UNIVERSITY OF LEICESTER

**Study Abroad**

**Modules in Chemistry**

2022/23 Academic Year

**MODULE NAME: Introductory Organic Chemistry**

**MODULE CODE:** CH1201

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, student at both Leicester and the Dalian Leicester Institute should be able to:

- Recognise functional groups, anticipate their reactivity and interconversions and the reagents required for these transformations

- Identify and explain the relationships between isomers and conformers of organic molecules.

- Rationalise and predict reactivity based on curly arrow mechanisms and diagrams; explain how structure and bonding controls the outcome and rate of organic reactions

- Interpret and discuss the differences between a variety of reaction mechanisms including nucleophilic substitution, elimination reactions, reactions of alkenes, reactions of carbonyls and electrophilic aromatic substitution

- Predict and interpret spectroscopic data for organic molecules whose structures are known; deduce structures of molecules using spectroscopic and analytical data

**COORDINATOR:** Sandeep Handa

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

Examination

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Introductory Inorganic Chemistry**

**MODULE CODE:** CH1202

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students at both Leicester and the Dalian Leicester Institute should be able to:

- Calculate oxidation states and dn configurations for transition metal complexes and identify the common types of ligand and methods of complex preparation

- Describe bonding in transition metal complexes using ionic (crystal field theory) and covalent (molecular orbital) models and calculate and crystal field stabilisation energies and use these to explain and predict magnetic and spectroscopic properties of transition metal complexes

- Predict the geometries of complexes, recognising rotational axes, mirror planes and centres of inversion and draw these on diagrams of molecules, use these to assign point groups to molecules and identify the possibility of distortions from ideal geometries and isomerism

- Describe the inorganic chemistry of a range of main group compounds and discuss the broader applications of descriptive inorganic chemistry

- Interpret solid state structures in terms of the type of unit cell adopted, the coordination number and coordination geometry of each atom, the radius ratio, and the relevant bonding models for ionic and metallic solids

**COORDINATOR:** Mark Lowe

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

Examination

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Introductory Physical Chemistry**

**MODULE CODE:** CH1203

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students at both Leicester and Dalian Leicester Institute should be able to:

- Describe and explain the aims and terminology of thermodynamics including the first and second laws, basic thermochemistry, enthalpy and entropy, Gibbs energy, acid-base equilibria, simple statistical mechanics and phase diagrams. Discuss electrochemical process and how they relate to thermochemistry

- Describe and explain the properties of ideal and non-ideal gases including the use of virial coefficients, Maxwell distributions and collision rates

- Know the basic principles of reaction kinetics and how they can be measured; use these principles to calculate the effect of various parameters on the rates of chemical reactions

- Perform qualitative and quantitative analyses of and solve problems involving thermodynamic and kinetic data

**COORDINATOR:** Andrew Hudson

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

Examination

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Chemistry Key Skills & Maths**

**MODULE CODE:** CH1204

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, student should be able to:

- Perform a variety of mathematical manipulations involving working with units, logarithms and trigonmetric functions.

- solving simultaneous & quadratic equations.

- plotting and extracting information from graphs.

- Differentiate and integrate simple and more complex functions using a variety of methods.

- Perform simple statistical analyses on datasets (mean, median, mode, standard deviation, and use the normal distribution function to identify statistical outliers); calculate errors and uncertainties.

- Communicate chemical concepts and ideas to a range of audience types using methods that will engage discipline specific and general audiences (e.g. posters, oral presentations and written materials)

- Be aware of best practice for CV writing, studying chemistry, taking exams and presenting scientific information.

**COORDINATOR:** Stephen Ball

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Exam (1st semester, 20%), Coursework (40%), Final Exam (40%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Introductory Practical Chemistry**

**MODULE CODE:** CH1205

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Manipulate simple laboratory equipment and glassware and hence perform a variety of basic synthetic and analytical practical procedures (either individually or as part of a larger team) in a safe manner and following good chemistry laboratory practice

- Accurately observe and record experimental details and results and appreciate the different types of errors that may occur and how to deal with them

- Interpret experimental data and report the findings in a concise written report

- Prepare, separate and purify compounds using different techniques including recrystallisation, distillation and tlc; characterise and identify these compounds using a variety of analytical and spectroscopic methods

- Employ a range of analytical techniques to determine important thermodynamic, kinetic and spectroscopic properties of systems, solutions and reactions

**COORDINATOR:** Chris Marsh

**TEACHING AND LEARNING METHODS:**

Lectures, pre-lab exercises, supervised practical work supported by demonstrations and experimental simulations, marked work, formative feedback

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Practical (100%), there are no reassesment opportunities for this module, it must be passed at the first time of taking

- Note - students must attend and complete at least 90% of scheduled laboratory sessions to pass the module

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, pre-lab exercises, online video demonstrations and simulations

**MODULE NAME: Organic Chemistry**

**MODULE CODE:** CH2201

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to: -

• Explain how carbon-carbon bonds can be formed from carbanions and electrophilic molecules and how this chemistry can be used in both the retrosynthetic analysis and the synthesis of organic molecules

• Represent important conformations of alicyclic systems (especially 6-membered); predict and rationalise their relative stability and their influence on the stereoelectronic requirements of reaction pathways

• Discuss and explain the electronic structure of aromatic carbocycles and heterocycles and its effect upon reactivity; use this information to propose effective reaction sequences to synthesise and interconvert aromatic species

• Rationalise and predict reactivity based on curly arrow mechanisms and diagrams; explain how structure and bonding controls the outcome and selectivity of organic reactions

**COORDINATOR:** Alison Stuart

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

Examination

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Inorganic Chemistry**

**MODULE CODE:** CH2202

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- State the methods of preparation, and describe the bonding, relative stability and reactivity of metal carbonyls, -alkyls, -carbenes, -hydrides; as well as alkene, diene, allyl, cyclopentadienyl and benzene complexes

- Describe inorganic reactions in terms of the basic reaction types: substitution, oxidative addition, migratory insertion, reductive elimination, salt elimination

- Be able to use spectroscopic (IR, NMR and Mass Spectrometry) microanalytical data and structural methods in the characterisation of organometallic species.

- Apply the concepts of chemical kinetics to inorganic chemistry including making connections between the kinetics of a process and the mechanism of a reaction

- Discuss the importance of inorganic chemistry in catalysis and describe the mechanistic steps in a number of industrially important catalytic cycles

**COORDINATOR:** Gregory Solan

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

Examination

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Physical Chemistry**

**MODULE CODE:** CH2203

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Describe the thermodynamics of solution formation, distinguishing the different methods of transportation and explaining and analyzing the factors affecting ion migration & diffusion. Distinguish the different ways a species can be transported through a solution. Explain the factors that affect ion migration and diffusion

- Describe the nature of a colloid and the factors affecting its stability. Explain the techniques used to determine the size and shape of colloidal particles. Discuss the interplay between the attractive and repulsive interactions between colloidal particles

- Describe how the kinetics of chemical reactions are influenced by homogenous and heterogeneous catalysts including associated mechanisms

- Perform qualitative and quantitative analyses of and solve problems involving the movement of charged and neutral species in solutions and kinetic data associated with adsorption and desorption processes on surfaces.

- Describe the process of surface growth and distinguish between the different techniques used to probe a surface. Explain the interactions at the electrode-solution interface and be able to determine the rate of electron transfer at the surface of an electrode. Understand adsorption and desorption processes on a surface.

**COORDINATOR:** Shengfu Yang

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

Examination

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Practical Chemistry & Key Skills**

**MODULE CODE:** CH2204

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 30

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Determine, plan and perform a variety of purification, analytical and computational practical procedures (either individually or as part of a larger team) in a safe manner and following good chemistry laboratory practice

- Record and interpret data from a variety of analytical and spectroscopic techniques and present the data in an appropriate format

- Employ a range of analytical techniques to determine important thermodynamic, kinetic and spectroscopi properties of systems, solutions and reactions; assess potential sources of errors in these techniques and calculate the errors associated with the final measurement

- Prepare and purify a variety of organic and inorganic compounds using single or multi-step synthetic procedures; characterise and identify the products from these syntheses using appropriate spectroscopic techniques

- Accurately observe and record experimental details and results; subsequently interpret this information and present their findings in a professional format

- Identify and research scientific concepts of interest to a defined target audience and prepare resources that will communicate these concepts in an effective way

- Evaluate the role of chemistry in the sustainable energy sector and the viability of different sustainable technologies based on the specific requirements of a defined geographical location

- Create, review and edit written content for a range of scientific audiences (e.g. journal articles) and employers (e.g. CV's, application letters)

- Reflect on their own skills identifying areas of strength and weakness

**COORDINATOR:** Chris Marsh

**TEACHING AND LEARNING METHODS:**

Lectures, pre-lab exercises, supervised practical work supported by demonstrations and experimental simulations, marked work, formative feedback, workshops, problem based learning activities, presentations

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 300

**ASSESSMENT METHODS:**

- Practical (85%)

- Coursework (15%)

There are no reassessment opportunites for this module, it must be passed at the first attempt.

Note: students must attend and complete at least 90% of scheduled laboratory sessions to pass the module

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, pre-lab exercises, online video demonstrations and simulations, reflective skills exercises

**MODULE NAME: Advanced Structure Determination**

**MODULE CODE:** CH4201

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Demonstrate that they are aware of the range of major spectroscopic techniques currently available to synthetic chemists; recognise and describe the analytical, structural and stereochemical information each technique can provide

- Discuss the magnetic properties of nuclei and electrons, summarise the main features of spectra (resonant frequencies, line intensities, lineshape) and describe the physical and chemical interactions that define these features

- Analyse and evaluate complex NMR spectra to extract key data; select and make use of appropriate 1D and 2D NMR experiments in simplifying and assigning spectra fully; predict and rationalize NMR spectra from inorganic and organic molecules

- Discuss techniques based on Correlation Spectroscopy, their uses and their limitations; apply these techniques to solve unseen problems

- Discuss the importance of variation of temperature in the study of time-dependent processes using NMR spectroscopy; evaluate the results of such VT NMR experiments to obtain data concerning equilibria and rates of reaction

**COORDINATOR:** Sandy Kilpatrick

**TEACHING AND LEARNING METHODS:**

Problems will be set and discussed throughout the module. The contact time will involve a variety of teaching methods – synchronous lectures, asynchronous classes that include example problems & group problem solving classes. Application of the ideas enco

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%)

- Exam (Final) (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, group literature interrogation exercises.

**MODULE NAME: Advanced Synthetic Methods**

**MODULE CODE:** CH4202

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Explain and evaluate different synthetic strategies and methods for stereocontrol as applied to the synthesis of target molecules; critically analyse proposed synthetic routes based on these methods explain the role of typical reagents and transformations in modern organic synthesis; evaluate potential synthetic routes to target molecules rationalizing the use of suitable reagents for selective synthetic transformations

- Use disconnections based on the chemical reactivity of the carbonyl group to propose a retrosynthesis and synthesis of unseen target molecules

- Predict and rationalise both familiar and unfamiliar organic reactions based on a mechanistic understanding of reactivity; with particular emphasis on the selectivity (chemo-, regio- and stereoselectivity) of such reactions

- Apply chemo-, regio- and stereoselective reactions for the proposed synthesis of unseen target molecules

**COORDINATOR:** Sandeep Handa

**TEACHING AND LEARNING METHODS:**

Problems will be set and discussed throughout the module. The contact time will involve a variety of teaching methods – synchronous lectures, asynchronous classes that include example problems & group problem solving classes. Application of the ideas enco

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%)

- Exam (Final) (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises

**MODULE NAME: Earth System Science**

**MODULE CODE:** CH4203

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Explain the fundamental physical and chemical processes that control the composition of Earth's atmosphere. Describe how atmospheric composition also links to the other components of the Earth system (geosphere, biosphere, hydrosphere, lithosphere).

- Compare, contrast and distinguish between the different physical and chemical processes that occur in the stratosphere and the troposphere.

- Apply concepts from gas kinetics in seen and unseen problems to calculate concentrations of atmospheric gases, their lifetimes, and sources & sink rates.

- Discuss how human activities can modify atmospheric composition and/or affect climate. Discuss some of the societal issues resulting from anthropogenic influences on the Earth system.

- Collate information from textbooks, research literature, atmospheric databases and scientific reports (e.g. IPCC) on a topic in Earth system science. Cogently present their findings to peers & staff.

**COORDINATOR:** Stephen Ball

**TEACHING AND LEARNING METHODS:**

Problems will be set and discussed throughout the module. The contact time will involve a variety of teaching methods – synchronous lectures, asynchronous classes that include example problems & group problem solving classes. Application of the ideas enco

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%)

- Exam (Final) (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, researching the peer-reviewed literature, reading relevant reports from scientific bodies (e.g. Intergovernmental Panel on Climate Change).

**MODULE NAME: Computational Chemistry & Quantum Mechanics**

**MODULE CODE:** CH4207

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Discuss the physical principles behind major simulation techniques such as ab initio quantum chemistry, molecular dynamics and the Monte Carlo procedure

- Use appropriate software packages utilizing the simulation techniques to predict and analyse properties in individual molecules and molecular assemblies

- Critically assess the strengths and weakness of different simulation approaches for predicting molecular properties

- Write short computational routines to determine key properties, such as energy levels and wavefunctions, using various methods

- Apply knowledge of simulation techniques and computer software simulations to solve unseen chemical problems

- Present data from computational simulations in a clear and concise way

**COORDINATOR:** Andrew Ellis

**TEACHING AND LEARNING METHODS:**

Problems will be set and discussed throughout the module. The contact time will involve a variety of teaching methods – synchronous lectures, asynchronous classes that include example problems & group problem solving classes. Application of the ideas enco

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (40%)

- Exam (Final) (60%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, simulation software exercises

**MODULE NAME: Bioinorganic Chemistry**

**MODULE CODE:** CH4208

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

Describe the occurrence and function of metals in biological systems including the transport and storage of oxygen and electron transport processes

Describe the ways in which spectroscopic and kinetic techniques, and synthetic model compounds, can be used to study metalloprotein mechanisms; apply this knowledge to unseen problems

Discuss the role played by platinum compounds as anti-cancer therapies and explain the fundamental coordination chemistry underpinning their mode of action; critically assess the design features of potential Pt-based anti-cancer agents

Describe how specific metals are used to carry out activation of small molecules such as H2, CO, O2, and N2, and discuss the importance of both metal coordination and macromolecular structure in tuning the chemistry of metal centres in proteins; be able to rationalise protein function based on metal coordination.

Apply the knowledge gained in this module to conclude whether a given metal complex/ligand system is suitable for a particular therapeutic application.

**COORDINATOR:** Rama Suntharalingam

**TEACHING AND LEARNING METHODS:**

Problems will be set and discussed throughout the module. The contact time will involve a variety of teaching methods – synchronous lectures, asynchronous classes that include example problems & group problem solving classes. Application of the ideas enco

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%)

- Exam (Final) (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises.

**MODULE NAME: Medicinal Chemistry**

**MODULE CODE:** CH4211

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Describe and discuss the concepts of drug targets and the differing strategies used in the drug discovery process for hit identification

- Describe the various stages of the drug discovery process and evaluate the medicinal chemistry involved following hit identification through to drug approval

- Describe and explain the key chemical and biological process involved in the development of several major diseases

- Discuss and rationalize the differing modes of action(s) of given examples of known therapeutic drugs such as antibiotics and anticancer agents; use this knowledge to predict the mode of actions for unfamiliar drug candidates

- Discuss and rationalize the organic chemistry involved in the synthesis of commercially available drugs; propose and critically analyse synthetic routes to potential drug molecules using the chemistry covered in this module and from core modules in years 1-3

- Describe and critically evaluate contemporary drug discovery strategies including future challenges in this field

**COORDINATOR:** James Hodgkinson

**TEACHING AND LEARNING METHODS:**

Problems will be set and discussed throughout the module. The contact time will involve a variety of teaching methods – synchronous lectures, asynchronous classes that include example problems & group problem solving classes. Application of the ideas enco

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%)

- Exam (Final) (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises.

**MODULE NAME: Advanced Forensic Science**

**MODULE CODE:** CH4212

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Academic Year

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Analyse and apply the process of making inferences about "facts" and “evidence” in forensic contexts

- Critically assess the contributions of scientific analysis to aspects of specialist investigations

- Apply archaeological methodology to the field of criminal investigation

- Describe the judicial and police frameworks in the UK and the role of the forensic archaeologist within those systems

- Critically assess the organizing and evaluation of forensic evidence

- Describe and appreciate the roles of expert forensic witnesses in the Anglo-American legal systems

- Describe and critically analyse the role and limitations of a variety of investigative techniques for solving forensic problems

**COORDINATOR:** Rob Hillman

**TEACHING AND LEARNING METHODS:**

Problems will be set and discussed throughout the module. The contact time will involve a variety of teaching methods – synchronous lectures, asynchronous classes that include example problems & group problem solving classes. Application of the ideas enco

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (60%)

- Exam (Final) (40%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, group problem solving exercises, primary literature critique

**MODULE NAME: General Chemistry**

**MODULE CODE:** CH1200

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Explain the principles of atomic structure, electron configuration, energy quantisation, wave particle duality, molecular orbital theory and coordinate bonding

- Determine the shapes of covalent molecules using Valence-Shell Electron-Pair repulsion theory

- Predict the Lewis acidity or basicity of a molecule

- Describe chemical equilibria on both molecular and mathematical levels

- Describe the underlying principles of spectroscopy and apply quantitative relationships (e.g. Beer-Lambert law, Rydberg equation) to analyse spectra; predict and rationalize spectra of atoms & molecules

- Draw and name organic molecules explaining their structure, shapeand possible isomers

- Use curly arrow notation to rationalise and predict stability, polar reactivity and acidity for organic molecules

**COORDINATOR:** Kal Karim

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

Examination

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Scientific Method & Principles of Analytical Chemistry**

**MODULE CODE:** CH1206

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Discuss the role of ethics in the pursuit of scientific discovery and be familiar with some of the underlying philosophical principles of science

- Describe the different types of analytical problems, the methods that can be used to solve them and the errors associated with each method and how they can be dealt with; use this knowledge to select the best technique to solve specific analytical problems

- Know the basic principles of electrochemical, chromatographic and UV/Vis and elemental spectroscopic techniques and discuss and evaluate their application in qualitative and quantitative analyses

- Know the principles and underlying chemistry of titrimetric and gravimetric quantitative methods of analysis

- Evaluate and interpret the results from qualitative and quantitative analyses and solve problems involving analytical data

**COORDINATOR:** Sergey Piletsky

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework and exam

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Spectroscopy Theory & Practice**

**MODULE CODE:** CH2200

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Identify and explain at a quantum level the nature of the transitions induced when specific wavelengths of electromagnetic radiation interact with molecules

- Interpret or predict data (from more than one spectroscopic technique) and hence identify structural or bonding characteristics and/or determine the full structure of molecules

- Analyse molecular spectroscopic data and conduct calculations relating to the properties of molecules

- Choose appropriate physical methods to solve chemical identification and characterisation problems

- Recognise elements of symmetry and use these to determine point groups of molecules; use this analysis to predict vibrational spectra

**COORDINATOR:** Andrew Ellis

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

Examination

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Polymer & Materials Chemistry**

**MODULE CODE:** CH2207

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, student should be able to:

- Describe the terminology of materials mechanics and explain the strength of materials in relation to their molecular structure

- Discuss the formation of alloys; explain and predict the chemical and physical properties of alloys based upon a knowledge of their composition

- Describe and explain the methods for production of polymers and characterization of their properties (e.g. glass transition temperature); explain and predict how polymer structure affects physical properties

- Classify polymers on the basis of their structure, properties or origin; describe the applications of polymers explaining how they are related to their structure and properties

- Discuss and rationalise the key mechanisms for polymerization (radical, cationic and anionic) and for cross-linking

- Recognise repeat units of polymers and hence predict appropriate routes for their synthesis

- Discuss and explain how kinetic & thermodynamic factors affect polymerisation reactions

**COORDINATOR:** Andy Abbott

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Advanced Organic Chemistry**

**MODULE CODE:** CH3201

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Illustrate the importance of spectroscopy (particularly NMR and MS) in the determination of the structure and shape of organic compounds. Interpret or predict NMR, MS and IR data, and hence determine the full structure, including stereochemistry, of organic molecules

- Recognise and be able to classify the principal types of pericyclic reaction

- Explain how mechanism relates to the selectivity of pericyclic reactions and why thermally and photochemically-activated molecules frequently exhibit contrasting selectivity. Use this knowledge to predict the outcome of unseen reactions

- Know and understand how radicals and carbenes can be generated and the types and mechanisms of reaction that they most commonly exhibit. Use this information to predict the outcome of unseen reactions

- Explain how the reactivity of transient species can be investigated, and recognise the advantages and limitations of the high reactivity of transient intermediates

**COORDINATOR:** Sandeep Handa

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Advanced Inorganic Chemistry**

**MODULE CODE:** CH3202

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Describe how the understanding of basic and advanced topics in inorganic chemistry, and appropriate physical methods can be applied to solve inorganic chemical problems; use this knowledge to solve unseen problems.

- Describe the basic principles of a variety of key spectroscopic and analytical techniques for inorganic chemistry appreciating the significance/relevance of the data available from each to select which technique is most appropriate for a given situation; interpret and evaluate data for these techniques to solve unseen problems.

- Discuss and critique the importance of inorganic chemistry in Biomedicine and metals in medicine and be able to apply this knowledge to solve unseen problems.

Discuss and critique the importance of inorganic chemistry in catalysis: acetic acid manufacture, polymerisation of alkenes, oligomerisation of alkenes and relation to the SHOP process, ring opening polymerisation (e.g., synthesis of biodegradable polymers like polylactide and polycaprolactone); apply this knowledge to solve unseen problems.

**COORDINATOR:** Philip Ash

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Study Abroad - Masters Options 1**

**MODULE CODE:** CH4711

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

Students may take two options from within the suite of options available to MChem students:

CH4201

CH4202

CH4203

CH4207

CH4208

CH4211

**COORDINATOR:** Sandy Kilpatrick

**TEACHING AND LEARNING METHODS:**

Lectures, set text(s), directed reading (literature articles), group problem solving workshops

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

-

**MODULE NAME: Study Abroad - Masters Options 2**

**MODULE CODE:** CH4712

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

Students may take two options from within the suite of options available to MChem students:

CH4201

CH4202

CH4203

CH4207

CH4208

CH4211

**COORDINATOR:** Sandy Kilpatrick

**TEACHING AND LEARNING METHODS:**

Lectures, set text(s), directed reading (literature articles), group problem solving workshops

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

-

**MODULE NAME: Study Abroad - Masters Options 3**

**MODULE CODE:** CH4713

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 1

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

Students may take two options from within the suite of options available to MChem students:

CH4201

CH4202

CH4203

CH4207

CH4208

CH4211

**COORDINATOR:** Sandy Kilpatrick

**TEACHING AND LEARNING METHODS:**

Lectures, set text(s), directed reading (literature articles), group problem solving workshops

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

Coursework

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

-

**MODULE NAME: Chemistry of the Real World**

**MODULE CODE:** CH1207

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, student should be able to:

- Identify and describe how chemistry impacts on everyday life in such areas as the environment, sustainability & materials.

- Present and critically analyse the role played by chemistry in a particular area of society

- Work together in groups to analyse and solve unseen problem based chemical scenarios

- Analyse and critique how science and chemistry in particular is disseminated in the media

- Participate effectively in a range of teaching and learning activities (some involving group work), combine facts and ideas and communicate scientific concepts to a range of audience types

**COORDINATOR:** Mark Lowe

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (100%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Introductory Pharmaceutical Chemistry**

**MODULE CODE:** CH1209

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, student should be able to:

- Identify and describe the chemical structure, organisation, properties and functions of various biological entities including; membranes, prokaryotic and eukaryotic cells, the nervous system and neurotransmission, molecular receptors and signalling mechanisms

- Describe the presence, interactions and various roles of amino acids, sugars, nucleotides and fatty acids in biological systems and drug discovery

- Describe the evolution of the pharmaceutical industry from historically important therapeutic areas to current targets and the overall process of drug design, development, screening and bringing to market

- Discuss the role and kinetics of enzymes and co-factors in biological catalysis, drug mode of action and their relationship to ATP and energy production

- Participate effectively in a range of teaching and learning activities (some involving group work), combine facts and ideas and communicate scientific concepts to a range of audience types

**COORDINATOR:** Richard Blackburn

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (100%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Analytical Chemistry in Practice**

**MODULE CODE:** CH2206

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, student should be able to:

- Identify the errors associated with analytical measurements and sampling methods and how they can be minimised and evaluated

- Describe the key components of analytical instrumentation and their function

- Describe the principles of a variety of spectrochemical methods and explain their use in chemical and biochemical analysis; choose the most appropriate method to solve specific analytical and bioanalytical problems

- Explain the principles of chromatography, electrophoresis and mass spectrometry and describe how these techniques can be used in bioanalysis; Describe the structure and biological function of DNA and RNA and explain how methods to analyse DNA are important in analytical chemistry and forensic science

- Evaluate and interpret the results from qualitative and quantitative analyses and solve problems involving analytical data in a critical manner assessing the significance and reliability of measurements

**COORDINATOR:** Elena Piletska

**TEACHING AND LEARNING METHODS:**

Asynchronous lectures, synchronous classes that include example problems and problem solving, tutorials, marked work & VLE directed activities

**PRE-REQUISITES:** -

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Advanced Physical Chemistry**

**MODULE CODE:** CH3203

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Discuss the mutual reliance of theory, statistical methods and spectroscopy

- Explain the Schrödinger equation for light atoms (H, He, Li etc) and simple diatomic molecules (H2+, H2, etc); identify the various terms as contributions to the potential energy or kinetic energy of the system

- Establish the symmetry of atomic and molecular wave functions; rank orbitals according to their energy; construct molecular orbital energy level diagrams and use them to infer properties about the bonding within molecules

- Implement Hückel theory to calculate the properties of π-bonded molecules and aromatic organic compounds

- Classify the various forms of molecular motion in terms of separation of their quantum mechanical energy levels

- Evaluate partition functions for a variety of simple chemical systems; use partition functions to calculate bulk thermodynamic properties of the system

- Explain key processes in the interaction between light and matter; use the information content of spectroscopic lines to infer properties of the molecule; identify the symmetry of energy levels and hence establish whether the transition is allowed or forbidden

**COORDINATOR:** Stephen Ball

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

DLI Students: Directed reading, set problems, group problem solving exercises, formative quizzes, presentations

**MODULE NAME: Biological Chemistry**

**MODULE CODE:** CH3204

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Discuss and rationalize the structure, chemistry and properties of simple carbohydrates and naturally occurring nucleosides; use this knowledge to solve unseen problems

- Explain the common strategies used for the synthesis of carbohydrates and use them to propose syntheses of target molecules

- Identify the structure, chemistry and functions of cofactors and vitamins; predict & rationalise the chemistry of these systems for both seen and unseen examples

- Produce and rationalise mechanisms and reaction pathways associated with cofactor catalysis, biosynthesis of natural products and energy production for both seen and unseen examples

- Explain and rationalise the chemistry involved for the laboratory synthesis and structure determination of DNA; apply this chemistry to design synthetic routes to such molecules and/or evaluate data to deduce DNA structure

**COORDINATOR:** Richard Blackburn

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Metals in Synthesis**

**MODULE CODE:** CH3205

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

-Explain the importance of selectivity in synthesis

-Summarise the important features of the use of transition and main group elements in stoichiometric and catalytic organic synthesis. Use this information to predict the outcome of unseen reactions and propose synthetic routes to target molecules

- Discuss the important features of the synthetic chemistry of silicon, selenium, lithium, boron and aluminium; explain the selectivity seen in the reactions of these organometallic compounds and use this knowledge to predict and explain the outcome of unseen reactions

- Explain what is catalysis and the effect of a catalyst on the free energy of a reaction. Define turnover frequency and turnover number and use these terms to calculate the catalytic efficiency in unseen systems

- Discuss in detail specific examples of transition metal catalysed processes, including asymmetric catalysis, information on their mechanisms and key reaction steps

- Explain how spectroscopy, kinetics and labelling studies can be used to help elucidate reaction mechanisms; evaluate data from these studies to deduce mechanisitic pathways in unseen systems

**COORDINATOR:** Sandeep Handa

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

DLI Studentds: Directed reading, set problems, group problem solving exercises, formative quizzes, presentations

**MODULE NAME: Advanced Analytical Chemistry**

**MODULE CODE:** CH3206

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Discuss the principles underlying modern analytical techniques and their applications. Use this information to critically analyse and interpret data for the solution of unseen problems in analytical chemistry

- Explain the methods of analytical chemistry at interfaces

- Summarise the relevance of sensitivity and selectivity to choice of an analytical method for a specific application; use this information to analyse unseen scenarios and choose the correct methods to solve analytical problems

- Evaluate unseen problems in analytical chemistry and thus select and apply techniques to obtain the best results in a variety of situations. Have insight into the nature, mechanism and dynamics of a range of interfacial physical and chemical processes

- Recognise the nature of the interaction between surfaces and the environment to which they are exposed

- Explain how interfacial structure may be experimentally determined and simulated, evaluating different methods for different scenarios

**COORDINATOR:** Rob Hillman

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

DLI Students: Directed reading, set problems, group problem solving exercises, formative quizzes, presentations

**MODULE NAME: Advanced Materials Chemistry**

**MODULE CODE:** CH3208

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Apply chemical knowledge and computational methods to design materials with specific properties

- Explain the basis of the analytical techniques used to characterize chemical materials and critically evaluate the advantages and limitations of each technique for different applications

- Interpret analytical data in view of a materials properties; predict material properties based on analytical data and vice versa

- Use advanced chemical technologies and design concepts to propose novel materials and their synthesis

- Demonstrate awareness of the impact of materials in society and the environment particularly in the fields of sustainability, diagnostics, imaging and drug discovery

**COORDINATOR:** Kal Karim

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Pharmaceutical Chemistry**

**MODULE CODE:** CH3211

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Discuss and critically assess the important factors that need to be considered when deciding on possible synthetic routes to pharmaceutical molecules (e.g. safety, reaction scale, purification, cost & availability of reagents, market value & quality control)

- Describe the different stages involved in drug discovery, development and determining the mode of action of a drug

- Discuss the essential features of protein structure and how they can be determined

- Explain the basic principles and chemistry involved in solid phase synthesis of peptides; apply these strategies to propose synthetic routes to target peptides in unseen problems

- Explain how physiochemical properties of drugs can determine their activity and stability; rationalise the chemistry that can be used to alter the physiochemical properties of drugs

- Explain the concepts of combinatorial chemistry (including dynamic methods); apply these strategies for the synthesis of target molecules in unseen problems

**COORDINATOR:** Richard Doveston

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (25%), Final Exam (75%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes

**MODULE NAME: Forensic Science**

**MODULE CODE:** CH3212

**MODULE DESCRIPTION:** Click to open.

**CREDITS:** 15

**PERIOD:** Semester 2

**DEPARTMENT:** Chemistry

**INTENDED LEARNING OUTCOMES:**

On successful completion of the module, students should be able to:

- Describe the capabilities of various analytical techniques; discuss the relevance of sensitivity and selectivity to choice of an analytical method for a specific application; use this information to critically evaluate and thus select and apply techniques to obtain the best results in a variety of situations

- Describe and explain the contributions of chemical analysis to aspects of pathology, fire investigation, road traffic accidents, forensic engineering and explosives detection; describe and explain other forensic tools to analyse some of the following, documents, biometrics, gunshot residue, advanced fingerprint methods

- Describe the role and limitations of analytical techniques in solving forensic problems; discuss these techniques and the information they provide with peers and teachers

- Design and execute analytical procedures

- Apply laboratory-based knowledge to the identification and collection of evidence at a crime scene.

**COORDINATOR:** Rob Hillman

**TEACHING AND LEARNING METHODS:**

The contact time will involve a variety of teaching methods – asynchronous lectures, synchronous classes that include example problems and problem solving & VLE directed activities. Application of the ideas encountered in lectures to the solution of probl

**PRE-REQUISITES:**

**TOTAL MODULE HOURS:** 150

**ASSESSMENT METHODS:**

- Coursework (40%), Final Exam (60%)

**GUIDED INDEPENDENT LEARNING: INDICATIVE ACTIVITIES:**

Directed reading, set problems, group problem solving exercises, formative quizzes