

Synopses of Postgraduate Lectures

10.1 Postgraduate Lectures

These specialist lecture courses are open to all postgraduate researchers in the School of Chemistry. In addition, postgraduates may attend undergraduate courses in Chemistry and other Departments e.g. Biochemistry, Physics etc.

A BRIEF INTRODUCTION TO SEMI-INORGANIC POLYMERS

Chris Entwistle, AWE Aldermaston

Further details will be available in due course (1 lecture).

AEROSOLS: PROPERTIES, PROCESSES AND SOURCES

Prof J P Reid

Aerosols are of increasing importance in a wide range of scientific disciplines, from their role in mediating important atmospheric chemistry, to their applications in the delivery of drugs to the lungs and fuels for combustion. In this course we will examine the fundamental factors that govern the properties of aerosols, reviewing some of the underlying thermodynamic principles that give rise to their unique properties. The natural and anthropogenic sources of aerosols will be described, along with methods for generating and characterising aerosols. Finally, the processes that lead to the chemical and physical transformation of aerosols will be defined. (6 lectures)

ADVANCED NMR SPECTROSCOPY

Dr C P Butts

The first four lectures (October) will give a brief introduction to the NMR Facility and instrumentation available in the School of Chemistry followed by a description of modern NMR hardware and experiment types, including correlation spectra (COSY, HSQC, HMBC) which are commonly used by chemistry. One lecture will demonstrate the use of NMR processing software, including hints and tips on maximising the information which can be obtained from NMR data. A further four lectures later in the year will cover details of advanced hardware (magnet technology, field gradients, cryo-cooled probes) and experimental methods (NOE, diffusion, band-selective methods).

COLLOIDS, POLYMERS AND LIQUID CRYSTALS

Dr JS van Duijneveldt

This short series of lectures will cover two areas of soft matter science:

1. Colloids and polymers (2h). The properties of polymers in solution will be reviewed briefly, as well as the adsorption of polymers at interfaces. The various ways in which polymers can be used to control suspension stability will then be discussed.
2. Liquid crystals (2x2h). The first part covers background to liquid crystal phase behaviour and properties of liquid crystals, with an emphasis on small molecule mesogens. The second part reviews the liquid crystalline phase behaviour of suspensions of colloidal particles, with an emphasis on work carried out in our group at Bristol.

DATABASE METHODS FOR CHEMISTS

Dr E M McGarrigle

This workshop (ca 3 hours) focuses on the use of computer databases in chemistry. In particular, this course will focus on the use of:

1. Web of Science - finding and downloading primary literature.
2. Reaxxys On-line database - searching by structure, keywords etc.
3. SciFinder - searching by structure and keyword, primary literature and patents.
4. On-line Journals - downloading pdfs.
5. Using Endnote to make a reference library.

The course is a single 3h workshop. In order to register for the course, please contact Dr. McGarrigle in person or by email (eoghan.mcgarrigle@bris.ac.uk). The course is limited to 25 participants on a first-come-first-served basis.

ELECTRON MICROSCOPY AND ASSOCIATED TECHNIQUES

Dr S A Davis

The aim of this course is to familiarise potential users of the Electron Microscopy Suite with the facilities available. Lectures will cover the basics of imaging, diffraction and microanalysis using electron microscopy. The workshops will be used to introduce the basic operating procedures for the JEOL 1200EX transmission electron microscope and the JEOL 5600LV scanning electron microscope. The course will also cover specimen preparation techniques such as ultramicrotomy, replication, vacuum coating and staining.

EXPLOSIVES CHEMISTRY AND HIGH ENERGY-DENSITY MATERIALS

Chris Murray, AWE Aldermaston

Further details will be available in due course (1 lecture).

INTRODUCTION TO MASS SPECTROMETRY AND THE MASS SPECTROMETRY SERVICE

Dr P Gates

This course is essential to all members of the department who will be using the mass spectrometry service and for those who want to use the mass spectrometry facility as a core part of their research. The lectures will cover the essentials of the technique with an overview of the theories and applications of the various methods available in the School Mass Spectrometry facility and through the Mass Spectrometry Service. The course will also contain a full introduction to the Mass Spectrometry service including what techniques are available, how to submit samples and how to understand your spectra. (2 lectures)

INTRODUCTION TO LINUX/UNIX

Mr C J R Tohill

Linux/UNIX is the most commonly used operating system for high performance computing (number crunching), and is also used widely in other scientific computing applications. This session gives a hands-on introduction to making basic use of Linux (which is effectively a type of UNIX). Some familiarity with this is essential for the later Fortran course and for Introduction to HPC.

Note that this course does not include the selection or installation of linux distributions, or how to use linux GUIs.

Course notes can be found at <http://www.chm.bris.ac.uk/compres/unix/index.htm>.

This course is a workshop with limited numbers and advance booking is essential. It is part of the High Performance Computing series arranged by the Advanced Computing Research Centre. For further information and to book a place please go to <http://www.bris.ac.uk/acrc/training.htm>

MEASUREMENT TECHNIQUES IN SURFACE SCIENCE

Robert Dyer, Kruss GmbH

This course, provided by a representative of Kruss, will provide a theoretical introduction to surface science with an emphasis on measurement techniques. We will cover static and dynamic surface tension of liquids and characterisation of solid surfaces (contact angle, surface free energy). There will be three lectures supported by three practical sessions giving hands on experience with a range of instruments for surface science analysis.

METHODS OF ELECTRONIC STRUCTURE THEORY

Prof F R Manby

In this course we will study four key theoretical techniques of ab initio electronic structure theory:

(1) Hartree-Fock theory; (2) coupled cluster theory; (3) perturbation theory and (4) density functional theory. This will give insight to some of the very widely used ab initio methods of quantum chemistry, such as the MP2 and CCSD(T) theories. (4 lectures)

MODELLING FOR SYNTHETIC CHEMISTS

Prof J N Harvey

This course seeks to introduce computational methods as practical research tools for synthetic chemists. The focus will be on application of methods rather than their theoretical or mathematical background. The course will consist of practical exercises for the prediction and rationalization of molecular structure and electronic structure, molecular properties, and chemical reactivity. After a brief introduction, students will work alone or in groups, using a range of self-accredited exercises to build their skills. They will also be able to discuss their results or address problems together with the course organizers. The total time involved will be equivalent to 8 lectures.

PHILOSOPHY OF SCIENCE

Prof J N Harvey

The philosophy of science is not usually part of the undergraduate curriculum in Chemistry, but philosophical issues relating to Science are often of great interest to some students. This course is aimed at helping such students by giving them a brief introduction to some of the questions raised by philosophers over the years. We will read and discuss short extracts from the works of authors such as Plato, Hume, Popper and Feyerabend.

RECENT ADVANCES WITH SOFT NANOMATERIALS

Prof I Manners

This lecture course will focus on the following topics: supramolecular polymers, nucleation elongation polymerization, synthetic approaches to functional hierarchical materials, and bioinspired materials. The necessary background needed to take the course will be a basic undergraduate course on polymers including polymer synthesis, characterization, and properties (6 lectures).

STRUCTURE DETERMINATION BY X-RAY CRYSTALLOGRAPHY

Dr M F Haddow

An introduction to the methods used for single crystal structure determination; principles involved and their practical implementation. Crystals: what they are and the requirements for a successful structure determination. Analysis of the diffraction pattern obtained: assignment of class and space group. Structure solution and refinement.

Note: This is timetabled as an undergraduate course, but is also compulsory for all postgraduates who wish to do their own crystallography. Additional safety training is required for those intending to use the X-ray facilities.

You should consult your Supervisor to discuss which of these courses are appropriate to your needs.

Other courses may be added during the year. For up-to-date information, timetables for all the postgraduate lecture courses in Chemistry, and for links to other useful sources, students should log into the DLM at dml.chm.bris.ac.uk.

Overseas students and students who are not from Bristol may like to take advantage of the advanced undergraduate Level 3/4 lecture courses. Detailed synopses for these courses are available in the undergraduate Yearbooks and online through the DLM.