MSc				
SCOTCAT Credits:	60	SCQF level 11	Semester	Full Year
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
The research project for MSc aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project is supervised by a member of the academic staff. The project topic and aims will be selected by both supervisor and student and a related literature survey will be carried out in module CH5831.				
Learning and teaching methods of delivery:	Weekly contact: 30 hours of practical classes (research work).			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No Re-Assessment available, requires lab attendance to complete coursework			
Module coordinator:	Professor M Buehl			
Module teaching staff:	all staff			