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| 4001APCHEM  Semester 1  *Chemistry* | ATOMIC STRUCTURE AND REACTIVITY  (20c) | *Aim:*  The module gives an introduction into key chemical concepts of atomic structure and chemical bonding which provide a strong foundation for the rest of the programme. Students will apply this knowledge to develop understanding of chemical processes such as electrolysis and chemical properties. Students will develop their numeracy skills during workshops and apply these to chemical concepts. | *Learning activities:*  Lectures, workshops, tutorials | *Assessment:*  Examination (60%) Report (40%) |
| 4002APCHEM  Semester 1  *Chemistry* | FROM ATOMS TO MOLECULES  (20c) | *Aim:*  This is an introductory module for Organic and Analytical Chemistry, covering basic sources, reactions and analytical approaches to identification and properties of molecules. | *Learning activities:*  Lectures, workshops and tutorials | *Assessment:*  Examination (60%) Report (40%) |
| 4002PHASCI  Semester 1  *Chemistry* | ORGANIC CHEMISTRY  (20c) | *Aim:*  To explore the structure, bonding, functionality and reactions of organic molecules with specific reference to pharmaceutically important drugs and to develop in the student an ability to practise chemical laboratory skills and evaluate and communicate their findings. | *Learning activities:*  Lectures, Workshops, practical sessions, small group tutorials with personal tutor, and reflections upon the various aspects of personal development, culminating in the completion of the self-awareness statement. | *Assessment:*  Practical report (40%) Examination (50%) Self awareness statement (10%) |
| 4003APCHEM  Semester 1  *Chemistry* | PRACTICAL LABORATORIES 1  (20c) | *Aim:*  This course will provide an introduction to the techniques and practice of a modern chemical laboratory, including each of the areas of Inorganic, Organic, Physical, Analytical and Computational Chemistry. The course will also establish the requirements for written and computational work throughout the programme, and thus for future work in the chemical and allied industries. | *Learning activities:*  Laboratory classes in Inorganic, Organic, Physical and Analytical Chemistry, including an introduction to the application of information technology and computing to Chemistry. | *Assessment:*  Practical Exam (40%) Practical Report (20%) Lab book portfolio (40%) |
| 5001APCHEM  Semester 1  *Chemistry* | RADIATION AND MATTER  (20c) | *Aim:*  This module provides candidates with a comprehensive description of fundamental aspects of the properties and chemistry of transition metal complexes, together with a rationalization of how non-ionising radiation interacts with simple matter to produces a variety of spectra within different branches of the electromagnetic spectrum. It also outlines how quantum mechanics differ from classical theories and thus its importance at the atomic level. The kinetics of enzymes reactions is offered in detail, and how QSAR analysis can predict changes to rates of reaction. | *Learning activities:*  Lectures and tutorials | *Assessment:*  Examination (60%) Report (25%) On-line test (15%) |
| 5002APCHEM  Semester 1  *Chemistry* | UNDERSTANDING MOLECULES  (20c) | *Aim:*  The module gives an introduction into key concepts of synthesis, properties and reactivity of organic molecules. This will be supplemented and contextualised by the introduction into the theory and application of analytical chemistry and spectral data interpretation applied to structure elucidation. Skills development in the area of data interpretation and reaction chemistry will be strengthened in workshops. | *Learning activities:*  Lectures and workshops | *Assessment:*  Exam (60%) Interpretative test (40%) |
| 5002PHASCI  Semester 1  *Chemistry* | SYNTHETIC AND NATURAL DRUGS  (20c) | *Aim:*  To present and illustrate the principles and processes involved in the discovery, acquisition of and analysis of a range of natural, synthetic and biotechnologically produced drugs. | *Learning activities:*  Lectures, workshops, practical sessions and small group tutorials with personal tutor | *Assessment:*  exam (60%) Practical report (40%) |
| 5003APCHEM  Semester 1  *Chemistry* | PRACTICAL LABORATORIES 3  (20c) | *Aim:*  Building on Level 4 practical modules, the course will focus on more complex molecular/compound synthesis, thus entailing the use of chromatographic and spectroscopic analytical techniques. | *Learning activities:*  Laboratory classes in Organic and Inorganic synthesis, physical and analytical assay | *Assessment:*  Practical Exam (50%) Practical Report (20%) Lab book portfolio (30%) |
| 6001APCHEM  Semester 1  *Chemistry* | MODERN MATERIALS  (20c) | *Aim:*  The course aims at covering the modern aspects of materials chemistry. Emphasis will be placed on stimuli-responsive materials, on nanoscale technology, and on the approaches used in the manufacture of modern materials. Applications of modern materials in different fields will also be discussed. | *Learning activities:*  Lectures, workshops, seminars. | *Assessment:*  Examination (70%) Report (30%) |
| 6002APCHEM  Semester 1  *Chemistry* | INDUSTRIAL ANALYSIS  (20c) | *Aim:*  To understand how a range of sample types can be analysed using advanced instrumental techniques. Knowledge will be gained on the whole concept of analysis from sample preparation techniques through to data interpretation, quality control and quality assurance issues. | *Learning activities:*  Lectures / Workshops | *Assessment:*  Report (30%) Examination (70%) |
| 6003APCHEM  Semester 1  *Chemistry* | PRACTICAL LABORATORIES 5  (20c) | *Aim:*  This course builds on skills attained in Levels 4 and 5 and deals with the synthesis and analysis of monomeric and polymeric organic and inorganic materials, including relevant examples from the modern chemical and allied industries. Advanced chromatographic techniques, including tandem approaches, spectroscopy and spectrometry will be employed for analysis of the materials produced in the laboratory. Assessment will be via a lab report and an oral presentation. | *Learning activities:*  Laboratory classes in Organic, Inorganic and polymer synthesis and analysis | *Assessment:*  Lab report (20%) Exam (60%) Lab book (20%) |
| 6005APCHEM  Semester 1  *Chemistry* | MOLECULAR DESIGN  (20c) | *Aim:*  This module will introduce the idea that in order to be useful and valuable, molecules need to have appropriate physical, biological and material properties. By understanding these properties, chemists can design better pharmaceuticals, agrochemicals, cosmetics, consumer products, materials and other chemicals. | *Learning activities:*  Combination of lectures, worked example workshops and poster preparation workshops. | *Assessment:*  Poster Presentation (30%) Examination (70%) |
| 7001APCHEM  Semester 1  *Chemistry* | ADVANCED ANALYSIS  (20c) | *Aim:*  The purpose of this module is to teach aspects of problem solving through the application of analytical techniques to specific problems related to research interests within the school. This may involve relatively simple techniques such as spot testing all the way through to hyphenated mass spectrometry. The students will discuss important aspects such as cost, speed and reliability of analysis. | *Learning activities:*  Lectures, workshops, seminars and tutorials | *Assessment:*  Examination (70%) Oral presentation (30%) |
| 7002APCHEM  Semester 1  *Chemistry* | HI-TECH COLOURANTS  (20c) | *Aim:*  Based on prior 'modern materials' modules, Hi-Tech Colourants provides candidates with comprehensive coverage of the applications of chemistry in modern photonics, including light emissive materials, photo- and electrochromics, dye-sensitised solar cell technology, photodynamics, sensors, biosensors and imaging agents. Material will reflect the place of non-textile colourants in modern commerce. | *Learning activities:*  Lectures, seminars, tutorials and workshops | *Assessment:*  Examination (70%) Report brochure (30%) |
| 7003APCHEM  Semester 1  *Chemistry* | PREDICTIVE TOXICOLOGY  (20c) | *Aim:*  This module aims to outline the principles of how chemistry is used in predictive toxicology. It will cover the chemistry associated with chemical toxicity and how this information can be encoded as computational tools and workflows. It will draw on the physical organic topics taught at earlier levels. | *Learning activities:*  Lectures and workshops | *Assessment:*  Examination (70%) Workshop report (30%) |
| 7004APCHEM  Semester 1  *Chemistry* | ADVANCED ORGANIC SYNTHESIS  (20c) | *Aim:*  The theme of the module will be the application of synthetic strategies to small, highly-functionalised molecules and larger biopolymers, which are of contemporary interest in pharmaceutical, agrichemical and materials science industries. A major element of focus will be chiral control and strategy in multistep organic synthesis. | *Learning activities:*  Lectures, workshops and tutorials | *Assessment:*  Examination (70%) Report (30%) |
| 4004APCHEM  Semester 2  *Chemistry* | PROPERTIES OF MOLECULES  (20c) | *Aim:*  Building on the first semester modules, this will cover more complex organic molecules and their physical attributes and reactivity resulting from molecular structure - for example the way a molecule might dissolve in one solvent, but not in another. The idea of multiple-step reactions and interconversions of molecules are also covered, as an important factor in the industrial production and use of chemicals. Career and employability self-awareness will also be assessed. | *Learning activities:*  Lectures, tutorials and workshops. | *Assessment:*  Examination (50%) Report (40%) Self Awareness Statement (10%) |
| 4005APCHEM  Semester 2  *Chemistry* | PROPERTIES OF MATTER  (20c) | *Aim:*  This module provides candidates with an outline of some basic principles of inorganic aqueous chemistry and solid state structures. It also indicates how the interaction of radiation with such matter leads to spectroscopic properties widely used in analytical chemistry. | *Learning activities:*  Lectures, workshops, tutorials and seminars | *Assessment:*  Examination (60%) Report (40%) |
| 4006APCHEM  Semester 2  *Chemistry* | PRACTICAL LABORATORIES 2  (20c) | *Aim:*  This course will focus on simple organic and inorganic synthesis. It will also build on the areas covered in Practical Labs 1, applying isolation and analytical techniques to the products obtained from the contained chemical syntheses/conversions. | *Learning activities:*  Laboratory classes in Organic and Inorganic synthesis, physical measurement and analytical assay. | *Assessment:*  Practical Exam (40%) Practical Report (20%) Lab book portfolio (40%) |
| 5004APCHEM  Semester 2  *Chemistry* | UNDERSTANDING MATERIALS AND MIXTURES  (20c) | *Aim:*  The course aims at providing an overview of the relationships between solid state structures and material properties. Different classes of materials will be covered to exemplify this concept. Techniques to characterise materials (and their properties) will be introduced. Emphasis will be placed on the synthetic approaches to inorganic, organic and composite materials. | *Learning activities:*  Lecture, workshops, tutorials | *Assessment:*  Examination (60%) Presentation (40%) |
| 5005APCHEM  Semester 2  *Chemistry* | STRUCTURE AND ANALYSIS  (20c) | *Aim:*  To develop knowledge, practical experience and the interpretation skills necessary for the quantitative and qualitative analysis of chemical species relevant to chemical industries. This module will also introduce the concepts of molecular modelling and computational analysis | *Learning activities:*  Lectures and tutorials | *Assessment:*  Examination (60%) Report (40%) |
| 5006APCHEM  Semester 2  *Chemistry* | PRACTICAL LABORATORIES 4  (20c) | *Aim:*  Building on both Level 4 practical modules and Practical Labs 3, this course will concentrate on the chemistry underpinning materials - compounds, polymers and copolymers - from the angle of synthesis and reaction/functionalisation. Chromatographic and spectroscopic analytical techniques, including some tandem techniques will be used for assaying laboratory products. | *Learning activities:*  Laboratory classes in organic and inorganic synthesis, physical and analytical assay and computational chemistry. | *Assessment:*  Practical Exam (50%) Practical Report (20%) Lab book portfolio (30%) |
| 6000APCHEM  Semester 2  *Chemistry* | RESEARCH PROJECT  (40c) | *Aim:*  The course aims to equip the student to undertake practical research in the area of Applied Chemistry and to be able to present the research orally and in written form. | *Learning activities:*  Lectures and practical work. Preparation of a personal development portfolio. | *Assessment:*  Project Dissertation (70%) Oral Exam (30%) |
| 6004APCHEM  Semester 2  *Chemistry* | MODERN SYNTHESIS  (20c) | *Aim:*  To convey some of the most important modern chemical transformations involved in pharmaceutical, agrichemical and materials science. This will equip the learner with the theoretical knowledge that will be applied in the industrial setting. | *Learning activities:*  Lectures, workshops and tutorials | *Assessment:*  Examination (70%) Report (30%) |
| 6006APCHEM  Semester 2  *Chemistry* | PRACTICAL LABORATORIES 6  (20c) | *Aim:*  Small Group Project (2-3 students). The students will work together to research a topic concerning modern materials from the angle of synthesis, property testing or analysis, plan and construct a suitable short piece of laboratory investigation and then carry this out. This will be overseen by an academic experienced in the area of Inorganic, Organic, Physical, Analytical or Computational Chemistry, but will require significant original student input. Poster presentation will be by the group, but individual formal reports will be submitted. | *Learning activities:*  Laboratory projects in Organic, Inorganic, Polymer, Analytical and Computational Chemistry | *Assessment:*  Practical exam (60%) Lab book portfolio (20%) Lab report (20%) |
| 6007APCHEM  Semester 2  *Chemistry* | CHEMISTRY MINI-PROJECT  (20c) | *Aim:*  The course aims to equip the student to undertake a short research project in the area of chemistry and to be able to present the research orally and in written form. | *Learning activities:*  Lectures and practical work. Preparation of a written report and an oral presentation | *Assessment:*  Research report (60%) Oral presentation (40%) |