

Improve your analytical techniques: Open Learning and Workshop

2003



Programme begins
14th April 2003 and
6th October 2003

- Gas Chromatography • Potentiometry
- Gel and Capillary Electrophoresis
- UV Spectroscopy • HPLC • Quality Assurance
- Statistics • Instrumentation
- Environmental Analysis
- Infra Red Spectroscopy
- X-ray Methods • Mass Spectrometry
- Chemometrics
- Analytical Methodology
- Classical Methods
- Atomic Spectroscopy

commitment to lifelong learning

RS•C
ROYAL SOCIETY OF CHEMISTRY

Royal Society of Chemistry

Open Learning and Workshops in Analytical Chemistry

The programme begins 14th April 2003 and 6th October 2003 with associated Workshops: 8th - 10th July 2003 at Greenwich University in Chatham, Kent; and 6th - 8th January 2004 at De Montfort University, Leicester

The ACOL Programme

The Analytical Chemistry by Open Learning Programme is based on a series of short courses. The Programme provides a sound knowledge of the basic principles of analysis, an understanding of the instrumentation involved and the opportunity to become familiar with practical techniques. Participation in the Programme involves distance learning using ACOL texts for a period of ten weeks and includes a three day Workshop in university laboratories. The content and mode of study are flexible.

When you embark on the Programme you will study at the time and place most convenient to yourself. You will have a correspondence tutor to whom you will submit written assignments and who will be available by telephone, fax or email to help with any difficulties. A Web site gives participants the opportunity to communicate with each other and with tutors. You will study for about 45 hours during the ten weeks and complete two assignments which should be sent to your tutor by given dates. You will be registered as a student of the University of Greenwich.

The Workshop

The three day Workshop for which residential facilities are available, will be spent mainly in the laboratory, but will also provide the opportunity to attend tutorials and a topical lecture in Analytical Chemistry. The emphasis of the Workshop will be on laboratory work, tutorials related to the module you have chosen, and to a comparison of analytical techniques. Each day the Workshop will begin at 09.00 and on the first and second day end at about 18.30. The Workshop will close on the third afternoon at 15.00.

Who Should Participate

This well-established training programme is used by people working in analytical laboratories from across a wide range of industries and scientific disciplines. It is useful to those planning to move into new areas of analysis or those who need a better understanding of techniques used in their work.

Professional Development Certificate

A BTEC Certificate of Achievement will be awarded for satisfactory completion of each course. The Certificate forms part of the BTEC Professional Development Certificate in Analytical Chemistry. This Award may prove useful to persons seeking membership of the Royal Society of Chemistry. A leaflet describing the Award is available separately. This Programme could also be useful to people returning to employment after a career break. A limited number of bursaries for members not in employment are available. If you think the Programme might be suitable for you but would like to talk further, please contact Ms Lorraine Hart, at the Royal Society of Chemistry: telephone 020 7440 3350. Email hartl@rsc.org

Choice of Programme

The Programme has a wide choice of options. The topic: Analytical Methodology and the topic Classical Methods are each full courses. All other topics are half courses and your choice should be for two of these. Some of the specialist options are presented only in either April or October. The grid on the attached application form shows clearly what is available.

The programme comprises the following:

Analytical Methodology

This course will give you an overview of the analytical process and provide you with some of the skills needed to produce and understand analytical measurements. We will look at basic laboratory procedures, the equipment available to analysts, the errors inherent in all results and statistical ways of handling those results and their errors. We will look at sampling procedures, ways of preparing samples, preparation of standards and calibration methods. You will also spend some time exploring the enormous range of information available on analytical methods in library sources: in books and on the Internet.

Classical Methods

Classical methods form the basic analytical tool in many laboratories, and even where modern instrumental techniques are employed, much of the theory and methodology of classical practice is still highly relevant. Classical analysis provides a sound training ground for all analysts. Chemical equilibria are the all embracing feature of this module and are applied to titrimetry - neutralisation, redox and complexometric - and to gravimetric analysis.

Statistics (*only available April*)

This course provides an introduction to the application of statistical methods as used in analytical chemistry and in the use of computers in the handling of analytical data and for statistical manipulation. No previous knowledge of statistics or of computers is assumed.

Chemometrics: Experimental Design (*only available October*)

The present increasing demand for method validation and quality control requires more competence in the area of instrumental data handling and sample analysis. Participants in this course will find it a valuable way to enhance their understanding of significance testing, calibration optimisation, experimental design and multi-variate data analysis. The topics will be addressed in a practical applied manner and no prior knowledge of these techniques is required.

In Spectroscopy:

Atomic Spectroscopy

The aim of this topic is to introduce the basic theory and practice of Atomic Spectroscopy and ICP with the emphasis on practical and instrumental aspects. First principles are covered and developed into an explanation of flame atomic spectroscopy, the most widely used technique. Emission Spectroscopy and ICP are introduced. The relative merits of different techniques and the problems which can be avoided by sample treatment are included.

Visible and Ultraviolet Spectroscopy

Various practical aspects of colourimetry and UV/Visible Spectrometry in quantitative and qualitative analysis are included in this topic. Both basic principles and instrumental requirements are dealt with and many analyses are examined as examples.

Infrared Spectroscopy

Infrared Spectroscopy has many applications and is one of the fastest growing of spectroscopic techniques. The topic covers Infrared Spectroscopy in comparison with other techniques, its basic principles, theory and practice. It deals with instrumentation, dispersive methods, Fourier transform methods and computer interfacing. Sample handling is also dealt with in detail. Spectral interpretations, quantitative analysis and structural determination are included.

Biological Applications of Infrared Spectroscopy

This half module is an alternative to the above topic: Infrared Spectroscopy, in that it covers the same theoretical and instrumental aspects of the subject but the applications are to biological systems for the determination of complex molecules, such as proteins, lipids and nucleic acids.

X-Ray Methods (only available April)

This course provides the beginner to X-ray techniques with a working knowledge of the range of analytical applications of X-ray diffraction and X-ray fluorescence. It covers the basic theory and assesses the usefulness and limitations of a number of X-ray and related techniques, including the electron probe microanalyser.

Mass Spectrometry

The aim of this course is to provide the practising analyst with a basic introduction to mass spectral analysis which will include the theory of ion formation and behaviour, instrumentation and the interpretation of the spectra of organic molecules. The important hybrid techniques of gc-ms and lc-ms are emphasised in particular.

In Chromatography:

Chromatographic Separations

This topic introduces chromatography and covers the theory and practice which are common to all forms of the technique, beginning with the underlying principles which affect the quality of a separation and then dealing with the use of chromatography in qualitative and quantitative analysis. The practical aspects of classical liquid chromatography are included.

Gas Chromatography

This topic covers the initial theory and practice of gas chromatography in sufficient detail for the analyst to carry out and understand a gas chromatographic separation. The topic will give an appreciation of the essentials of gas chromatography as an analytical tool and an understanding of the main causes of errors in analyses. A computer based learning package is included.

High Performance Liquid Chromatography

This topic covers the foundations of liquid chromatography, the equipment needed for HPLC, column packings, and the different applications of the technique. The topic provides a basic practical introduction with an emphasis on applications and methods. A computer based learning package is included.

Instrumentation

As part of validation and quality assurance processes there is an increasing need for analysts to understand and be able to quantify the performance of analytical instruments. This course provides a framework of spectroscopic and chromatographic instrumental techniques to explore: performance characteristics; the limitations imposed by instrument design; estimation of uncertainties in instrumental measurement; and specification of equipment for purchase.

Potentiometry and Ion Selective Electrodes *(only available April)*

The aim of this topic is to provide sufficient knowledge and skill for a non-specialist to select a suitable method of potentiometric analysis to solve a given problem. The topic is designed for those wishing to extend their knowledge of the applied nature of potentiometry and will include the design and application of ion-selective electrodes.

CHOICE OF MODULE

Please indicate your choice of programme, either:

Analytical Methodology

or Classical Methods

or any *two* of the following topics:

Statistics

Chemometrics: Experimental Design

Atomic Spectroscopy

Visible and UV Spectroscopy

Infrared Spectroscopy

Biological Applications of Infrared Spectroscopy

X-Ray Methods

Mass Spectrometry

Chromatographic Separations

Gas Chromatography

High Performance Liquid Chromatography

Instrumentation

Potentiometry and Ion Selective Electrodes

Gel and Capillary Electrophoresis

Environmental Analysis

Quality Assurance

April-July 2003, Workshop at
Greenwich University,
Chatham, Kent
October 2003-January 2004,
Workshop at De Montfort
University, Leicester

Please indicate:

(a) position in organisation

(b) level of qualification

(c) experience in the topics you have chosen

Gel and Capillary Electrophoresis (*only available April*)

Electrophoresis plays an important part in modern clinical and forensic studies not least as the basis of DNA fingerprinting and protein profiling. This course will cover the principles of the electrophoretic process, the various systems and support media used for analysis and methods used to detect separated samples. Emphasis will be placed on both traditional gel electrophoresis and capillary electrophoresis. The unique features of the capillary electrophoresis and its present-day applications will be considered.

Environmental Analysis

Beginning with an explanation of factors controlling transportation and deposition of pollutants, this topic brings together a wide range of analytical techniques used in environmental analysis. The particular considerations of water, soil and atmospheric samples as well as the problems of ultra-trace analysis are included. A basic knowledge of analytical techniques is assumed. This choice of topic will suit those working in the environmental field.

Quality Assurance in Analytical Chemistry

With analytical measurements playing an increasingly important role in the economics of all countries, the validity of these measurements is of prime concern to both producers and users of analytical data. This topic covers the basic ideas underlying quality assurance issues for those involved in analytical chemistry and gives an introduction to quality assurance systems as used in chemical laboratories.

Application: Complete the attached form and return together with full fee (including accommodation for the Workshop if required) to: Ms L A Hart, Royal Society of Chemistry, Burlington House, Piccadilly, London W1J 0BA.
Tel: 020 7440 3350.

Registration cannot be confirmed unless applications are accompanied by the full fee. Fees cannot be returned in the event of cancellation after the start date of each course: 14th April and 6th October.

Course material will be dispatched about one month before each starting date

The Workshops will begin on Tuesday mornings: 8th July at Greenwich University and 6th January at De Montfort University, but participants taking residential accommodation will be able to register on the previous Monday evening. Joining instructions for each Workshop will be dispatched about a month in advance.

Course fee: Inclusive of ACOL texts, assignments, tuition, lunches during the Workshop:

i) Royal Society of Chemistry/CSTI	£725.00 (VAT exempt)
Institute of Chemistry of Ireland members	
ii) Non-Members	£805.00 (VAT exempt)
iii) Full-time student in Membership	£305.00 (VAT exempt)
of the RSC	

Accommodation: Residential accommodation inclusive of dinner, bed and breakfast for 3 nights, will be available from the Monday evening prior to the start of each Workshop until Thursday morning, the final day.
The accommodation charge will be £180.00 including VAT.

Programme Organiser: **Dr Norma Chadwick**
(Consultant)

Programme Secretary: **Ms Lorraine A Hart**
(Royal Society of Chemistry)

Tutors for the course will include:

Dr John D Barnes
(Consultant)

Dr Lorraine Gibson
(University of Strathclyde)

Dr Gillian Greenway
(Hull University)

Dr David Hawcroft
(Consultant)

Dr Sian Howells
(University of Greenwich)

Mr Sandie Lindsay
(Consultant)

Dr Audrey Matthews
(De Montfort University, Leicester)

Dr Tom McCreedy
(Hull University)

Dr John Newbery
(University of Greenwich)

Dr Colin Peacock
(University of Lancaster)

Dr Philip Riby
(University of Greenwich)

Dr Clare Smith
(University College, Cork)

A limited number of bursaries for student members and for unemployed members are available. Details from Ms Hart at the Royal Society of Chemistry.