A double module teaching & learning programme in Analytical Science, at 2nd year England & Wales Undergraduate level

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Title	'Read Me' introduction to a 'Double Modular Teaching and Learning Programme in Analytical Science at 2nd year England & Wales Undergraduate Level'
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Description	A document explaining how the double modular programme shown in the title above should be used. It also gives an indication of the approximate time it should take to study each of the 15 Chapters which form the programme.
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This programme has been modified from that written originally, as part of Strand 3.3 (Curriculum development), of the Royal Society of Chemistry's (RSC), 'Chemistry for our Future Project', which was funded by the Higher Education Funding Council for England.

Summary of the programme

The programme is written in PowerPoint, but is **intended to be used** as an open learning text and not to be used as a presentation tool. The programme is divided into **15 chapters** and it has been estimated that on average, 1 learning hour is equivalent to around 15 slides, however, as some topics may prove more demanding than others, this figure is purely a guide. The course is free-standing, however there are a number of internet references to which the learner is directed in order to obtain additional or background information. There are of course many textbooks in Analytical Chemistry to which the learner may refer in order to obtain further information about a topic.

At the end of all but one Chapter, there are self assessment questions (SAQs) together with outline answers. Where possible the answer is presented on a single slide

It is estimated, that excluding the SAQs, the total learning time for this whole course is approximately 70 hours. Excluding scheduled practical time, this is in excess of the length of time normally spent by Universities in England and Wales on a double module course at 2nd year undergraduate level. Therefore Universities who may direct their

students to use this course, may wish to select parts of this course, appropriate to their interests. Also as the programme could be used for training purposes, trainers may wish to select individual areas of the course to satisfy their training needs. With this in mind, the table below attempts to identify 'Learning times' for aspects of the course programme. The total number of slides in each Chapter is also provided in the table below to enable learners to calculate how many slides remain in any particular section.

Guide to using the course materials

- The programme has been written in Microsoft PowerPoint 1997 – 2003 and is compatible with all PowerPoint programmes after 1997 including the 2007 version. However all but 3 chapters (which contain some limited animation) are delivered as pdf files. If you do not have PowerPoint or Adobe Acrobat on your computer, reader versions of these can be downloaded free of charge from Microsoft.

- The font used throughout is ARIEL and most text is written in 18 point type. Smaller typefaces have been used – 16, 14 and 12 to describe aspects of figures and for worked examples and 10/12/14 for the contents pages. Main headings are in 40 point and sub-headings are in 32 point.

- Where possible the topics are divided up, so that each small part of the topic is covered on a single slide. However this is not always possible and where the coverage continues onto the following slide the following message appears at the base of the slide. [**Continued on the next slide**]. The aim, is to allow learners to cover a small part of the course at the end of a day working on a chemical plant or in a laboratory etc. To continue learning the following day, just bring up the programme you are studying and type in the number of the next slide followed by the 'return key'. The programme will move to the numbered slide. Within the pdf files it is advisable to activate the 'pages' option shown on the left of the screen, which will allow you to move rapidly between pages.

- In order to enhance the learning process, images have been added throughout the programme. These include diagrams, photographs, graphs and to a limited extent, some animation. In many instances text boxes accompany the image with a written explanation.

- The PowerPoint programmes are presented in 'presentation mode only' and all slides are numbered. You can progress through the programme by using the 'up' and 'down' keys or by using the 'page up' or 'page down' keys. You can move backwards and forwards within the programme by typing in the slide number you wish to move to, followed by return. In some of the slides, there is cross reference to other Chapters of the course and slide numbers, where material is covered which is relevant to the topic under consideration. Within the pdf files it is advisable to activate the 'pages' option shown on the left of the screen, which will allow you to move rapidly between pages.

- Throughout the text there are some terms written in a **bold blue colour.** This indicates that the term appears in the Glossary of Terms (a PowerPoint pdf file). [https://edocs.hull.ac.uk/muradora/objectView.action?parentId=hull%3A2199&type=1&pid=hull%3A2350] It is probably a good idea to download this file before you start the learning process as it will save moving constantly to access this document. **Bold black** has been used to emphasise important points, and **dark blue** to direct learners to other parts of the programme

- The total number of slides in each element of the programme is given in the table below, and each Chapter has it's own contents slide (slide 2 in all chapters).

- There is one small word file dealing with 'Statistical Sampling'. This is added to support Chapter 2, but could be of interest to those learners specifically interested in 'Sampling'.

Chapter	Title	No. of slides	Approximate Learning hours
1	Introduction to Analytical Science	26+4	1.5
2	'Analytical Process Model' unit 3 - Sampling	77+7	5
3	'Analytical Process Model' – units 4&5 – Sample Preparation, Separation and Concentration	65+6	4.5
4	'Analytical Process Model' – Unit 6 – Measurement Techniques	115+9	7
5	'Analytical Process Model' – unit 7 – Evaluation of Data and Consideration of Objectives	61+3	4
6	(1) Introduction to Chromatographic Methods and (2) Thin Layer Chromatography	67+3	4
7	Gas chromatography (gc) and High Performance Liquid Chromatography (hplc)	72+13	5
8	Capillary Electrophoresis	21	1.5
9	Measurements Using Electrical Signals	89+9	6
10	Introduction to and Theoretical Principles Underlying Spectroscopic Measurements	36+4	2.5
11	Spectroscopic Techniques Based upon the Absorption or Emission of Electromagnetic Radiation for the Measurement of Molecular Species	115+9	8
12	Spectroscopic techniques for the measurement of elemental species	97+28	6.5
13	Mass Spectroscopic Techniques	54+5	4
14	Introduction to Automation and Process Analysis	56+13	4
15	Quality Assurance, Method Development and Method Validation	73+5	5

Note: The additional hours quoted in the table above are the slides devoted to self assessed questions and answers. The approximate learning hours do not include answering the self assessed questions.