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Reviewed in this issue:

30 books

2 software packages

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Physical Sciences Educational Reviews

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Editorial

This issue of the journal comes out when we are thinking about our publications and evaluating the impact they have on our community. We have already asked for comments from our Departmental Representatives at a meeting with them in the spring and later this year we will be seeking the opinions of our wider audience. If you have comments you would like to pass on to us now then please email the Centre (psc@hull.ac.uk) or me directly (rgladwin@liv.ac.uk).

In the meantime we have another significant contribution from our reviewing panel with over 30 resources being evaluated.

Roger Gladwin
Editor

In this issue...

Book reviews...

Software reviews...

500 Tips for Tutors

Subject area
General

Description
A reference manual for those teaching in higher education

Authors
Phil Race and Sally Brown

Publishers/Suppliers
Routledge Falmer
(www.routledge.com)

Date/Edition
2005/2nd edition

ISBN
0-415-34278-3

Level
Teachers

Price
£21.99

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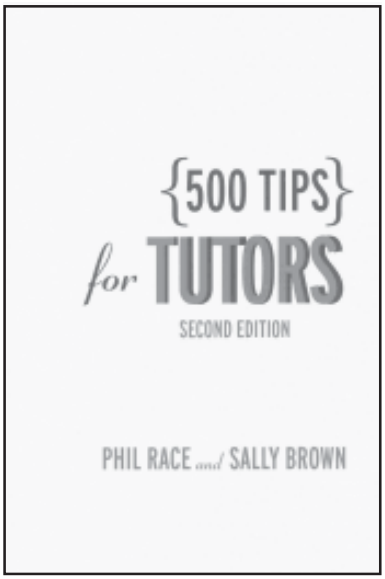
May 2007

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	***
Usefulness to teacher	****
Meets objectives	****
Accuracy	*****

As part of a series of books for those engaged in teaching, this volume is primarily aimed at tutors to help them help students get the most out of all aspects of their university education, although it is also of use to lecturers, mentors, postgraduate students, teaching assistants and even students themselves. With its broad scope, its intended audience spans those new to tutoring through to more experienced tutors. The tips themselves represent the accumulated wisdom of both the authors and many other sources from which they draw. It is not restricted to any one discipline and is quite appropriate for the physical sciences with sections, for example, on preparing for labs and writing reports.



The book is written in the style of a reference book to allow easy access via the contents or index. To aid a rapid finding of material, the book is organised using a four-tier hierarchy: chapters, objectives, tips, and tip summaries. In more detail, there are six chapters covering the basics of learning, working in different learning environments, how to complete assigned tasks, assessment and job preparation. These chapters are further broken down into 54 more specific objectives ranging from time management skills and how to participate in tutorials to taking notes and doing productive revision. Finally, each objective lists about 10 tips on how to achieve the objective, with each tip summarised by a short phrase in bold. While the chapter classifications are not entirely watertight, it is relatively straightforward to see what material is covered and where to find it. Inevitably, there is some repetition when the same tip is supplied under different objectives, such as the need to make clear learning outcomes to students. An extensive list of references for further reading is also provided.

The tips themselves are sound and sensible, being based on the experiences of the authors and drawing on many other sources. There is quite a variety of tips for any one objective and it is left to the reader to decide which ones suit their tutoring style. Key themes the authors stress are active learning by students, studying in groups, frequent two-way communication in many forms and reflection. While being fairly basic and recipe-style in form, the book is a valuable resource to those seeking to improve their tutoring. Of course, advice on helping others can also be applied to one's own work, indirectly doubling the scope of the book.

A Handbook for Teaching and Learning in Higher Education

Subject area
General

Description
A very useful resource for university lecturers and others engaged in HE teaching at whatever stage in their career

Authors
Heather Fry, Steve Ketteridge and Stephanie Marshall

Publishers/Suppliers
Routledge Falmer
(www.routledge.com)

Date/Edition
2003/2nd edition

ISBN
0-7494-3799-5

Level
Teachers

Price
£27.99

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May 2007

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	***
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This excellent handbook was originally published in 1999 and updated as a second edition in 2003 which has been reprinted twice. Hence in academic terms it is something of a best seller! It brings together the expertise of a number of distinguished authors in the field of pedagogic research, action learning and educational development in a readable, accessible and informative manner. Hence it provides a very valuable starting point for lecturers wishing to develop their teaching, learning and assessment not only for those early in their teaching career but also for experienced staff who are looking to refresh and develop their teaching and the learning of their students. Its 25 chapters cover some 450 pages and are by different authors, preceded by a users' guide. The chapters are divided into three sections:

Development of Practice
Development of the Academic for Teaching and Learning
Working in Discipline Specific Areas

Many of the authors are familiar names and all are greatly respected in their fields. Each chapter has a good summary, check-lists and references for further learning. There are also, dotted throughout the book, boxes labelled "interrogating practice" containing interesting questions to ponder which lead one into applying the material to our personal departmental or school situation.

This book gives a fascinating tour of the variety of practice in teaching and learning styles across the university curriculum as well as tackling the difficult and very topical issue of assessment. Each chapter maps out the territory, as well as summarising the theoretical framework and contains good references for further reading, Certain topics, such as 'Virtual Learning Environments', look a little dated now and this is always going to be a problem for any handbook dealing with areas involving technology. However, the pedagogic issues discussed remain substantially the same and even this section is a valuable starting point for anyone considering using a VLE with their students. Pedagogic research too, has moved on apace since 2003 and with the advent of the CETLs to complement the excellent work of the HEA subject centres, the pace looks set to increase. However, the majority of this handbook focuses on what we might term perennial issues and includes contemporary themes such as the consequences of widening participation and the expansion of the university sector, improving quality assurance, maintaining academic standards and some useful material on assessment setting which points us towards tackling accessibility and inclusivity.

The more discipline-specific later chapters too contain a wealth of good material which has a high degree of transferability. This organic chemist, for example, has learned much in the past from colleagues who teach and assess music and the performing arts; which has provided new insight for me into group and fieldwork assessment.

I hope very much to see this handbook updated and perhaps a third edition would be timely in our post-SENDA world, particularly as the output of the CETL network begins to emerge. As it stands, it is a very valuable asset to any university lecturer's personal library and I cannot recommend it highly enough.

Analytical Chemistry: a modern approach to analytical science

Subject area
Analytical chemistry

Description
A compilation of analytical methodologies, common and diverse applications and underpinning theoretical considerations to allow the reader to undertake both routine and non-conventional methods of chemical analysis

Authors
Kellner, Mermet, Otto, Valcacel and Widmer

Publishers/Suppliers
Wiley-VCH (www.wiley-vch.de/publish/en)

Date/Edition
2004

ISBN
3-527-30590-4

Level
Undergraduate, research

Price
£52.00

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May 2007

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

The book traverses what at first sight appears to be distinct themes united under the umbrella of analytical chemistry or the physical science principles[1] integral to measurement science (analytical sciences) but it does so in a very logical and purposeful manner. The pitch of the book aims to target introduction to the interface and a working knowledge of analytical science and the correct approach to measurement (fitness-for-purpose, chapters 3-8) in thirty six chapters. The book is aimed at providing global knowledge of these areas to undergraduates in the more advanced, later stages of a degree programme in chemistry, analytical chemistry or chemical aspects of forensic science. The text is also ideally suited to industrialists and those in the early stages of advanced research, particularly when coming from other disciplines, such as the biomedical sciences. The rear cover of the text indicates the book provides an “accessible” approach to analytical chemistry. The book is presented in a way which does not overstretch the reader and thereby provides a basic understanding on which to build a more detailed, practical and therefore valuable knowledge[2,3]. At just over one thousand pages and flowing over at least ten “general analytical methodologies” Kellner et al provide the best formal description of analytical chemistry techniques and key issues as a teaching text that I have ever read in all my years as a tutor in this subject area. I actually use this book for year three and four degree level analytical chemistry courses. The reader is however, probably required to have a formal pre-undergraduate physical science knowledge[1] to get the most from the book.

The text is likely to be of significant interest and essential reading to those scientists and students working in the area of analytical chemistry[2-4], material sciences, routine quality control and diagnostics, chemometrics and lab management, laboratory chemistry, biophysics, the pharmaceutical and biomedical sciences[5] and aspects of biochemistry (eg the ‘kinetics’ section). To this end the objectives of the book are accomplished without flaw as desired by the authors (and editors) in that the book provides the best surveyed ‘taste’ of the everyday[3-6], adapted research and state-of-the-art methods[2,7] and methods yet to be universally adopted[2,6-8] under the banner of techniques encompassed by analytical chemistry. There are books which detail themes more extensively[2,3] however, as a rule they do not cover the diversity and penetration or depth of subject matter in as universally helpful manner[8] as is presented here. As such these piece-meal texts are of limited use as ‘single text purchase’, university teaching tools and referential guides. The book is of significant and appropriate value to newcomers and experts in chemical and process analytics alike and because of its more user-friendly approach provides the means to better understanding through an explanation of key themes.

Key themes discussed in the text cover subject essentials such as, thermal analysis, electrochemistry (rather limited but covered in part in chemical and biosensor sections), preparative chemistry, technique hyphenation (chapters 26, 30 and 33-34), miniaturisation, automation, conventional chromatographic methods, conventional spectroscopic methods and a range of titrations[4]. One example of this appropriately weighted and accommodating approach is the explanation of process analytical technologies and the background of description of the evolution in analytical science demands (‘customer’ requirements) and experimental

Analytical Chemistry: a modern approach to analytical science

design (chapters 36, 3-4 and 8, respectively). Yet another is the description and definition of the Karplus curve associated with nuclear magnetic resonance (NMR) spectroscopy (p809) spin coupling dependant on different molecular structures which is described at length and very simplistically. This is done in an obvious experience-based manner which provides a workable synopsis and clearly explains the subject matter that will prove enjoyable for multidisciplinary scientists that may encounter this material for the first time. The little snap-shots of historical and factual information dotted throughout the text also serve to increase the book's appeal and general readability. The book itself provides the best example of a research-driven yet teaching-focused text encountered to-date. The value of the text is also supplemented with a summary of key points and quizzes at the end of a topic and it is now widely accepted (based on student feedback) that students find this form of presentation exceptionally useful in getting a handle on new conceptual material.

It is significant, given current interest and recent increased uptake across many research laboratories that three sections (24.6, 25.4 and 27.4.2) and greater than 60 pages are dedicated to mass spectrometry (MS) and this certainly reflects a very large scale interest in mass spec as a 'new-age' diagnostic tool for branches of organic chemistry, biophysical chemistry ('-omics methods' such as peptidomics) and inorganic chemistry, such as might use inductively-coupled plasma MS. MS is even relevant to microscopy-hyphenated imaging as seen with secondary ion mass spectrometry. All of which forms of MS are used ubiquitously in the material and biomaterial sciences[5-7]. There are interesting contemporaneous sections in the book on Raman spectroscopy, NMR spectroscopy, flow injection analysis (FIA), X-ray fluorescence spectroscopy, liquid-liquid systems and analyte extraction, pattern recognition and data handling, enzyme-based biosensor systems and atomic force microscopy (AFM)[2,3,8] as cutting edge diagnostic tools. The more routine 'standard or common techniques' such as gas and liquid chromatography, NMR, FIA and electrophoresis, UV-visible and infrared spectroscopy are also given appropriate treatment[3].

Incorporation of newer methods is fantastic for teaching purposes as reference to research papers for student learning is not always practical. The less common methodologies (micro-total analytical systems, semi-conductor field effect transistors, generic biosensors[2], AFM, X-ray diffraction/ crystallography) now represent science (specialised know how) that is at the cutting-edge of (bio)analysis and are frequently more useful to scientists or can serve as an additional tool that can be used to supplement conventional analytical techniques. Such inclusion proves to be very handy although it is to some extent to be expected from a text of this size that does not fit-in-the-pocket. The book discloses specifics such as catalysis and essential aspects of physical chemistry[1] that influence real practices in contemporary laboratory analysis, for instance that might be relevant to 'biotech' and drug analysis[8]. Such biomedical analysis uses what have now become conventional experimental techniques such as NMR, MS and recently adopted newer analytical methods such as amperometric biosensors[2,8]. From a student perspective it is often conceptually difficult to understand the working of such approaches other than at a complex level but themes are discussed here in an instructive and fundamental manner without being dull (achieved by frequent references to worked examples).

As an introduction to the more advanced forms of subject[8] the book works particularly well and delivers a broad swathe of theories, techniques, practical notions and raises discussion points, paradoxes and *unproven* hypotheses that will be useful in both undergraduate and graduate lectures and seminars. Theme-specific exercises and worked problems provide a clear point of practising model questions for complex aspects of analytical chemistry and provide a means of tackling 'routine' calculations, which can in some cases serve to dampen the enjoyment of the subject for less numerate students and those not particularly well-versed in physics and physical science.

The main body of the text, boxed and highlighted or shaded (encoded) and sectionalised clearly and with its simple tables (with carefully selected examples) and figures is ideally presented with succinct discussion that is undertaken in a consistent manner. Figures are never over-complicated, always unambiguous, well thought-out and consistently drawn and labelled, then interspersed throughout the text and this makes the subject matter clear, light and interesting. This book by Kellner et al represents a purchase of excellent value for any students that will cover analytical chemistry at any significant level on their course.

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Atkins' Physical Chemistry

Subject area
Physical chemistry

Description
A textbook for undergraduates and a valuable reference for postgraduates and researchers

Authors
Peter Atkins and Julio De Paula

Publishers/Suppliers
Oxford University Press (www.oup.co.uk)

Date/Edition
2006/8th edition

ISBN
0-19-870072-5

Level
Undergraduate, research

Price
£39.99

Zia Khan,
CA/151-9/A,
Model Town A,
Bahawalpur,
Pakistan
May 2007

Summary Review

range: * poor to ***** good

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Atkins' Physical Chemistry is one of the most widely popular and authentic texts on the subject. The 8th edition of the book familiarises the students with the latest theoretical and applied developments in the realm of physical chemistry. The book is divided into three distinct parts, Part I, Part II and Part III, containing the discussion on equilibrium, structure and change respectively. Part I elaborates properties of gases; 1st, 2nd, and 3rd law of thermodynamics; physical transformations of pure substances; simple mixtures; phase diagrams; and chemical equilibrium. The authors begin with the discussion on gases and provide elaborate explanation of theories behind some general and important properties, such as pressure, temperature and volume, including mathematical derivations of the fundamental laws. Coloured figures and applied examples further help explain both real and perfect gases. This is followed by the discussion on the basic concepts of thermodynamics. State functions, such as internal energy and enthalpy, are explained using simple mathematical steps, figures and examples. The major emphases include differential scanning calorimetry, thermochemistry, various enthalpies and Hess's law, followed by some experiments. Heat capacities (C_p and C_v) are explained with the help of mathematical formulations, while the explanation of 1st and 2nd law of thermodynamics includes figures as well. Given the specific significance of enthalpy as a very important state function, the concept is discussed in a more detailed manner including elaborate theoretical background, easy to follow mathematical derivations and some applied examples. The concept of relative and absolute entropy is explained and the calculations are made by applying the 2nd and 3rd law of thermodynamics. This is followed by discussion of the phenomenon of free energy using interesting examples, mathematical derivations and a number of helpful diagrams.

Description of physical transformation of pure substances includes phase diagrams focusing on stability of phases and phase boundaries. Phase stability and phase transitions are discussed with the help of relevant mathematical derivations, diagrams and examples. Before moving to mixtures, the authors provide a brief description of Ehrenfest classification of phase transitions. The thermodynamics of mixing is explained using mathematical derivations and some diagrams which help improve students' understanding of the phenomena. While discussing properties of ideal solutions, the authors include some very good examples. The discussion on activities (activity, mean activity co-efficient and activity co-efficient) is followed by the description of the activities of ideal and real solutions. Mathematical derivations and useful illustrations are used to explain the D H limiting law. In the phase diagram chapter, phases, components and degree of freedom are described with the help of some chemical equations, phase rule, experimental procedures and some diagrams. In order to explain liquid-liquid phase diagrams (phase separation, critical solution temperatures, the distillation of partially miscible liquids) and liquid-solid phase diagrams (eutectics incongruent), the authors use applied examples of liquid crystals, ultra impurity and controlled impurity.

Part I ends with discussion on chemical equilibrium in Chapter 7 of the book. Spontaneous chemical reaction is explained using some thermodynamical equations containing Gibbs energy, partial pressure of gases and chemical potential. There is detailed discussion on the

Atkins' Physical Chemistry

equilibrium constant, followed by the response of equilibria. Students' understanding is further enhanced with the explanation of equilibrium electrochemistry using half reaction and electrodes, varieties of cells (liquid junction potentials, notation), the emf (the Nernst equation, cells at equilibrium), standard potentials and their applications. Finally, a few good examples are included to help understanding of the application of the phenomena with reference to biological systems.

In Part II, the discussion on structure begins with the introduction of quantum theory and covers the failure of classical physics, wave particle duality, the Schrödinger's wave equation, the Born interpretation of wave functions, some basic mathematics, uncertainty principle and the postulates of quantum mechanics. This is followed by quantum theory techniques and applications using easy to follow mathematical formulations. A few very interesting and well drawn figures help the observation of multidimensional movement of particles, thus enhancing the understanding of energy levels and wave functions. Diagrammatic depiction of wave functions provides valuable insight into the phenomena, while mathematical derivations of vibrational energy levels are supported with necessary theoretical explanations. Biological systems are elaborated with the help of relevant examples (such as AFM image of bacterial DNA plasmids on a mica surface) often used to explain the application of nanoscience in atmosphere and space. The discussion on approximate techniques begins with the time independent perturbation theory and Hamiltonian Energies and wave functions are systematically used to simplify the concept of perturbation. Elaborate details of dependent perturbation theory provide highly valuable guidelines and inspiring information to further probe the subject.

The chapter on atomic structure and atomic spectra includes systematic explanation of structures and spectra of hydrogenic atoms, using mathematical derivations, various illustrations and well informed discussion of important aspects. The authors undoubtedly deserve applause for their remarkable effort since it is not a simple task to describe structures of many of the atoms. Reflections are also made on the spectroscopy of stars. A number of vividly drawn figures are used to help students understand quantum defects and ionisation limits, singlet and triplet states, and spin orbital coupling. The authors then move on to the discussion of molecular structure. The Born-Oppenheimer approximation is explained by valance bond theory, while the phenomena of hydrogen molecular ion, linear combination of atomic orbitals, bonding orbitals, and antibonding orbitals are discussed to help explain molecular orbital theory. Vivid depiction of homonuclear diatomic systems (σ-orbitals, π-orbitals, overlap integral, the electronic structure of homonuclear diatomic molecules) adds further clarity to students' understanding. The discussion on biomolecular reactivity of O_2, N_2 and NO provides additional relevant information. Topics such as polyatomic systems, Hückel approximation, and butadiene and benzene energies are also dealt very skilfully and a brief section on computational chemistry adds further analytical value to the book. Molecular symmetry happens to involve complicated phenomena and usually it is a difficult read even in widely popular text books. However, the book under review stands out in that the authors explain symmetry operations using elaborate, diverse and simplified analytical methods including very fine diverse illustrations. The symmetry is also applied to MOT and spectroscopy.

The authors appear to accord distinct status to the subject of spectroscopy, as its discussion is spanned over three chapters of the book, Chapter 13-15. Theoretical perspectives on the phenomena are followed by mathematical derivations and practical applications. Indeed spectroscopy remains a subject which is often not clearly followed by the students since many of the popular text books skip important mathematical derivation and also evade a quantum mechanical approach because of its over complexity. However, the book under review deserves to be given a 'clean bill of health' in that the authors use both classical mechanics and quantum mechanics to help explain in a simplified manner the theoretical framework as well as the mathematical formulations. Further simplification is added by a number of attractive figures vividly depicting highly complicated phenomena: a sequential and close study of the figures alone is helpful for students' clarity of relevant perspectives. The authors also highlight in detail the infrared absorption spectra of polyatomic molecules owing to its significance for the science of the environment, especially the 'hot' phenomenon of global warming. The discussion on electronic spectroscopy and basic concepts of electronic transitions draws heavily on elaborate diagrams, though not falling short of theoretical footholds and mathematical formulations. A vivid description of electronic excitation in the human eye creates interest even for the layperson. Engaging discussions on fluorescence, phosphorescence, lasers and the spectroscopy of single molecules provide a high measure of value addition to the book. The description of magnetic resonance spectroscopy in Chapter 15 introduces the students to NMR, EPR and pulse technique NMR, using mathematical derivations and diagrams. Introduction of solid state NMR is particularly useful. A general description of two dimensional NMR is supplemented with some simple examples and magnetic resonance imaging (MRI) is also briefly described. A brief introduction to EPR is followed by the description of g-tensor and hyperfine tensor using line diagrams. Finally, a concise and articulate introduction of Continuous Wave (CW) EPR spectrometry and Fourier Transform (FT) spectrometry helps acquaint the students with the important instruments required for furthering research on the subject.

Continued on page 8

Atkins' Physical Chemistry

Continued from page 7

Statistical thermodynamics is explained in detail using mathematical derivations and diagrammatical depictions. The former include derivation of internal energy, entropy, distinguishable and indistinguishable molecules, and the entropy of a monatomic gas, also explained with help of diagrams. The discussion on the application of statistical thermodynamics mainly contains the mathematical formulations of Helmholtz energy, enthalpy and Gibbs energy. Students are provided with easy to follow guidelines to calculate mean energies of translational, rotational and vibrational motions and partition functions. Elaborate discussion on heat capacities, molecular interactions in liquids, residual entropies and equilibrium constant helps enhance understanding of the application of phenomena.

The explanation of molecular interaction includes electrical properties of various molecules such as electrical dipole moment of polar molecules and polarisabilities. Major emphases of discussion appear to be potential energy of interaction; the electric field; dipole-dipole interaction; dipole-induced-dipole interactions; induced-dipole-induced-dipole interaction; hydrogen bonding; hydrophobic interaction; and the total attractive interaction. Repulsive and total interaction is also described with the help of molecular recognition and drug design. The book moves on to the discussion of macromolecules and aggregates in Chapter 19. Mass spectroscopy is used giving suitable experimental detail of MALDI-TOF mass spectrometry. The chapter contains impressive illustrations. The very important topic of viscosity is discussed using some well drawn figures and mathematical equations to help calculate the intrinsic viscosity and molecular mass. Structure and stability of synthetic polymers is also explained in a simplified manner, while the structure of proteins is described by keeping in perspective the Corey-Pauling rules, conformational energy, helices and sheets, and higher order structures. Highly skilful diagrammatic depictions are used to help explain micelles and biological membranes along with membrane formation.

The last chapter of Part II, Chapter 20, deals with the solid state. Various crystal lattices and unit cells are portrayed with the help of 3-D figures. Before moving to highly scientific and complicated analytical methods, students' interest is developed by aiding them to understand the relevant phenomena with the help of easy to follow interesting illustrations. Major subsequent descriptions include Miller-indices; X-ray diffraction, both in single crystal and powder method, involving advanced mathematical formulations such as Fourier Synthesis; neutron and electron diffractions; crystal structure of metallic solids and ionic solids.

In a discussion on change, Part III, deals with molecules in motion, Chapter 21-25. Initially, explanation of basic gaseous properties and kinetics models are illustrated with the Maxwell distribution of speeds. Easy and systematical mathematical formulations help understand mean speed, most probable speed and relative mean speed, while experimental results provide support for the phenomenon of molecular motion in a liquid. The chapter on the rates of chemical reaction begins with discussion of rate laws and the authors use both mathematical derivations and experimental results to describe 1st and 2nd order reactions and temperature dependant reaction rate (Arrhenius parameters). This is followed by discussion on accounting for rate laws and unimolecular reactions.

While explaining kinetics of complex reactions, a few chain reactions of the following form are discussed:
$CH_3CHO \rightarrow CH_4 + CO$
$H_2 + Br_2 \rightarrow 2HBr$
$2H_2 + O_2 \rightarrow 2H_2O$

Other important topics include kinetics of polymerisation, homogeneous catalysis and photochemistry. Kinetics of photophysical and photochemical processes are discussed using applied examples such as chemistry of stratospheric ozone and harvesting of light during photosynthesis. Highly complex topics like diffusion controlled reactions and material balance equations are part of the discussion on molecular reactions dynamics. The authors also reflect on transition state theory and related thermodynamic aspects, followed by an impressive discussion on reaction dynamics with the ultra-fast laser technique and electron transfer in homogeneous systems. The description of the processes at solid surfaces begins by explaining growth and structure of solid surfaces, while major emphases include ionisation techniques, vibrational spectroscopy, electron spectroscopy, surface extended X-ray absorption fine structure spectroscopy, low energy electron diffraction and molecular beam techniques. Other important discussion focuses are the extent of absorption, heterogeneous catalysis and processes at electrodes.

Finally, the book stands out in many distinct ways including informed discussion of phenomena, consistency in the order of succession of chapters, cohesion between diverse topics, easy to follow mathematical derivations and illustrations, especially figures and applied examples highlighted in blue.

Editor's note: This reviewer also reviewed the electronic version of this textbook. The review follows on pp9-10.

Atkins' Physical Chemistry: online electronic edition

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

The *electronic edition* of **Atkins' Physical Chemistry** is indeed a priceless fully searchable database to access deeper information on the topics of students' specific interest as well as the wider information on the subject as a whole. The home page of the *electronic edition* is at www.oxfordtextbook.org/orc/pchem8e. However, the user needs to have a login account which is free with every new copy of the text. The chapter-by-chapter resources provide a vast universe of information and analysis presented in a user friendly manner and the students learn way beyond the pages of the text. A click on the tools on the menu bar leads to a series of further links such as periodic tables, dilution calculator, molarity calculator, density calculator, graph plotter/ fitter and equilibrium calculator. All these tools are very helpful in general calculations of many experimental problems, specifically at the undergraduate level. Take for example the periodic tables which provide a lot of additional help including electronic configuration for all elements, data plotting for molar masses, atomic radius, ionic radius, melting points, electronegativity, and 1st, 2nd and 3rd ionisation potential. Similarly, plot fitter works for enthalpy of ionisation and for many exercises.

The home page provides direct access to each chapter in the text. A click on the mouse for opening Chapter 1 is the beginning of a navigation through the formal course contents brought together in the shape of applied examples, explicit exhibits, exercises and also the research articles on specifically important phenomena. Furthermore, there are lecture notes for each topic. The navigation process is simple, efficient and interesting. To open the window to the tutorials, software and other relevant database, just click on the web links. The most important database, though requiring subscription, for this book is the *CRC handbook of chemistry and physics*. However, users have free access to the *NIST web book* which is another good link providing valuable additional help for almost all topics. Free links are also available for various tutorial sites of fluid systems sharing a vast amount of information on enthalpy, entropy, internal energy, viscosity, thermal conductivity, Joule-Thomson co-efficient, C_p, C_v etc. Finally, the *electronic edition* also provides access to free online software for pressure unit conversion.

The most important database for the chapter on thermodynamics is community on data for science and technology (CODATA). It helps calculate thermodynamical properties of many chemical substances. Faculty for analysis of chemical thermodynamics (FACT) is another database useful for both students and researchers. Each database is loaded with a huge body of rich information and also provides free and fast links to many useful downloads.

The thermodynamics phenomena can be further probed with the above mentioned free access to the *NIST chemistry web book*. The *electronic edition* also offers free download of the software *Phase*. This highly sophisticated software has enough flexibility to allow both calculation and display of phase diagrams of binary, tertiary and quaternary mixtures of liquids. Users may also send a request for a copy of *Phase* on CD. Software are also available in the *electronic edition* to help calculate quite a few of the important parameters discussed in Chapters 5-6 of the text. For example, Henry's law constants and phase online conversions of Henry's law. Additionally, NIST provides a vast database on thermodynamics of enzyme catalysed reactions, while a tutorial link for an electrochemistry dictionary provides easy to follow instructions which help understanding of otherwise complicated topics.

In the structure part of the *electronic edition* access to the *CRC handbook of chemistry and physics* is a rich source of useful and relevant information further supplementing NIST, particularly on ground level and ionisation energies of neutral atoms. Useful tutorial tips are available on the physics web including a link to a page about the particle in a box experiment. Moreover, the *NIST atom spectra database* provides simple and efficient tools for online visualisation of spectral lines, along with the useful links for symmetry and character tables. This is followed by a continuum of web sites to help enrich theoretical and applied knowledge of the phenomenon of symmetry.

The CRC hand book and NIST also provide access to useful sites for spectroscopy databases. For example, the spectral database system for organic chemistry which happens to be one of the best sources of information on organic NMR, FTIR, Mass, Raman and ESR spectra. Tutorial sites such as the spectroscopic simulator of rot-vib spectra of diatomic molecules in the gas phase and Beer-Lambert law offer significant value addition to the time invested by the users. The online links are also available for free software usage and application. Highly helpful software includes *Arguslab* (semi empirical, *AM1*, *PM3*, *MNDO* etc).

Continued on page 10

Atkins' Physical Chemistry: online electronic edition

Continued from page 9

Additionally, the users can access *COMSPEC* (online software) to calculate the theoretical IR and Raman spectra of small molecules. Similarly, access is also available to *WebMO*, free visualisation software which works as an interface with *Gaussian*, *GAMESS* and *MOPAC*. Finally, another free of cost link is accessible for online calculations of useful spectroscopic properties such as IR and MS, and this software provides a wide selection to predict and identity any functional group at any frequency.

The CRC handbook and *NIST X-ray photoelectron spectroscopy database* are particularly helpful for studying depth and width of electronic transition. Online links available for light absorption, photoelectron spectroscopy, fluorescence and lasers serve a wide range of users, from layperson to the expert. Web links also provide free access to magnetic resonance spectroscopy databases such as *BMRB* (bio medical bank) which contains NMR of proteins, polypeptides and nucleic acid. Another free of cost database is *enhance NMR periodic table*, a rich online source providing magnetic properties of almost all the elements of the periodic table. User-friendliness of the databases is further enhanced by adding tutorials to help the average user understand theoretical principles of NMR, solid state NMR and ESR.

Java-demos for probability and statistics are another highly useful tutorial site supplementing the study of statistical thermodynamics. Similarly, the tutorial site related to ideal atmosphere is a simplified simulation of the earth atmosphere and illustrates the canonical ensemble and Boltzmann distribution etc. The subject gets further help with the online software access including *VEMDL* and *WATER*. An additional feature of the *electronic edition* is free access to lecture notes of statistical thermodynamics, available to both students and teachers.

The databases available on macromolecules, Chapter 19, encompass almost the entirety of the information on the subject including a database of macromolecular models; *Lipidate* (database of thermodynamical properties of lipids); *NDB* (nucleic acid database) and *RCSB* protein data bank. The related tutorial sites add emphasis to the discussion of protein structure, protein explorer and electrophoresis simulation. Latest, highly technical and user friendly software such as *AMBER server*, *CoRina*, *RASMOL*, *MDL Chime* and *Protein Explorer* are available free of cost. The *electronic edition* also provides free access to a vast inorganic structural database on the solid state, while *MatWeb* is another available online database of thermodynamical properties.

Chapter 21-23 of the text must be studied in conjunction with the *electronic edition* in that the database available is a virtual lab and a highly useful free of cost piece of software is also available for studying the rate of chemical reactions. The software also provides sufficient measure of flexibility and reliability for kinetic calculations. A free of cost personal copy of the software may also be downloaded for offline usage. The major database available on kinetics of complex reactions is the CRC handbook.

Perhaps NASA is the most significant database source of the *electronic edition* and the access to information in this case is also available free of cost. The database site additionally offers many free downloads on important topics. Indeed access to the *NASA Atmospheric Chemistry Data and Resources* offers a unique learning opportunity to the experts as well as the average users. However, the database on thermodynamics of enzymes catalysed reactions is yet another source of information for all including teachers researchers and students. A few of the major links include: *AIRS* (the Atmospheric Infrared Sounder), a facility instrument aboard the second earth observing system (*EOS*); *HIRDLS* (High Resolution Dynamic Limb Sounder), on *AURA* measures IR emission in 24 channels ranging from 6.12 to 17.76 mm; *LIMS* (microwave limb sounder and); *MLS* (Microwave Limb Sounder) microwave emission from the earth limb at 118, 190, 240, 640 GHz and 2.5 THz; NIST tender database 74 and radiation chemistry database at Notre Dame.

Finally, the last chapter of the text, Chapter 25, is supplemented with the databases including the *IMB* scanning tunnelling microscopy image gallery and *NIST X-ray photoelectron spectroscopy database*. The latter provides easy access to the energies of many photoelectron and Augar-electron spectral lines, while its interactive utility is another important feature allowing the user to search by element, line type, line energy and a few other helpful variables.

Chemistry and Medicines: an introductory text

Subject area
Medicinal chemistry

Description
The book is aimed at those studying advanced undergraduate and postgraduate courses in medicinal chemistry

Authors
J R Hanson

Publishers/Suppliers
Royal Society of Chemistry Publishing (www.rsc.org/Publishing/Books/index.asp)

Date/Edition
2006

ISBN
0-85404-645-3

Level
Undergraduate, research

Price
£27.50

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May 2007

There are some science books that when reviewed you would be happy to lend out to colleagues while there are others that remain jealously guarded in a drawer. This book falls into the latter category.

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	****
Meets objectives	*****
Accuracy	*****

Chemistry and Medicines: an introductory text is by no means a text book. There are no review sections, no questions at the end of chapters and the diagrams are limited and rarely add to the text. But this is a book aimed at final year or postgraduate students and as such it does exactly as it sets out to do: provide a brief introduction to chemistry and medicines.

The content is based upon short medicinal chemistry lecture courses which have been given to students on summer schools at the University of Sussex. The first two chapters provide a general introduction. Chapter 1 looks at the basis for the classification of drugs, the targets for the medicinal chemist, the stages in the development of the drug and finishes with the history of medicinal chemistry. The placing of the history section at the end is useful, as the outline allows the reader to place it into context.

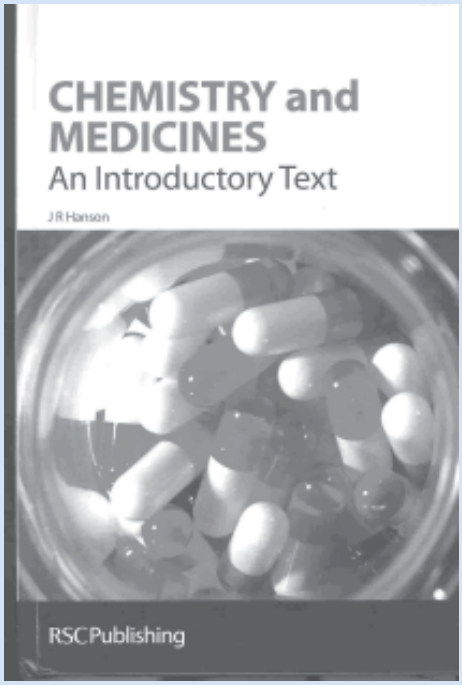
Chapter 2 goes on to describe the more general techniques of medicinal chemistry. It begins by outlining how a drug may be administered and absorbed, then goes on to describe the gastrointestinal tract in more detail, followed by other routes of administration. The author then goes on to describe the metabolic changes that may lead to the development of toxicity and then explains the relationship between biological activity and physiochemical parameters including oil:water partition coefficients, Hansch QSAR analyses, Craig plots and the Topliss decision tree.

With this background established, the author then moves to the role of medicinal chemistry in treating specific therapeutic targets. Chapter 3's focus is on the medicinal chemistry of non infectious diseases associated with neurotransmitter and hormonal action. It begins with a general introduction to hormones and then the nervous system, then goes on to describe the structure of neurotransmitters and cell surface, ion channel, kinase-linked and g-protein linked receptors and the design of drugs for these receptors. This is followed by sections covering the structure of drugs that interact with acetylcholine and those that target adrenergic receptors such as anti-asthma agents and beta blockers.

Chapter 4 outlines the role of medicinal chemistry in the treatments of mental disease. It begins by describing the brain as a site of intense chemical activity and emphasises the importance of selectivity of medicinal action. The author then goes on to explain the treatments for neurodegenerative diseases such as Alzheimer's and Parkinson's, before describing the role of dopamine, serotonin and GABA in more depth. This is followed by sections on benzodiazepines, barbiturates and opoids.

Continued on page 12

Chemistry and Medicines: an introductory text



From the publisher...

Chemistry and Medicines
An Introductory Text
by J R Hanson, University of Sussex, UK

Chemistry and Medicines: An Introductory Text provides a general introduction to this fascinating subject. The first chapters contain a brief historical introduction followed by a description of the chemical features involved in the adsorption, distribution, metabolism and excretion of a drug. The remaining chapters describe the chemistry underlying the design and synthesis of some of the key drugs used to combat some major diseases of the peripheral and central nervous system, infectious diseases and cancers. A glossary and suggestions for further reading complete this textbook.
The book is aimed at those studying advanced undergraduate and postgraduate courses in medicinal chemistry

0 85404 645 3 192pp 2006 £27.50

Continued from page 11

The next chapter looks at compounds that modify the action of local and circulatory hormone targets. It begins by covering histamine and provides a case history of the use of its antagonists in the treatment of peptic ulcers, then describes the role of aspirin and other non-steroidal anti-inflammatory agents as inhibitors of prostaglandin biosynthesis. The chapter concludes with sterols and steroid hormones and their structural modification in the development of anti-inflammatory steroids and oral contraceptives.

Chapter 6 describes the development of compounds that can be used against invasive organisms. After some historical background including Koch and Ehrlich, the author goes onto explain the role of sulphonamides and penicillins in the defence against bacterial infections, the role of medicinal chemistry in the fight against malaria and describes the development of antifungal and antiviral agents.

The final chapter describes how cancer chemotherapy exploits the differences between the normal and the cancerous cell. The normal cell cycle is outlined and then contrasted with that of the cancerous cell. The author then goes on to the different types of compounds used in chemotherapy such as antimetabolites, alkylating agents, intercalating agents and anti-mitotic agents. He goes on to describe the treatment of breast cancer and the use of monoclonal antibodies, before rather abruptly finishing with an outline of prostate cancer treatments.

Perhaps some sections of this text would have benefited from more bullet points or clearer schemes (figures) but these would be minor points. The plethora of chemical structures provided more than makes up for them, as do the very useful case histories scattered throughout the text. The lack of any real conclusion is also no barrier to recommending this text, in fact it rather enhances it. This book doesn't mess about with overly complicated diagrams, nor does it spend much time trying to sell medicinal chemistry as a career. If students have got this far, they know medicinal chemistry is important and what they really need is an easy to read reference text. This is that book and I'm willing to bet that they won't be lending it out either.

Data Analysis for Chemistry: an introductory guide for students and laboratory scientists

Subject area
Analytical chemistry

Description
This book makes data analysis simple by demystifying the language and whenever possible giving unambiguous ways of doing things

Authors
D Brynn Hibbert and J Justin Gooding

Publishers/Suppliers
Oxford University Press (www.oup.co.uk)

Date/Edition
2006

ISBN
978-0-19-516211-0

Level
Undergraduate

Price
£11.99

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	****
Usefulness to teacher	****
Meets objectives	*****
Accuracy	****

Most maths books aimed at undergraduate chemists deal with data analysis in a fairly cursory fashion, and this reflects the importance placed on the subject in the contemporary undergraduate chemistry curriculum. As a result most chemists who go on to use their degree in professional employment will often find that their knowledge of data analysis is insufficient. **Data Analysis for Chemistry** by Brynn Hibbert and Justin Gooding is an excellent introductory text aimed at redressing this deficiency and providing undergraduate chemistry students with the statistical tools necessary to perform common data analysis tasks.

The first chapter in the book provides the hurried reader with an initial stop-off point where they can obtain the information they seek in a rapid way. It consists of an exhaustive glossary defining all the terms used within the book and references to where they are defined and used. Unusually, there is also a FAQ (Frequently Asked Questions) section, which is useful and does indeed contain those sorts of questions which are likely to be posed by students. However, the general idea of a FAQ is one of an easily navigable list of questions and answers, usually hyperlinked. Thus using the FAQ format in a book is prone to difficulties. In this case the list of 57 questions covers nearly eight pages and is without any sectioning. It is thus not particularly easy to find your question and its solution. There is also a brief section describing how to use common *Excel* functions to perform the types of analyses described in the body of the text.

The first real chapter is the introduction, which deals with terminology, the definition of error, the concepts of accuracy and precision, the presentation of data and the normal distribution. As with the entire book, the clarity of explanation is very good, and the use of extended examples particularly useful in giving meaning to the concepts.

The second chapter introduces mean, variance and standard deviation of both populations and samples, the use of confidence intervals to quote uncertainty, robust estimators and the repeatability and reproducibility of measurements. Numerical examples are used to show how the concepts are applied, and these are illustrated step by step both long-hand and by use of *Excel*.

Chapter three deals with hypothesis testing, and discusses at length the idea of the null hypothesis and Type I and II errors. It goes on to explain how to use the Rankit method to test whether data is normally distributed, and Grubbs's test for an outlier. There then follows explanation of the use of Fisher's *F*-statistic to compare variances, the means *t*-test and paired *t*-test to compare data from different sources. All are clearly explained within the context of the type of data analysis required of a chemist.

The fourth chapter explains the concept of analysis of variance (ANOVA) and how to perform and interpret both one-way and two-way ANOVA. These calculations are easy to perform using *Excel* yet the interpretation of the numbers produced is prone to misleading conclusion. The description of the method here is particularly lucid.

Continued on page 14

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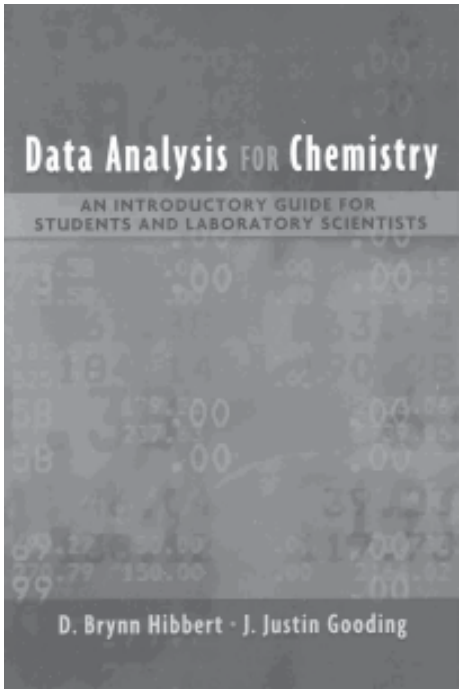
May 2007

Data Analysis for Chemistry: an introductory guide for students and laboratory scientists

Continued from page 13

The fifth and final chapter deals primarily with regression in the context of instrument calibration. The linear calibration model is used to estimate uncertainties in calibration parameters and test concentrations, the method of standard addition is introduced, and the determination of detection limits is explained.



The appendices contain some useful tables of critical statistics, namely one- and two-tailed Student *t*-values, values of $G_{critical}$ used for Grubbs's test for outliers, and one- and two-tailed Fisher *F*-values. The selective, annotated bibliography is very useful, providing as it does a number of relevant texts in general and chemical statistics, chemometrics, quality control and the use of *Excel* for data analysis.

A major deficiency of the book is that it has no problems. Presumably the authors hoped that students would gain sufficient familiarity with the material by following the lengthy examples through which many of the concepts are introduced. However, being a mathematical subject, understanding is really only achieved by doing, and the lack of problems (and associated solutions) does detract from the utility of the text for undergraduate learning. The book also makes no mention of how to combine uncertainties from independent measurements. While this is a relatively small topic it often confuses students and would find a natural place in a text such as this.

The use of *Excel* is wise as it shows students how to achieve practical solutions to data analysis problems. While *Excel* may not be the program of choice for practising analytical chemists it is more or less ubiquitous and hence makes a suitable choice of software. While the spreadsheets which appear in the book are clear, I would question the use of numbers in the formulae where there may be some ambiguity. For example, if a formula involves the degrees of freedom in a data set I would prefer to see a reference to a cell which contains this value clearly labelled, rather than just have the number appearing in a formula. This makes it very clear how the actual calculation is being performed and allows the spreadsheet to be copied and easily edited for alternative data sets with less likelihood for error.

Surprisingly for a book from OUP there are a number of typographical errors in the text and the spreadsheet examples, which are rather annoying and potentially confusing. There is inconsistency in the designation of quantities for table headings. Good practice generally dictates that a quantity used as a column heading in a table or an axis label on a graph is written as 'quantity/units' to give a dimensionless result, eg 'energy/kJ mol^{-1}' or 'concentration/mol dm^{-3}'. Here we find in one example "$[Ca^{2+}]$ (ppm)" as a column heading in a table, "[Calcium]/ppm" as an axis label on the accompanying graph, and "C mg/ml" as a column heading in a spreadsheet. I would also question the presentation of a result as "0.1146 ± 0.0096 M", examples of which appear throughout the text. Clearly this terminology is ambiguous, unlike the alternatives '(0.1146 ± 0.0096) M' or '0.1146 M ± 0.0096 M', of which the former is to be preferred.

Given the clarity of explanation of the text I think it will prove useful to all chemistry undergraduates faced with the analysis of data, and to a good many lecturers requiring a reference text to explain basic statistical concepts. It clearly achieves its objectives in providing an entry level text but any subsequent editions would benefit from end of chapter problems and solutions.

Designing Learning: from module outline to effective teaching

Subject area
General

Description
Practical tips and guidelines offered to educators on all aspects of designing learning, from the module outline to the actual teaching

Authors
Christopher Butcher, Clara Davies and Melissa Highton

Publishers/Suppliers
Routledge Falmer
(www.routledge.com)

Date/Edition
2006

ISBN
978-0-415-38031-7

Level
Teachers

Price
£80.00 (hardback)
£17.99 (paperback)

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June 2007

The book, **Designing Learning: From module outline to effective teaching**, by Christopher Butcher, Clara Davies and Melissa Highton is a surprisingly stimulating read considering its focus on a somewhat wearisome topic area that has been subjected to endeavours of often contradictory advice.

Summary Review

range: * poor to ***** good

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Designing Learning is one of a range of books in the series: *Key Guides for effective teaching in Higher Education* by Routledge. It is split into 10 main chapters that cover UK Higher Education in impressive breadth without, however, sacrificing the explicitness of advice such as on the effective design of *PowerPoint* presentations or improved alignment of assessment to learning outcomes. The succinct, encouraging, and conversational writing style culminates in a compelling yet digestible read easily completed in one afternoon by busy educators.

Even after 12 years in Higher Education (HE) this reviewer began each new chapter teeming with useful information from the one previous to it- and not merely because of her limited teaching experience in the UK. The authors are duly thanked from the start for acknowledging not only the increasing student diversity in Higher Education, but also the increasingly international face of its teaching staff who now need not fret further over HE's acronym circus (where a VLE can also be an LMS) while still grappling with the difference between terms and trimesters.

The book is aimed at all lecturers, but the first two chapters in particular offer the new teacher an excellent overview of the recent history of education in the UK including the humble beginnings of relevant agencies (eg, HEFCE, JISC, QAA), nature of current national directives (eg, widening access, internationalisation, lifelong learning) and government legislation (eg, DDA, DED, CLA). Whether it is the historic rationale for the subject review process of the 90s or a recommended checklist for planning lectures the authors understand to introduce topics in a way that raises awareness (such as for benchmark statements), heightens curiosity (such as for the QAA Code of Practice) and prompts critical thought around debates in mainstream higher education.

In Chapter 2 ('How your teaching fits into the bigger picture') not less than 6 course design models are introduced while recommending to the reader to "select from all the above models and list those aspects that seem to fit with your discipline and context". Throughout the book the authors seek to strike a balance between the introduction of research and evidence based teaching models offset by examples of local practicalities, overall, a refreshingly non-didactic approach to module design and teaching-with one notable exception: the reader is reminded persistently to approach module design and teaching with a focus for the learner. Not only are 3 of the 10 chapters dedicated to learner issues (Ch 3 'What are your students supposed to learn and be able to do?'; Ch 7 'Learning materials and resources for diverse learners'; Ch 8 'Supporting your learners') all the other chapters either highlight the different learning styles, address the changing learner cohort, or remind of the needs of today's learner.

The refreshingly honest and practical outlook the authors share on current teaching and learning simply makes the book hard to put down. The reader is called upon to acknowledge the fact that despite a tutor's exhaustive

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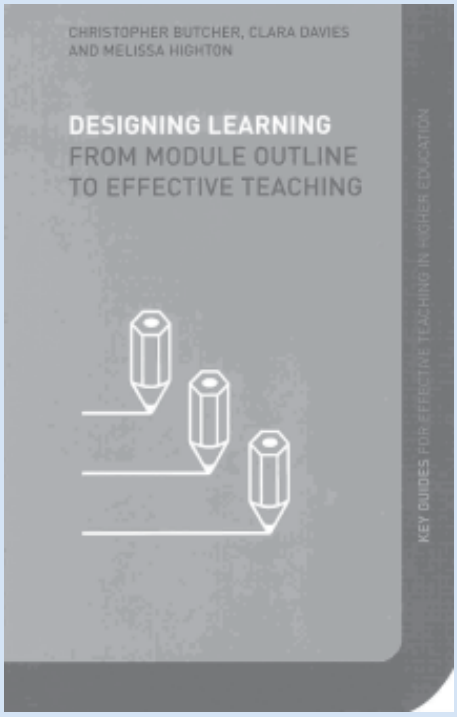
Designing Learning: from module outline to effective teaching



From the publisher...

Designing Learning (Key Guides for Effective Teaching in Higher Education)

By Christopher Butcher, Clara Davies and Melissa Highton

Written in an informative and jargon-free style, this book is guided by principles of good practice and covers the relevant theory to deal with the essential aspects of designing a course.
Important areas covered include:
learning levels and outcomes
aligning learning and teaching strategies
assessment methods
course management
C&IT
resources.
In this concise guide, the authors look to the future in terms of integration of computing and technology in course design and consider the promotion of student learning, the diversity of the student body and the need to create inclusive learning environments.

978-0-415-38031-7 232pp 2006 £80.00

Continued from page 15

efforts what is learned is determined first and foremost by the learner (Ch 5 'Horses for courses'). Additionally faced with models for teaching and support defined largely by the institution (Ch 8 'Supporting your learners'), the novice educator by this time has gained a blatant snapshot of the very real restraints of university teaching. Thankfully, support materials such as a skills matrix (p66), assessment review checklist (p126), feedback guidelines (p112), and course handbook contents list (p180) make up for some of the unsettlement.

Each subsequent chapter flows perfectly from the last driven by examples of authentic teaching scenarios, useful overviews and tables (eg p75, Table 5.2 'Linking learning methods to student outcomes'), and carefully selected web resources. The unexpected brevity of the further readings lists is a sheer relief. Despite covering the less familiar topics such as Biggs' constructive alignment (Ch 2) or Gagne and Briggs' events of instruction (Ch 5) no term appears too common (Ch 3 'Aims, objectives, outcomes') or process already well-understood ('Timing of assessments', Ch 6) for it not to be thoughtfully explained. Handled equally well is the role of technology in education. Wherever relevant, tools such as assistive software, electronic voting systems, VLEs, e-portfolios, asynchronous discussion boards and plagiarism detection services are found right alongside more conventional advice. The authors are applauded for choosing not to single-out educational technology in a dedicated chapter. This demonstrates to the novice and senior educator alike that teaching with technology is not the exception anymore, but rather understood to be complementary to traditional methods.

Finding a flaw is hard, and only after looking long enough might the reader stumble across minor lapses. The first reference to the brilliant web evaluation tutorials by INTUTE (www.vts.intute.ac.uk/), for example, remains buried in Ch 7 (p145) while actually more relevant in a number of places earlier on such as on p84 in the section 'Providing new material'. Similarly, copyright receives only brief mention on p86 leaving many questions open which are then unknowingly addressed, however, two chapters on (pp146-147). ICT, in particular the affordances of web 2.0 (the social web) is not referred to fully enough for the taste of this reviewer, and the series' website at www.routledgefalmer.com/series/KGETHE/ is disappointingly redirected to a commercial book site. The final moan is of the opportunity lost to include FE colleagues in this timely conversation. 'Thinking outside the box' (p75) applies surely to all educators. Undisputed, this book is a highly recommended read to educators young and old for inspiration, selective resources and measured advice for their teaching practice.

Developing Creativity in Higher Education

Subject area
General

Description
A collection of views from various authors which have developed from the imaginative curriculum network. The issue of creativity in higher education across the curriculum is addressed, creativity in course design, in teaching and in learning as well as the challenges of assessment are fully and helpfully explored

Authors
Jackson, Oliver, Shaw and Wisdom

Publishers/Suppliers
Routledge Falmer (www.routledge.com)

Date/Edition
2006

ISBN
0-415-36532-5

Level
Teachers

Price
£25.99

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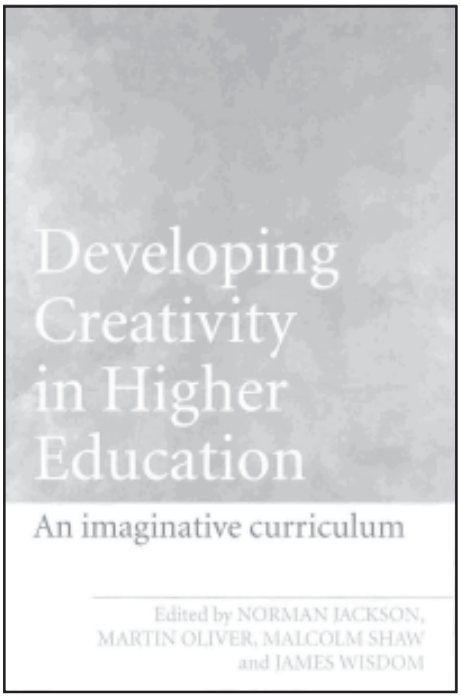
Plymouth PL4 8AA
June 2007

Summary Review

range: * poor to ***** good

Academic content	*****
Usefulness to student	****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This excellent book brings together views on creativity in Higher Education developed over a number of years by academics working in various disciplines. The central argument is that creativity is essential in all disciplines (including the sciences) for deep learning to occur, for students to develop as professionals and practitioners (as well as learners) and not least, for the development of imaginative and sustainable curricula which will continue to enthuse students and their tutors alike.



The various authors who have contributed to the book are experts in their fields and communicate powerfully with a real passion for teaching: rarely does one come across a volume of this kind that is difficult to put down! It is a challenging book too: "Creativity is inhibited by predictive outcome-based course designs which set out what students will be expected to have learned with out room for unanticipated or student-determined outcomes. Assessment tasks and assessment criteria which limit the possibilities of students' responses are also significant inhibitors of students' and teachers' creativity".
Creativity is explored from the public policy perspective, from institutional perspectives and from that of student and teacher. The challenges raised by assessment of this essential quality are discussed and some exemplars of good practice are given from various disciplines.

For any academic who wants to reinvigorate and improve their teaching, this is an essential read and one which will inspire. Creativity is poorly recognised in the sciences in my own experience, although with the trend towards problem solving and discovery based practicals and exercises, we are beginning to develop and articulate some of the important qualities needed by good scientists and researchers. Trends in course administration and measurement of quality may mitigate against a creative curriculum but as the authors rightly point out; many have risen to and overcome these challenges with notable success, creatively, of course!

Environmental Analytical Chemistry

Subject area
Analytical chemistry, environmental chemistry

Description
An overview of the principles and practice of analytical chemistry

Authors
F W Fifield & P J Haines (Editors)

Publishers/Suppliers
Blackwell Publishing (bookshop.blackwell.co.uk/jsp/welcome.jsp)

Date/Edition
2000/2nd Edition

ISBN
0-632-05383-6

Level
Undergraduate, research

Price
£32.99

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	***
Meets objectives	***
Accuracy	*****

The second edition of **Environmental Analytical Chemistry** is a surface review of the various analytical methods available for sample analysis, both within the environment and in laboratory conditions. The book is specifically targeted at undergraduate students within chemistry, environmental sciences and related disciplines. It is also aimed at professionals working in the field, to renew their knowledge with respect to the quality and reliability of techniques used to collate data on the environment, as stated in the preface and synopsis.

This multi-authored book is essentially divided into two parts, in total consisting of 20 overlapping chapters, together making up 470 pages. The book edited by Fifield and Haines commences with an introduction on the basic principles and concepts of analytical chemistry. Part I of this book provides a basis on which the fundamentals of chemistry are defined. It sequentially builds the knowledge of the reader by applying the basic principles to analytical chemistry, providing a synopsis to analytical investigation and discussing the most prominent techniques used. Part I covers different techniques, depending on the principles of operation - this is useful in terms of expanding one's knowledge in a particular field. In turn, it can also be useful as a rudimentary reference source as any one method may not possess the attributes required to perform the analysis, hence alternative methods are also detailed.

The depths into which the different analytical techniques are described differ from technique to technique and consequently depend on the complexity of the system in question. A concise overview of the theoretical principles of operation regarding given techniques of analysis are provided as an introduction to each chapter. This follows onto a more detailed account of the specific analytical methods in relation to the theoretical principles, the instrumental components and typical spectral graphs have been provided – referenced and adapted from a variety of sources.

Part II engages the reader with the specifics of environmental analysis, where an array of environmental samples are examined and illustrated. It discusses key issues with regards to environmental sampling and analysis, with particular attention given to the reliability, resolution, reproducibility, accuracy, precision and cost. This section illustrates the sources and outcomes of change in environmental conditions, examining the contributing sources of pollution that require monitoring. It consequently considers the restrictions that are imposed onto industries by regulating authorities.

The addition of the final chapter on 'Ecotoxicology' evokes a clear distinction between biological indicator methods and toxicity studies which are both used to determine the effects of pollutants on the environment. This chapter builds the knowledge of the reader for the purpose of Ecotoxicology studies and how anthropogenic substances effect the environment, which is a key aspect of environmental science.

Sadiq I Lula,
Research Analytical Scientist,
Inhalation and Device Centre of Emphasis,
Cambridge Research Centre,
Pfizer Inc,
Cambridge
(Principal reviewer)
and
Usman I Lula,
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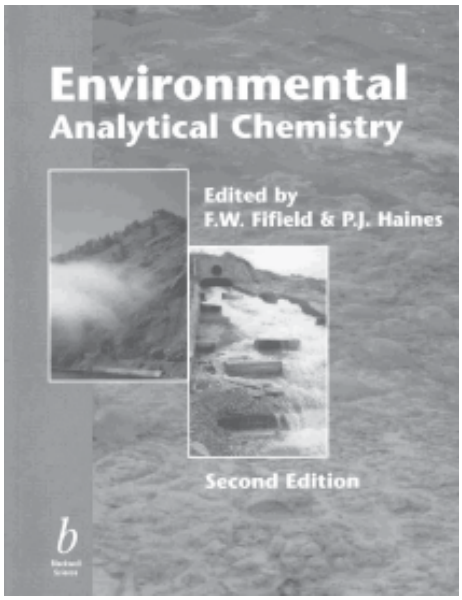
June 2007

Environmental Analytical Chemistry

This book is written in a clear and concise manner, with an impressive layout. Each chapter is devoted to a specific technique with a discussion on depicting the strength and weaknesses of the techniques in question. The inclusion of a glossary is a useful tool for those with limited knowledge of biology and chemistry and further for those who have no practical experience of the techniques discussed within. The index and contents page clearly define the techniques covered within the book.



The authors provide several sources from which to compile a further understanding of the chapters, however useful as this may be, a comprehensive understanding of any one technique would surely require a 'specialist book'. To this end, there are limited citations to further reading in the book which are referenced at the end of each chapter and also within certain chapters. It should be noted that in the bulk of the text the authors tend to simply state "refer to a specialist book" for an in-depth discussion on a specific technique. The references within **Environmental Analytical Chemistry** are dated prior to 2000, as the publication date is April 2000. The previous edition of *Principles and Practices of Analytical Chemistry* was referenced in virtually all of the chapters in Part I; retrospectively this book does appear updated.

The self-assessment exercises at the end of each chapter engage the reader and provide direction, the answers to which are also provided. However, readers should note that the answers are in my opinion, short and calculations are not clearly stated. The calculations detailed in the book are very descriptive rather than being given a full numerical explanation, which may prove cumbersome when using the book as a quick reference source. The book provides numerous examples and illustrations, with the majority of the illustrations referenced for each technique. The illustrations enhance the grasp of the reader to the stated techniques and practices, though it was felt that some illustrations were clarified and discussed in more detail than others. The dialect from chapter-to-chapter does seem to change, although this is possibly the direct result of the book being co-authored. Nonetheless, the book has a solid layout, a notable structure, and a good balance that is required to address the various analytical techniques. It also covers numerous problems that could potentially arise in environmental sampling and therefore chemical analysis. It provides helpful discussions to those involved in environmental sampling and analysis by giving cues to the potential hazards that would arise in relation to sampling, operator error, accuracy, precision and so forth. To this end, key topics including aspects of environmental pollution have been integrated seamlessly by Fifield and Haines.

This reasonably priced book gives a basic introduction to the chemical analytical techniques that have been used to date. Fifield and Haines subtly apply the fundamental principles of physical chemistry to environmental analysis consequently fulfilling the aim of the book. I would recommend this book to departmental libraries and to professional physical scientists starting out in a career in analytical chemistry. It will also be a very good primer for undergraduate students entering the analytical or environmental science or a related discipline.

Heterocyclic Chemistry at a Glance

Subject area
Organic chemistry

Description
An overview of the main principles and reactions of heterocyclic chemistry for students studying chemistry and related courses at undergraduate level

Authors
J A Joule and K Mills

Publishers/Suppliers
Blackwell Publishing (bookshop.blackwell.co.uk/jsp/welcome.jsp)

Date/Edition
2007/1st edition

ISBN
1-4051-3918-8

Level
Undergraduate

Price
£17.99

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	***
Meets objectives	****
Accuracy	*****

Blackwell Publishing already offers a series of medical textbooks in the *At a Glance* format. This is intended to provide readers with concise, readily-accessible texts that can serve as revision notes, or as a primary or secondary textbook in support of a specialist lecture course. In the medical series, the chapters are generally just two pages, with one page of explanatory text and one page with a complementary 'mind-map' illustration.

Heterocyclic Chemistry at a Glance presents a sub-set of the material in the existing successful but more comprehensive *Heterocyclic Chemistry* by the same authors (referred to hereafter as 'HC'), the fourth edition of which is reviewed pp21-22 in this issue. The authors state that **Heterocyclic Chemistry at a Glance** is intended to serve as a revision summary, or as a starting point for more extensive study of the subject, which is much the same philosophy as the books in the medical series. The book is aimed at students in Year 2 (and up) of a UK Bachelor's degree, and the moderate price would probably make it more attractive to an undergraduate than 'HC'.

The ordering of material generally follows that of 'HC'. After an opening brief chapter on nomenclature (not explicitly covered in 'HC') and then structures of basic heterocycles, there is a chapter on common reaction types in heterocyclic chemistry. There then follow chapters on individual classes of heterocycle, beginning with pyridines, then the benzo-fused analogues, and diazenes. In the latter respect, the book differs from the alternative RSC-published book by Sainsbury (reviewed in this journal **4**(1) p16, 2003), aimed at a similar level, which is restricted to heterocycles containing only one heteroatom. After dealing with pyryliums, we next meet the five-membered heterocycles pyrrole (and indole), thiophene and furan. The azoles are then dealt with, followed by purines, heterocycles with more than two heteroatoms, and then those with ring-junction nitrogens. As with 'HC', non-aromatic heterocycles warrant only the briefest of treatment. There then follows a section on palladium-catalysed reactions, appropriate since these are increasingly of importance in heterocycle syntheses.

The most important reactions, illustrating the fundamental reactivities of the heterocycles, are chosen, and only key reaction conditions are cited, so that the focus is on principles rather than details. I liked the very clear layout of the text and reaction schemes. In contrast to 'HC', there are no literature references. I was more surprised to find that there are also no problems – I would have thought that the more basic problems from the main text could have been profitably included, perhaps in re-worked form.

Nonetheless, the book is a useful and well thought-out resource, and would make a good recommended text for a Year 2 or 3 core course in heterocyclic chemistry. The chemistry is a judicious selection of classical and modern, with good coverage of, for example, Pd–catalysed coupling methodology and modern protecting group chemistry as applied to heterocycles. As with 'HC', the emphasis is on reactions rather than on properties and applications, although there is coverage towards the end of the book of heterocycles in biology and medicine.

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May 2007

Heterocyclic Chemistry

Subject area
Organic chemistry

Description
A textbook to teach the fundamentals of heterocyclic reactivity and synthesis in a way that is understandable to second- and third-year undergraduate chemistry students

Authors
J A Joule and K Mills

Publishers/Suppliers
Blackwell Publishing (bookshop.blackwell.co.uk/jsp/welcome.jsp)

Date/Edition
2000/4th edition

ISBN
0-632-05453-0

Level
Undergraduate, research

Price
£29.99

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May 2007

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	****
Usefulness to teacher	*****
Meets objectives	****
Accuracy	*****

It is not often realised just how widespread and important is the subject of heterocyclic chemistry. Aromatic heterocycles are components of many important pharmaceuticals. Recent examples include the drugs Tagamet (used for ulcer treatment) and Viagra (which probably needs no introduction!). If you want more venerable examples, how about quinine, first brought to Europe by the Jesuits from South America in the sixteenth century, or sulfapyridine, the first successful antibiotic? The bases in DNA are heterocycles, exemplifying the ubiquity of heterocyclic molecules in biology. Even in materials science, heterocycles are taking their place. For instance, metallophthalocyanins are being tested as catalysts in fuel cells, and among the most promising semiconductors in the rapidly developing field of organic electronics are poly-3-alkylthiophene derivatives.

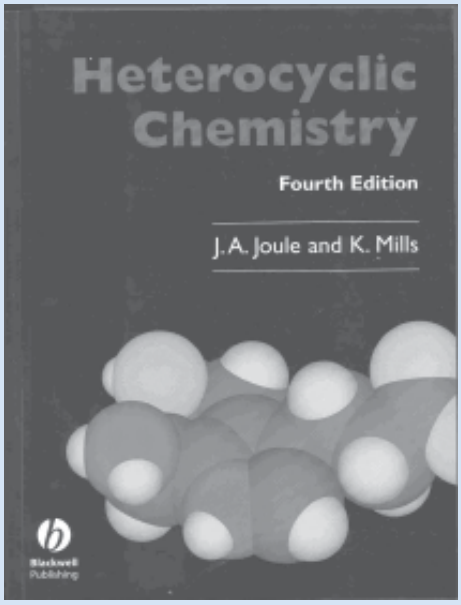
Apart from more general chemistry texts, which usually cover heterocyclic chemistry in dedicated chapters, there are several good and well-established specialist textbooks, including this text by Joule and Mills. I first encountered this book (in its second edition, as Joule and Smith) as an undergraduate in the early 1980s, and found it easy to use and approachable. This was just as well, since the person teaching the course stuck closely to the text of the book!

Since then, great advances have been made in the subject, particularly in synthetic methodology, and this is partly responsible for the growth in the number of pages (2nd edition, 378; 4th edition, 589). The fourth edition opens with a very short chapter on the structures of aromatic heterocycles, and their spectroscopic properties. Next, general concepts in the reactivity of heterocycles are dealt with, followed by a general chapter on synthetic methods used to assemble heterocyclic rings. The next section of the book deals with different classes of heterocycles in turn, beginning with pyridines and their benzo-fused analogs, then pyrilium ions and pyrones. A chapter on diazines then follows, before the next section of the book, which deals with five-membered heterocycles (pyrroles, thiophenes and furans), and their benzo-fused analogs. The next stage in complexity is related rings with more than one heteroatom, and in fact these are treated next. The final substantial chapter describes the purines, following which there are brief chapters on heterocycles in which nitrogen occurs at a ring junction, then heterocycles with more than two heteroatoms. The emphasis of the book on aromatic heterocycles is best illustrated by the fact that saturated and partially-saturated heterocycles are summarised in a short chapter near the end of the book, prior to the final chapter on some specific applications of heterocycles. This is rather a token effort, covering solid phase chemistry, the pharmaceutical industry, and organic electronics, all in 24 pages.

I think that this book is an authoritative and quite comprehensive resource. There are plenty of references to original papers, both classical and up to date, given at the end of each chapter. There are problems at the ends of the chapters on the major classes of heterocycle, divided into basic problems for undergraduates, and more advanced problems mainly aimed at research workers. There are brief solutions in an 'Appendix' that do not offer much in the way of explanation (although this aspect could probably be left to course teachers).

Continued on page 22

Heterocyclic Chemistry



From the publisher...

Heterocyclic Chemistry

By John Joule, Keith Mills

This fourth edition of Heterocyclic Chemistry retains its original aims, thus maintaining the principal objective of earlier editions - to teach the fundamentals of heterocyclic reactivity and synthesis in a way that is understandable to second- and third-year undergraduate chemistry students. In recognition of the level at which much heterocyclic chemistry is now normally taught, the authors have included more advanced material, making the book appropriate both for postgraduate taught courses and to postgraduate students. It is important to emphasise that the more advanced sections of the book make it an important reference work for chemists at all levels who are working with heterocyclic compounds in industry.

0-632-05453-0 608pp 2000 £29.99

Continued from page 21

For courses where heterocyclic chemistry is encountered in the core, in years 1 or 2, this book is a useful library reference source. The authors give guidance for undergraduates as to how to make the best use of the book in the 'Introduction'. However, a less chemically comprehensive text with a heavier emphasis on explanation, such as Sainsbury's RSC Tutorial text (reviewed in this journal **4**(1) p16, 2003) might be more appropriate as a set text at that level. The authors' own *Heterocyclic Chemistry at a Glance* (reviewed p20 in this issue) is another such possibility.

I expect that this book will be of most use to students doing an advanced (perhaps optional) module on the subject, or to postgraduates embarking on a PhD who expect to encounter heterocycle syntheses during their studies. As someone who works on conjugated materials for electronics, I will certainly make much use of my review copy, and I will recommend it to my research co-workers.

How to get a First Studying at University

Subject area
General

Description
These books are aimed primarily at university applicants and freshers, although they may also be of interest to higher education advisors in sixth forms and parents

Authors
How to get a First
by Thomas Dixon
Studying at University
by G W Bernard

Publishers/Suppliers
Routledge Falmer
(www.routledge.com)

Date/Edition
How to get a First: 2004
Studying at University: 2003

ISBN
How to get a First:
0-415-31732-0 (hardback)
0-415-31733-9 (paperback)
Studying at University:
0-415-30311-7 (hardback)
0-415-30312-5 (paperback)

Level
A-level, undergraduate

Price
How to get a First:
£70.00 (hardback)
£14.99 (paperback)
Studying at University:
£75.00 (hardback)
£10.99 (paperback)

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May 2007

Summary Review

range: * poor to ***** good	Dixon
Academic content	***
Usefulness to student	***
Usefulness to teacher	**
Meets objectives	*****
Accuracy	****

For many young (and occasionally not so young) people the prospect of going to university is a daunting one. The recent rapid expansion in participation at HE level means that many university applicants are the first from their family to enter higher education; coupled with the recent introduction of top up fees, making the right choice of course and institution has never been more important. Getting there is only half the story though, G W Bernard's book, **Studying at University**, sets out to help potential undergraduates make sense of the university system and to make the right choices. It also has plenty of advice on how to make the most of the experience once the student has arrived. Thomas Dixon's book, **How to get a First**, has much less to say on the application process and focuses on how to work the system to obtain a first class degree. Its overarching point is that it is not necessary to be some kind of genius to graduate with a first – anyone can do it. This is not some sort of get rich (top grades) quick scheme but a collection of good advice. In fact, the secret – if that is the correct word – to achieving a first is a combination of working hard and working smart. Before going any further, an important point needs to be made: both these books are written by lecturers in history. Bernard makes some attempt to broaden his advice to include the sciences (and also warns when his arguments cannot easily be transposed). On the other hand, Dixon's book pays scant attention to even the existence of the physical sciences. This somewhat limits the usefulness of these from a sciences point of view. That said, there is still plenty of interesting reading and good advice to be had.

Bernard begins with a brief history of the university system all the way from the twelfth century up to the present. He points out where some of the arcane traditions still associated with the higher education system arose and maps out the development of modern academic areas of study. Although only a few pages long, this chapter contains a history lesson that will benefit everyone studying and working in today's universities. I was somewhat surprised that Bernard omits to mention the Open University anywhere in his book, especially as he has devoted a few sections to the particular needs and concerns of mature students.

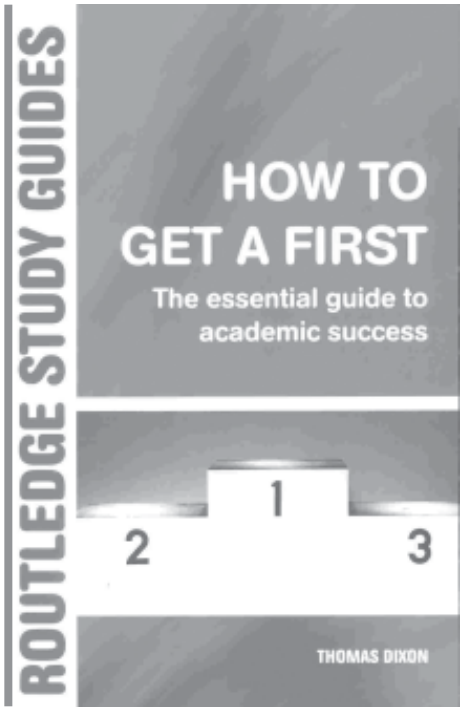
The second chapter outlines what a modern university is and how it is different to other forms of educational establishment. Bernard is keen to point out the benefits of being taught by active researchers and gives a brief outline of a typical academic career path so that the reader (of his book) understands the hierarchy of lecturers, readers and professors. There is also a very valuable passage in which the author stresses the importance of choosing the degree subject 'positively', focusing on the enjoyment of the subject for its own sake rather than choosing a subject because it may be useful when looking for a job after graduation. Chapter three addresses the thorny issue of 'Why some universities are better than others'. It opens with an account of how universities are funded and makes clear that although overall income has risen in the past quarter of a century, the spending per student has fallen relentlessly. The only good point that Bernard can find is that the HE sector, while strapped for cash, is in better shape than the NHS. Bernard explains why he considers university league tables are misleading. He also claims that Research Assessment Exercise (RAE) scores are "deeply flawed" citing the 2001

Continued on page 24

How to get a First Studying at University

Continued from page 23

history rankings at Oxford and Oxford Brookes as evidence (5 and 5* respectively). Perhaps unsurprisingly, the author has similar misgivings about Teaching Quality Assessment (TQA) scores. At this point, the book seems to flip from 'young person's guide' style into a polemic. That the TQA focuses on paperwork, procedures, clearly defined learning outcomes etc "reflects a damagingly skewed and philistine view of the nature of university education". So, if newspaper league tables, RAE scores and TQA ratings are not good tools for differentiating between universities, what is the poor applicant to do? Bernard has the answer: aim for the universities with the



highest research funding. The rationale is that the government provides that same amount of money per undergraduate no matter which university a student goes to but research funding is, by design, highly unequal. Higher research funding equals more money for labs, libraries and more (and better) staff equals better undergraduate teaching. Of course the counter argument is that all these extra research focused academics in research lead departments will be too busy doing research to spend quality time with undergraduates whereas academics in teaching lead institutions have more time to devote to undergraduates and more incentive to become excellent teachers.

Chapter four is probably the chapter that the target reader is going to concentrate on the most as it is the one that gets to the 'nitty-gritty' of deciding which institutions to list on the UCAS form. The advice is to start with Oxbridge and move down the list until one comes to a university that will accept the A-level grades that you expect to be able to offer; the list being the one constructed in the last chapter. There is also some useful advice on personal statements. As an admissions tutor myself, I am often asked about how to write a personal statement and I tend to give a similar reply to Bernard: that however good a personal statement that an applicant supplies, it is not going to make up for poor A-level predictions.

Chapter five is a short discussion of the benefits of obtaining a university degree. Although I do not dissent from anything said there, I do believe, from the point of view of the physical sciences, that mentioning the existence of the MSci programmes would have been useful.

Chapter six, entitled 'Are too many students like this?' is a diatribe against lazy students. One gets the feeling that Bernard is close to the end of tether with students who are too tired to engage with their academic study because they have been forced through economic necessity to take many hours of paid employment, or they have chosen to take many hours of partying, or worse still, both.

The subject of the seventh chapter is the interval between accepting an offer and finally arriving at university. He wisely suggests undertaking some preparatory reading which, in my experience, many applicants do, and (if necessary) learning the rudiments of cooking, which in my experience many students do not. The main focus of this chapter is about arranging the financial side of things and unfortunately is of little value as it is now out of date due to the introduction of top up fees in 2006.

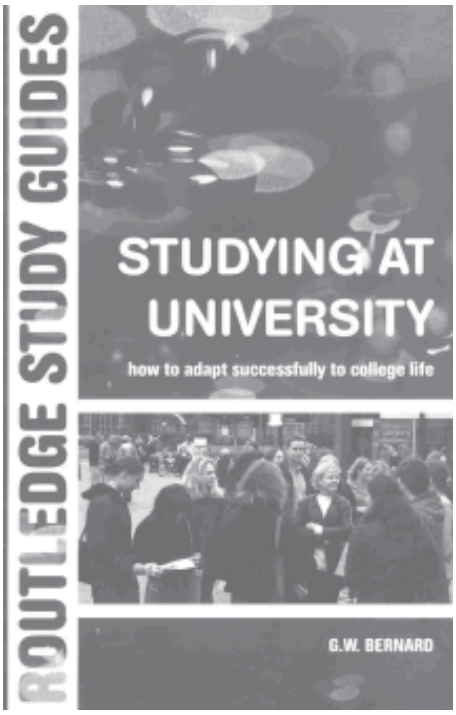
The remainder of the book is concerned with surviving and flourishing in the university environment. Chapter eight points out the main differences between university and school life; that no one chases you if you are not present for a class or lecture; and that university level material is not necessarily going to be designed to be easy to digest. Continuing in the same vane, chapter nine focuses on lectures and lecturers, which is another big difference that many students struggle with after being used to lessons and teachers in a school environment. It gives an insight into what makes a lecturer tick and points out that the student should expect and welcome a multitude of styles.

How to get a First Studying at University

Summary Review	
range: * poor to ***** good	Bernard
Academic content	**
Usefulness to student	****
Usefulness to teacher	**
Meets objectives	****
Accuracy	**

Chapter 10 on classes, seminars and tutorials is not particularly useful for students intending to study a physical science as we have evolved a different set of methods to deliver our programmes. If a scientist rather than an historian had written the book, a chapter on how to get the best from laboratory sessions and problems classes would have appeared at this point.

The next short chapter on computers is probably superfluous to requirements for potential physical science students as I am sure they all have much more knowledge than is put forward here. In fact, I would suggest that all school age students, even those with a



heavy bias to the humanities are much more competent that Professor Bernard in the finer points of information technology as he is at the level of being frustrated by having to press 'Start' to turn his computer off.

Chapter 12 focuses on essay writing, a skill that is much more important to humanities students and is written with a student of history in mind. That having been said, physical science students are expected to be able to produce written work in the form of lab papers and dissertations and this chapter has much good advice to offer.

The next two chapters are about examinations. The first one on revision techniques offers some good ideas that include some basic memory tricks. The final chapter on exam technique is focused on the essay style examinations that humanities students face and is not relevant to the type of assessment that science students are exposed to.

The final chapter deals with feedback and points out that in most overstretched university departments this is something that may take a long time to arrive.

Dixon's book, **How to get a first** does not deal with the issues associated with choosing and applying to universities and is therefore more applicable to first years, although, the advice on the first page is to "read this book before you go to university". Perhaps it should form part of the preparatory reading that Bernard mentions in his book. As noted earlier, the reader of the book is assumed to be embarking on a humanities degree and no mention is made of the sciences. The examples of good and bad practice are all based on topics the average science fresher will not have come across in any depth or even heard of (stoic theories of emotion, slavery and the American Civil War, the sociology of crime and Simone de Beauvoir and the construction of gender to name but a few). However, there is much here that students of the physical sciences can utilise: how to handle lecturers, how to take good notes, how to give a presentation and some very useful tips on common grammatical mistakes and how to avoid them.

Both of these books have been written with the humanities student in mind, but that is because they are both written by real academics who happen to be historians. And the fact that they are academics and not educational psychology experts is what makes them so valuable. Dixon has written a book that covers all the things he wished he known himself as a fresher but didn't and Bernard has drawn on twenty five years experience as an academic historian. Even given the lack of reference to the sciences, I will be recommending that my next batch of first year tutees read both books and think about which parts apply to them and which parts do not.

Inorganic Chemistry

Subject area
Inorganic chemistry

Description
The book gives a comprehensive overview of the current state of inorganic chemistry

Authors
Atkins, Overton, Rourke, Weller and Armstrong

Publishers/Suppliers
Oxford University Press (www.oup.co.uk)

Date/Edition
2006/4th edition

ISBN
0-19-926463-5

Level
Undergraduate, research

Price
£37.99

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Faculty of Life and Health Sciences,
University of Ulster at Jordanstown,
Newtownabbey,
Co Antrim BT37 0QB
June 2007

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

The arrival of a new edition of this well established inorganic chemistry text is to be welcomed. Not only does it provide an excellent opportunity for teachers of advanced inorganic chemistry courses to refresh and update their knowledge but it also enables us to gauge the progress made in the field since the publication of the previous edition in 1999. The book is certainly much changed from the previous edition, while some of this may be accounted for merely by reorganisation of the material, there is also much that is new.

Shriver and Atkins have now become Atkins, Overton, Rouke, Weller and Armstrong and this new team of authors would appear to have succeeded in doing justice to the extensive field that is 'Inorganic Chemistry' today.

The fourth edition is divided into three sections, 'Foundations', 'The elements and their compounds' and 'Frontiers'. 'Foundations' provides, in the first eight chapters, an excellent theoretical base to underpin the topics covered in the later sections. I was delighted to see that traditional topics like 'Acids and bases' (chapter 4) and 'Oxidation and reduction' (chapter 5) have been joined by chapters on the equally important areas of 'Physical techniques in inorganic chemistry' (chapter 6) and 'Molecular symmetry' (chapter 7). The 14 chapters in the section on 'The elements and their compounds' provide an extensive, if uneven, coverage across the periodic table, possibly reflecting the specific interests of the authors. Nonetheless the four chapters on transition metals well met the requirements of a coordination chemist like myself. The final section of the book, 'Frontiers' contains chapters on 'Solid-state and materials chemistry', 'Nanomaterials, nanoscience and nanotechnology', 'Catalysis' and 'Biological inorganic chemistry'. This section provides an excellent overview of the contributions that inorganic chemistry makes to important intradisciplinary areas and well illustrates how inorganic chemistry now prospers outside its traditional boundaries.

The extensive use of coloured diagrams throughout the book lends an attractive and reader-friendly appearance. The book, however, is quite demanding and considerable prior knowledge is often needed to fully benefit from the text. Therefore while it is likely to be a useful reference book to all chemistry students it is not, I believe, an ideal textbook for many first or even second year undergraduates. It is however likely to provide an excellent companion for third year undergraduates, postgraduate students and indeed anyone who teaches advanced inorganic chemistry. The text is well supported by a number of worked examples, a wide range of problems of varying degrees of difficulty, for students to solve and an 'Online Resource Centre'. At less than £40 the over 800 pages represent excellent value for money and I see no reason why the book shouldn't continue to be widely used.

Interfacial Forces in Aqueous Media

Subject area
Colloids and surface chemistry, biochemistry, particle technology

Description
This textbook examines the role of polar interfacial and noncovalent interactions among biological and nonbiological macromolecules as well as biopolymers, particles, surfaces, cells, and both polar and apolar polymers

Authors
Carel J van Oss

Publishers/Suppliers
CRC Press, Taylor & Francis Group (www.crcpress.com/default.asp)

Date/Edition
2006/2nd Edition

ISBN
1-57444-482-4

Level
Research

Price
£85.00

Yang Gan,
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University of Melbourne,
VIC 3010,
Australia
June 2007

Summary Review

range: * poor to ***** good

Academic content	*****
Usefulness to student	***
Usefulness to teacher	****
Meets objectives	*****
Accuracy	*****

First things first, since this book is on 'forces', it is worthwhile to emphasise that (as stated by the author): "for linguistic reasons, the terms: 'force', 'pressure', and 'interaction', are here used interchangeably. Where these interactions are discussed specifically, they are treated in units of *energy*, or in units of energy per surface area, except when explicitly stated otherwise."

The author, Carel J van Oss, is professor emeritus of microbiology and immunology, adjunct professor of chemical and biological engineering (since 1980) and of geology (since 1995), at the State University of New York at Buffalo. He is also the author (together with Giese) of *Colloid and Surface Properties of Clays and Related Minerals* (2002).

I highly recommend this book to researchers. This second edition includes a large amount of new data and many concepts. It also contains a new part - Part II 'Interfacial Properties and Structure of Liquid Water' comprising four chapters, plus a new chapter 'Kinetics and Energetics of Protein Adsorption onto Metal Oxide Surfaces'. The 25 chapters are divided into 4 parts: Part I-'Theory'; Part II-'Interfacial Properties and Structure of Liquid Water'; Part III-'Experimental Measurement Methods'; Part IV-'Associated Phenomena and Applications'.

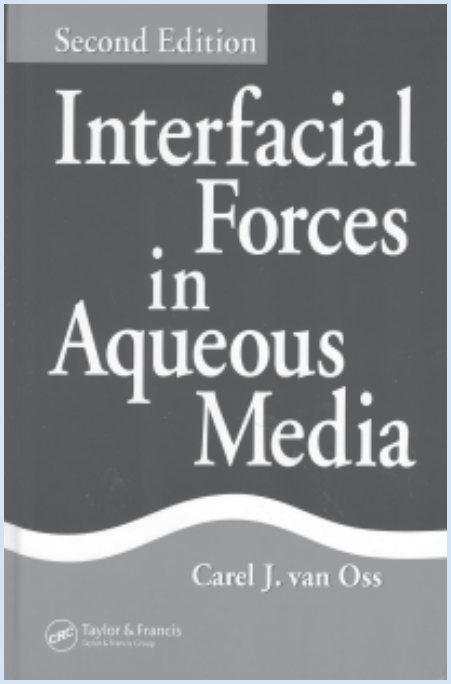
Regarding the coverage and emphasis of his book, the author confessed that "I must apologise for, or at least explain, the fact that quotations of my own work and the work of my close collaborators may seem referenced with unusual frequency. The explanation is two-fold: (1) even though I spend considerable time trying to keep up with the literature I still am, like most authors, more familiar with my own than with everybody else's work, and (2) the substance of this book deals with the nature and the effects of interfacial interactions in polar and the especially in aqueous media, mainly resulting from my own and my close collaborators' experimental and theoretical endeavours, which began with some of us as early as the late 1950s, but which has intensified considerably since 1985."

Because my research area is on the application of atomic force microscopy (AFM), the most provoking chapter, for me, is Chapter XX; 'The primary and Secondary Interactions'. It reads like a fascinating detective story. It starts with; "In past years one has tended to be confronted with a growing number of different forces, which are commonly believed to play a role in the interactions between biological and other polar entities, such as cells, biopolymers and other polar polymers or particles, when immersed or dissolved in water. This expanding catalogue of (non-covalent) interaction force comprises:

1 London-van der Waals, or dispersion forces;
2 Debye-van der Waals, or induction forces;
3 Keesom-van der Waals, or orientation forces;
4 Electrostatic, or Coulombic forces;
5 Hydrogen-bonding forces;
6 Hydrophobic interactions;
7 Hydration forces;
8 Brownian movement forces;
9 Osmotic pressure;
10 Disjoining pressure;

Continued on page 28

Interfacial Forces in Aqueous Media



From the publisher...

Interfacial Forces in Aqueous Media, Second Edition

By Carel J. van Oss School of Medicine, State University of New York at Buffalo

Provides up-to-date information on the interfacial forces among biopolymers, particles, surfaces, cells, and other non-polar and polar polymers. Incorporates new data and concepts which have emerged since the publication of the first edition. Revises interfacial tensions between polar organic liquids and water.

1-57444-482-4 456pp 2006 £85.00

Continued from page 27

11 Structural forces;
12 Steric interactions;
13 Depletion interactions;
14 Entropy-driven interactions;
15 Enthalpy-driven interactions;
16 Cross-binding interactions;
17 Specific interactions."

Then the author asked himself - "The question is: which ones of these are primary and separate physical-chemical forces, and which ones are secondary manifestations of one or the other of the more fundamental forces?" Otherwise, one may erroneously count the same force twice!

The author clarified that there are only *four types of primary non-covalent interactions* comprising the first eight interactions:
1. Electrodynamic, or Lifshitz-van der Waals (**LW**) interactions,
2. Polar, electron-donor-electron-acceptor, or Lewis acid-base (**AB**) interactions,
3. Electrostatic (**EL**) interactions, and
4. Brownian movement (**BR**).
The other interactions are only secondary!

Keynotes in Organic Chemistry

Subject area
Organic chemistry

Description
Outline of the core subjects of organic chemistry at undergraduate level

Authors
Andrew Parsons

Publishers/Suppliers
Blackwell Publishing (bookshop.blackwell.co.uk/jsp/welcome.jsp)

Date/Edition
2003/1st edition

ISBN
0-632-05816-1

Level
Undergraduate

Price
£15.99

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11 Ridley Road,
Lowerhouse,
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Cheshire SK10 5HL
May 2007

Keynotes in Organic Chemistry by Andrew Parsons aims to cover the 'core' material of Organic Chemistry relevant to undergraduate courses in chemistry and related subjects. The book is just over two hundred pages long, with a fairly small typeface and manages to cover all the expected material in a concise but very clear way.

Summary Review

range: * poor to ***** good

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

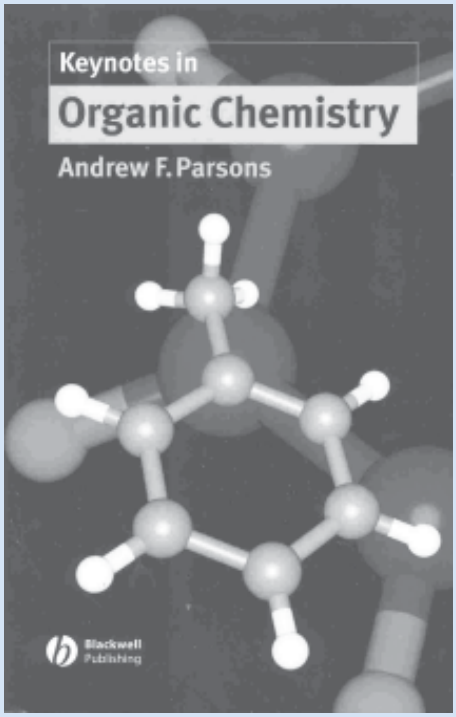
The book is divided into eleven chapters. The first of these covers the necessary background material on structure and bonding without which the understanding of why organic reactions take place the way they do is difficult to achieve. Types of bonding, hybridisation, electronic effects and acidity and basicity are covered and the chapter concludes with half a dozen problems to allow the student to use the concepts covered and test understanding. Each of the subsequent chapters also concludes with a selection of problems and outline answers for all of the chapters are provided at the back of the book. Although described as outline answers in several cases quite a lot of detail is provided to make sure that the concepts have been understood. The next three chapters look at more of the fundamental material that is required to gain an understanding of why organic reactions take place the way they do. Chapter two looks at functional groups, organic nomenclature and ways of depicting organic compounds diagrammatically. Chapter three is concerned with stereochemistry and chapter four with reactivity and mechanism including the necessary coverage of thermodynamics and kinetics. The diagrams used to explain reaction rates are very clear despite their relatively small size. This chapter concludes with a very useful aide to constructing correct reaction mechanisms. One of the most useful skills that a student of organic chemistry may develop.

The next five chapters consider, as one would expect, the chemistry of the important organic functional groups in greater detail. Chapter five is devoted to the alkyl halides, beginning with structure then looking at standard preparative methods and then at their reactions. A similar layout is present in the next four chapters which are on alkenes and alkynes; benzenes; aldehydes and ketones; carboxylic acids. The chapter on carboxylic acids also looks at their derivatives, esters, amides and nitriles. Throughout these chapters many very clearly presented reaction schemes and mechanisms are provided to make the chemistry come to life and enhance the likelihood of the student grasping and remembering it.

The remaining two chapters look at spectroscopy and natural products chemistry. The chapter on spectroscopy manages to cover, in about twenty pages: mass spectrometry, ultraviolet spectroscopy, infrared spectroscopy and nuclear magnetic resonance spectroscopy. Although this may sound rather brief, the clarity of the text along with the very useful and clear diagrams make this chapter a very good revision guide to the main spectroscopic techniques used by the organic chemist. The final chapter describes some of the more commonly encountered classes of natural products: carbohydrates, lipids, steroids, amino acids and polymeric compounds. This is a very brief introduction, but sufficient to make the student aware of at least some of the range of natural products they may encounter.

Continued on page 30

Keynotes in Organic Chemistry



From the publisher...

Keynotes in Organic Chemistry

By Parsons, Andrew F.

This concise and accessible book provides organic chemistry notes for students studying chemistry and related courses at undergraduate level, covering core organic chemistry in a format ideal for learning and rapid revision. The material is organised so that fundamental concepts are introduced early, then built on to provide an overview of the essentials of functional group chemistry and reactivity, [leading]... the student to a solid understanding of the basics of organic chemistry. Graphical presentation of information is central to the book, to facilitate the rapid assimilation, understanding and recall of critical concepts, facts and definitions.

0-632-05816-1 228pp 2003 £15.99

Continued from page 29

This text meets its aims very well and is an excellent revision guide for the most important features of organic chemistry at undergraduate level. It is a handy size, easily carried around for revision purposes. The text, while quite small, is very clear, as are the diagrams and reaction schemes. It also works very well as an aide memoir for the more experienced chemist. As someone who has, on occasion taught organic chemistry to pre-medical students I would happily recommend this text for its clarity of explanation and use of very well chosen diagrammatic material to cover a very useful selection of organic chemistry topics.

Learning Online

Subject area
General

Description
This book provides guidelines to facilitate student learning in a virtual learning environment

Authors
Maggie McVay Lynch

Publishers/Suppliers
Routledge Falmer
(www.routledge.com)

Date/Edition
2004

ISBN
0-415-70000-0

Level
Undergraduate

Price
£16.99

Summary Review

range: * poor to ***** good

Academic content	***
Usefulness to student	**
Usefulness to teacher	**
Meets objectives	**
Accuracy	***

Learning Online is a book aimed at "both current and prospective online learners" to give practical, clear and detailed assistance for learning online. The first chapter, 'The future is now' sets the scene for the proliferation of online learning and discusses its development from the 1960s. This would be fine for a book introduction but for the fact that it reads very much like an introduction for a book aimed at academics, not students. Reference to the reader (a student) is not made until page 16. At this point it asks the reader to undertake a short survey to "assist you in rating your current readiness to pursue online education courses".

An example is Question 2 on the survey that asks the reader to rate what level "I am comfortable communicating with others over the Internet". I feel this sets a risky precedent for the book since potential online students may think they're not ready for online learning and put the book down. Online education providers might also argue that putting a student at ease with online learning is their responsibility and not a requirement for students to pre-prepare themselves or evaluate their readiness to take on this course of education or training.

Having said that, chapter two 'Deciding to pursue online learning' is a much better overview to learning online for students. It gives a better introduction and some initial pointers on what online learning might include (audio/video interaction, dynamic data etc). It also provides useful tips on how to consider the quality of online courses such as quality assurance and validation, as well as considering support services. Chapter three starts by giving a good background to online communication but I feel the examples are a bit laboured after the initial overview is given. For example, the reader is told about asynchronous communication and then given further examples of asynchronous communication tools.

Chapter four is entitled 'The media you need to understand' and starts out discussing what I would consider 'core' technologies for online learning such as email, discussion boards and general MLE (Managed Learning Environment) software. Unfortunately this chapter also follows a trend I think starts to emerge for a book supposedly aimed at students, which is to discuss topics in too great a detail. The use of email for example has two pages dedicated to netiquette (how to send messages politely) and when discussing another tool called a 'MOO' it actually provides a list of some common commands. I find it difficult to see how students would find this of interest.

The next chapter ('Overcoming isolation and building community') is much more student focused and gives a better indication of the experiences and situations an online learner is likely to face. It starts off with some practical advice on creating a good study environment but I felt the following tip was a bit patronising:
"Tip: Do not slouch in your chair. Be sure to get up and have a stretch break at least once an hour! Make a conscious effort to blink regularly!"

The chapter redeems itself by raising a number of very important and pertinent issues that a student will face when learning online, such as study routines, becoming an independent learner and dealing with other students online to build an effective learning community.

Continued on page 32

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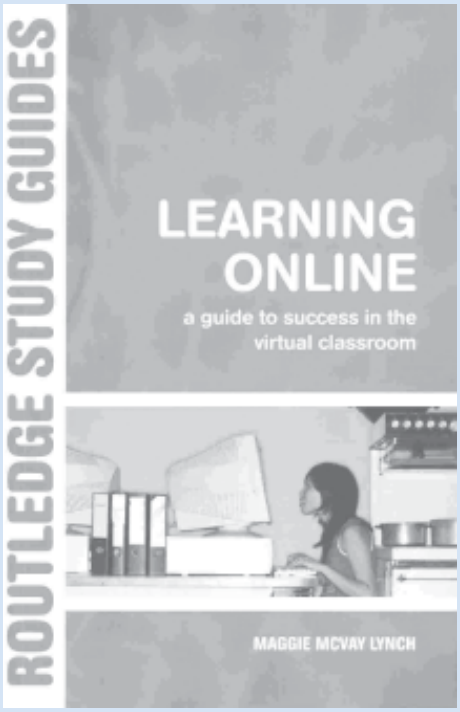
May 2007

Learning Online



From the publisher...

Learning Online: A Guide to Success in the Virtual Classroom

By M McVay Lynch

Whether taking classes in school, college or university, or in a corporate training setting, it is likely that learners will be expected to do at least part of their studies via the computer. This book provides realistic guidelines to ensure their success in the virtual learning environment.

0-415-70000-0 232pp 2004 £16.99

Continued from page 31

Chapter six is entitled 'Adapting your learning style to the online environment' and is another good chapter providing sound advice to "both current and prospective online learners". It introduces the concept of learning styles and helps the reader identify their own learning styles. It then takes this further by helping the reader understand how they can adapt their learning styles to different situations, especially in an online environment to make the most of their learning experience.

The next chapter 'Doing research online' offers some practical advice on the use of various search tools for finding information and resources on the Web but it seems to be placed quite strangely in the book as I feel the chapter is just dropped in without any proper introduction of how it fits with the overall theme of the book on advising students in online study. If you ignore this bit however, the chapter is actually quite well structured and covers most topics you would think of. I was pleased to see mention of judging the quality of information a person might search for.

The penultimate chapter concerned itself with ethics. The first part of the chapter considered netiquette again and highlighted some common social and ethical issues such as dealing with cultural differences, plagiarism and cheating in assessments. This was well presented for the reader who might be a potential online learner. Also on the same topic but perhaps less pertinent was a discussion about illegal copying of software and other digital resources such as music files.

The final chapter gives a supposition of what the future of learning technology might be. The author uses the cyborg as a metaphor but this seems far fetched and yet other recent technological developments aren't really touched on, such as podcasts. How all this relates to the online learner is not mentioned for considering education in the present.

The cover says that this book "provides realistic guidelines to ensure your success in the virtual learning environment" yet part of it reads more as a background for academics rather than students. This means that it isn't always clear who the author is addressing or how the content can aid learning online. As a result it often feels like the book misses the mark with its intended purpose. There are good themes covered in the book and it is an easy read but perhaps it forgets its purpose sometimes and would be better if it was written more concisely for its intended reader.

Nuclear Forensic Analysis

Subject area
Forensic science

Description
Introductory text linking nuclear science and forensic analyses of nuclear materials

Authors
Kenton James Moody, Ian D Hutcheon, Patrick M Grant

Publishers/Suppliers
CRC Press, Taylor & Francis Group (www.crcpress.com/default.asp)

Date/Edition
2005/1st edition

ISBN
0-8493-1513-1

Level
Undergraduate, professional

Price
£92.00

Marie Walsh,
Department of Applied Science,
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Limerick,
ROI
May 2007

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

The authors of this text are all working in various sections of the Lawrence Livermore National Laboratory and would be regarded as authorities in the field of nuclear forensic analysis. They have been involved in the development of this merger between the disciplines of nuclear chemistry and forensic science. The new discipline started to develop in response to the realisation in the early 1990s that smuggling of nuclear materials was happening and becoming more and more threatening.

Moody, Hutcheon and Grant produced this book with the objective of capturing the foundations of nuclear analysis as a discipline as it evolves into a mature science. They also set out to write a single text which would do justice to the development of the discipline but also provide pertinent, multidisciplinary information. This is not intended to be a textbook, but a collection of what the authors pertinently call 'enrichment material'. It is not for experts in radiation detection techniques or radiochemistry but is a useful introduction to the area of nuclear analysis, with an emphasis on its relevance in forensics.

The book comprises 25 chapters that consolidate fundamental principles of radio-forensic analysis, all pertinent protocols and procedures, computer modelling development, interpretational insights, and attribution considerations, into one convenient reference source. The principles and techniques are then demonstrated and discussed in their applications through a number of chapters outlining real-world investigations and casework that have been conducted in a variety of situations, from the cause of a fatal cold-fusion laboratory explosion to a questioned sample from the US Drug Enforcement Agency.

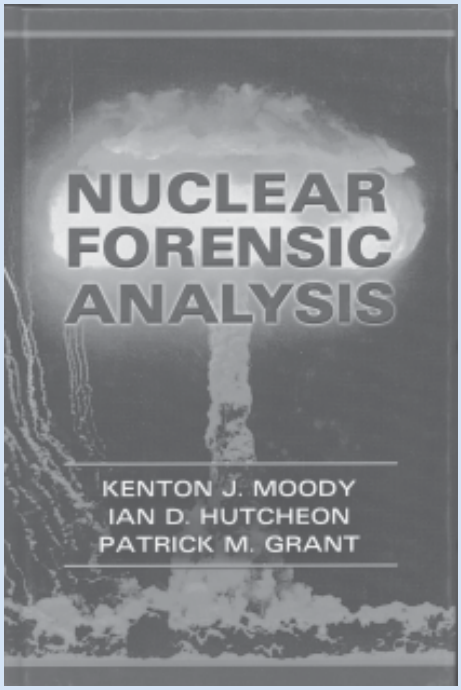
The first four chapters of the book provide the reader with information on the basics of nuclear chemistry, the history of the Cold War nuclear materials production complexes, and the commercial nuclear power sector. This is an important section in which the whole area of nuclear forensic analysis is put in context with the development of nuclear chemistry and the reality of nuclear proliferation in the late twentieth century.

The authors go on to give an overview of the construction of nuclear weapons and the components used, before describing the principles of Chronometry where they illustrate how forensic information about the purity and history of nuclear materials can be derived from a knowledge of nuclear decay chains and radiochemical purification processes.

In keeping with Locard's Principle, they highlight the fact that much information can be obtained from tiny amounts of material if the correct radiochemical procedures are used. This section would be of particular interest to experienced forensic scientists who have limited experience of this type of radioactivity analysis - or first responders, who might have the task of preserving a chain of evidence in a case involving radionuclear samples. It reviews basic methods for investigating collateral evidence that may be associated with nuclear materials such as chemical explosives, hairs and fibres, inks and papers, and other sources of forensic information. The authors also consider protocols for collection of samples and sample preparation for radiochemical and chemical analyses, looking separately at inorganic/isotopic, organic and extraordinary sample issues.

Continued on page 34

Nuclear Forensic Analysis



From the publisher...

Nuclear Forensic Analysis

By Kenton J. Moody Lawrence Livermore National Laboratory, California, USA; Ian D. Hutcheon Glenn T. Seaborg Institute, Livermore, California, USA; Patrick M. Grant Lawrence Livermore National Laboratory, California, USA

Nuclear Forensic Analysis provides a primary reference source for nuclear forensic science, including the vastly disciplinary nature of the overall endeavor for questioned weapons of mass destruction specimens. Nothing like this exists even in the classified material. The book consolidates fundamental principles of radioforensic analysis, all pertinent protocols and procedures, computer modeling development, interpretational insights, and attribution considerations, into one convenient source. The principles and techniques are then demonstrated and discussed in their applications to real-world investigations and casework conducted over the past several years.

0-8493-1513-1 512pp 2005 £92.00

Continued from page 33

In Chapter 14 the authors emphasise the vital role of the investigators at the incident or crime scene and provide advice on the construction of a generic Field Collection Kit, based on their own real-life experience. They also give an update on field identification of radioactive samples and the instrumentation necessary to detect these materials.

One chapter gives a brief review of modern instrumental techniques for examining nuclear forensic samples covering radiation counting systems, microscopy, x-ray methods, organic analysis methods, and isotope mass spectroscopy. This does not go into depth which an expert might demand, but it fits the objective of the authors to provide a primary overview rather than an in-depth account. The book makes it very clear that the sophisticated analyses and interpretation of these samples require highly sophisticated instrumentation and nuclear chemistry expertise that may only be available in national laboratories.

The information chapters conclude with a review of estimates of the types and amounts of nuclear materials produced since the dawn of the nuclear age. This practical information can help in real cases to identify categories and sources of nuclear materials. They also contain information about the sources of nuclear materials and route attribution that focuses on pathways that were used before the material was interdicted.

The book is mainly illustrated with black and white line drawings and photographs. It is a user friendly text which would be useful for any forensics laboratory or course, and also as a source of information on the proliferation of nuclear materials. Definitely recommended as reference material, but may whet the appetite for more detailed information for specialists!

Numerical Methods in Astrophysics

Subject area
Astrophysics

Description
An introduction to a broad range of numerical techniques in contemporary astrophysics. The book comes with an accompanying set of program listings on CD that echo the chapter contents

Authors
Peter Bodenheimer, Gregory Laughlin, Michal Rozyczka and Harold Yorke

Publishers/Suppliers
CRC Press, Taylor & Francis Group (www.crcpress.com/default.asp)

Date/Edition
2006/1st edition

ISBN
0-7503-0883-4

Level
Undergraduate, research

Price
£39.99

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

In the Sixties, there was a gold rush in theoretical astronomy. Essentially analytic methods that had been used to solve industrial and laboratory problems in hydrodynamics, plasma physics and radiative transfer were turned on astrophysical systems. Sometimes the problems were so close, that those who knew where to stake their claims made swift progress. Gravitation and ubiquitous free boundaries did add new features to some classical problems: the classical theory of spiral structure in galaxies, and idealised models of magnetised collapsing clouds remain nice examples where the prospectors left the streams rather more enriched than when they found them. It would be nice to believe that there was still much flour gold to be found, trapped in our analytical riffles. But the search has turned underground, and large-scale numerical computation, the equivalent of heavy-duty industrial mining, has largely overtaken the zealous group of 'forty-niners' who made such rapid progress a few decades ago.

Numerical Methods in Astrophysics is therefore a very timely book, written by four distinguished contributors to this area. The book will appeal to graduate astrophysicists who love getting quick insights by writing their own programs. They will find the essential equations of each field covered – hydrodynamics and magnetohydrodynamics, stellar evolution, gravitational N-body interactions and potential theory, radiative transfer – and introduced in a way that lends itself to discretisation and numerical models. The editing too appears good in a book with so many subscripted equations; in a fairly quick read, I had just one concern, in the discussion of momentum flux on page 10, where it would have been helpful to have retained the full tensor. One of the features of the book that will interest purchasers is the included disc of program listings that mirror the chapter contents. They are written in Fortran and might easily lend themselves to undergraduate projects. These are codes to sharpen your numerical claws rather than immediate research tools and some, eg the Zeus fluid dynamics code, have been especially edited for the book. This is a nice broad selection with an informative chapter prefacing their use.

The sweep of the book is impressive given its size. Even with the space constraint, room has been found for excellent discussions of code stability, starting with very simple examples, and including nice comparative discussions of various techniques. These are extremely useful teaching tools for starting graduate students. Apart from this book, what do you need to start tentatively prospecting? Two things: first, as the authors openly admit, they have written a complementary book to Press et al's *Numerical Recipes* and that priceless source of numerical wisdom and folklore will remain the most fingered (and borrowed) book on your desk; second, you should find an experienced and careful practitioner to guide you. Only practice will illuminate the many vagaries of an algorithm, and it can take an experienced eye to separate the physical from the artificial, and suggest honest tests to evaluate a code's range of applicability.

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May 2007

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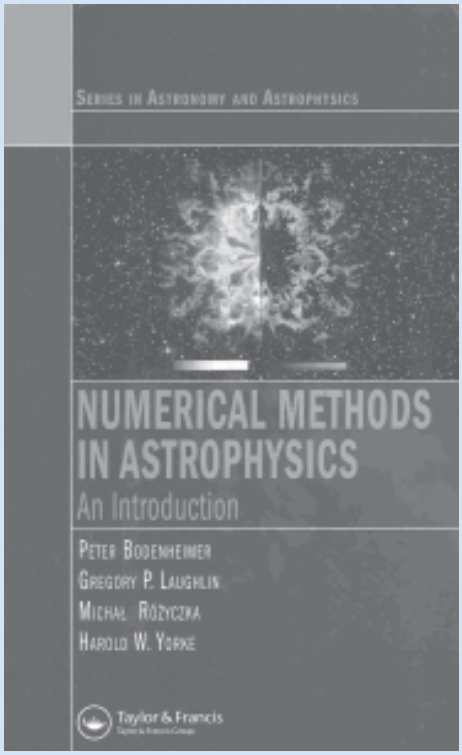
Numerical Methods in Astrophysics



From the publisher...

Numerical Methods in Astrophysics: An Introduction

By Peter Bodenheimer University of California, Santa Cruz, USA; Gregory P. Laughlin University of California, Santa Cruz, USA; Michal Rozyczka Nicolaus Copernicus Astronomical Center, Poland; Harold. W Yorke Jet Propulsion Laboratory, PASADENA, USA

Numerical Methods in Astrophysics: An Introduction outlines various fundamental numerical methods that can solve gravitational dynamics, hydrodynamics, and radiation transport equations. This resource indicates which methods are most suitable for particular problems, demonstrates what the accuracy requirements are in numerical simulations, and suggests ways to test for and reduce the inevitable negative effects.

0-7503-0883-4 330pp 2006 £39.99

Continued from page 35

A future edition should address the quality of the pictures in the book. There are colour images that are to be used alongside monochrome text illustrations of, for instance, the Rayleigh-Taylor instability in an expanding supernova blast, and smoothed particle hydrodynamics simulations of colliding planets. These are too small and printed with insufficient resolution to do them justice. If you haven't calculated it before, guess first and then work out how long it takes two 1cm ice-cubes separated by 1cm to collide under the action of gravity alone. This simple example introduces a nice section on the scaling of length and time which many students seem uncomfortable with when they start code writing. This is a most welcome and carefully thought out book that should help in the search for deeper subterranean seams.

Physics Matters: an introduction to conceptual physics

Subject area
General physics

Description
This textbook is an introduction to physics covering its principles in a manner that is easily understandable to non-science students because it provides them with examples of real life rather than mathematical explanations. The authors emphasise the connection between physics, other sciences, and the rest of the human experience. Complementary material can be found at: www.wiley.com/college/trefil

Authors
James Trefil and Robert M Hazen

Publishers/Suppliers
John Wiley & Sons Ltd
(eu.wiley.com/WileyCDA)

Date/Edition
2004

ISBN
978-0-471-15058-9

Level
Undergraduate

Price
£51.50

Summary Review

range: * poor to ***** good

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This book is organised with the classical approach, beginning with Mechanics and finishing with Relativity and Cosmology, to reflect the history of the science. Hence, it is divided into the following parts:

1. Introduction;
2. Mechanics and energy;
3. Matter, energy, and the laws of thermodynamics;
4. Waves;
5. Electricity and magnetism;
6. The atom;
7. The nucleus and elementary particles;
8. Relativity and cosmology.

Although the organisation is classical, the book is not. The explanations are presented with examples of real life that help students to understand the underlying concepts. It also encourages students to investigate by themselves. To achieve these objectives, chapters are composed of several sections like; 'Key ideas', with a statement of a key idea to help students to focus on the main concept of the chapter; 'Physics around us', where the authors tie the chapter's main theme to a common experience; 'Develop your intuition', where students are prompted to think about what they have learned in terms of common facts in their lives; 'Connection', to highlight applications of physics concepts to other areas of science; 'Physics in the making', essays that illustrate the scientific method by describing the way in which specific new understanding was gained; 'Ongoing process of science', where the authors examine questions currently being addressed by physicists; 'Equations and worked examples', here equations are presented in three different forms, evolving from the idea to the mathematical symbols to ease their understanding; 'Key terms' that appear in bold within each chapter, and then, they are listed in the 'Summary', with their definitions; 'Looking deeper' are intended for higher level discussion; 'Thinking more about', address a social or philosophical issue tied to physics; 'Questions', four levels of end-of-chapter questions: review, questions, problems and investigations.

Besides this pedagogical organisation, the explanations are complemented with visual illustrations that facilitate the task of learning.
Also, additional material can be found from the book's web page at www.wiley.com/college/trefil, together with references to other web pages at the end of each chapter.

This book can be supplemented with *The Lab Manual* (R Ehrlich and A Wyczalkowski), *The Activity Book* (M Tammaro), *The Instructor's Resource and Solution Manual* (M Tammaro), *The Test Bank*, The Instructor Resource CDROM, and *The Wiley Physics Demonstration Videos* (D Maiullo).

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May 2007

Practical Inductively Coupled Plasma Spectroscopy

Subject area
Analytical chemistry

Description
Introduction to ICP for analytical chemistry courses

Authors
John R Dean

Publishers/Suppliers
John Wiley & Sons Ltd
(eu.wiley.com/WileyCDA)

Date/Edition
2005/1st edition

ISBN
978-0-470-09349-8

Level
A-level, access, foundation

Price
£39.99

John Leaver,
11 Ridley Road,
Lowerhouse,
Bollington,
Macclesfield,
Cheshire SK10 5HL
May 2007

Summary Review

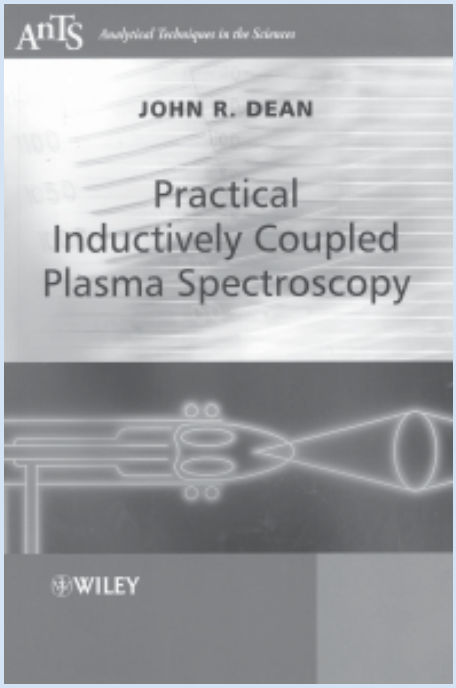
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

Inductively Coupled Plasma Spectroscopy has, as is noted by the author in the preface to this book, developed considerably over the last forty years. Unfortunately, it is a significant proportion of forty years since I was a chemistry undergraduate and so I am able to recall that ICP spectroscopy did not feature to any great extent in my undergraduate course! However, it is now a very important technique for trace element analysis with very good sensitivity in a variety of situations using either atomic emission spectroscopy or mass spectrometry detection. It is good to see a book devoted to this subject that is aimed not only at undergraduates and masters degree students but also at those doing foundation degrees and BTEC courses. The language and content therefore must be intelligible to a range of possible users for this book to succeed in its aims. The book has a very practical approach and is careful to provide the reader with necessary background information. Each chapter has very clearly stated learning objectives at the start. The book also contains a variety of self-assessment questions to allow readers to test their understanding.

The book is divided into eight chapters. The first chapter briefly looks at methodology for trace element analysis. This chapter includes a glossary of analytical terminology, information on units, methods of calibration, information on presenting data in tabular and graphical formats, calculating dilution factors and quality assurance. Having covered some basic considerations in the first chapter, the author moves on to sample preparation in chapter two. This chapter highlights the need for employing suitable sample preparation techniques depending on the nature of the sample to be analysed. Samples may initially be liquid or solid. Liquid samples may need to be subjected to extraction, ion-exchange, precipitation, filtration, pre-analysis concentration and so on to render them suitable for ICP spectroscopic analysis. Solid samples may need to be decomposed or digested, heated, fused and then subjected to one or more extraction techniques to make them amenable to ICP analysis. Sample preparation requires great care and considerable thought to achieve as good an analytical sample as might reasonably be obtained from an original sample and this chapter does a good job of highlighting the possible techniques available. The chapters from two onwards conclude with a list of useful references.

Chapter three considers ways in which the analytical sample may be introduced into the ICP system and therefore looks at nebulisers and spray chambers for introduction of liquid samples as small particle aerosols and at various means of discrete sample introduction such as electrothermal vaporisation of liquids and laser ablation of a solid sample. The possibility of using HPLC and GC with ICP is also briefly discussed. Another feature of the book is discussion questions that appear throughout. These are usually brief questions directed to the reader but then immediately followed by a possible answer. They have the advantage over merely including the content of the answer as part of the text, of making the reader momentarily pause for thought before looking to see what the answer is. They also act to stop the reader drifting on through a section without taking much in, as is all too easy with uninterrupted text of a technical nature.

Practical Inductively Coupled Plasma Spectroscopy



From the publisher...

Practical Inductively Coupled Plasma Spectroscopy

By John R. Dean

The book provides an up-to-date account of inductively coupled plasmas and their use in atomic emission spectroscopy and mass spectrometry. Specific applications of the use of these techniques are highlighted including applications in environmental, food and industrial analysis. It is written in a distance learning / open learning style; suitable for self study applications. It contains contain self-assessment and discussion questions, worked examples and case studies that allow the reader to test their understanding of the presented material.

978-0-470-09349-8 208pp 2005 £39.99

Chapter four is fairly brief and looks at the inductively coupled plasma itself along with direct-current plasma, microwave-induced plasma and glow discharges.

Chapters five and six then consider, respectively, using atomic emission spectroscopy and mass spectrometry as detection techniques and the various sorts of analyses to which these techniques lend themselves.

Chapter seven then describes some selected applications of ICP technology such as document analysis in forensic science, industrial analysis of coal, clinical analysis of blood and urine, food, materials and environmental analyses. This chapter includes much analytical data for the reader to inspect and comment upon.

The final chapter collects together a variety of resources such as data recording sheets, online and printed information sources.

Answers to the self-assessment questions are provided near the back of the book. There are also tables of units and physical constants and a fairly thorough index.

Overall this is a well-constructed book with interesting content. It manages to cater well for the intended range of possible readers. It is nicely produced with clear print and excellent diagrams. It is very suitable as a student text for any institution where ICP is amongst the analytical techniques taught.

Principles and Practice of Analytical Chemistry

Subject area
Analytical chemistry

Description
This text provides an overview of the principles and practice of analytical chemistry

Authors
Frederick William Fifield & David Kealey

Publishers/Suppliers
Blackwell Publishing (bookshop.blackwell.co.uk/jsp/welcome.jsp)

Date/Edition
2000/5th edition

ISBN
0-632-05384-4

Level
Undergraduate

Price
£32.99

Marie Walsh,
Department of Applied Science,
Limerick Institute of Technology,
Limerick,
ROI
May 2007

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This book is the fifth edition of **Principles and Practice of Analytical Chemistry**, published some twenty five years after the first edition appeared. The successive editions of the book have remained true to the authors' objective of providing a basic understanding of the principles, instrumentation and applications of chemical analysis, "as it is currently practiced".

It is easy to see why the book has established itself as a primary text for undergraduate and some postgraduate courses, as well as for practising analysts who require a well-written and concise overview of the principles and practice of analytical chemistry.

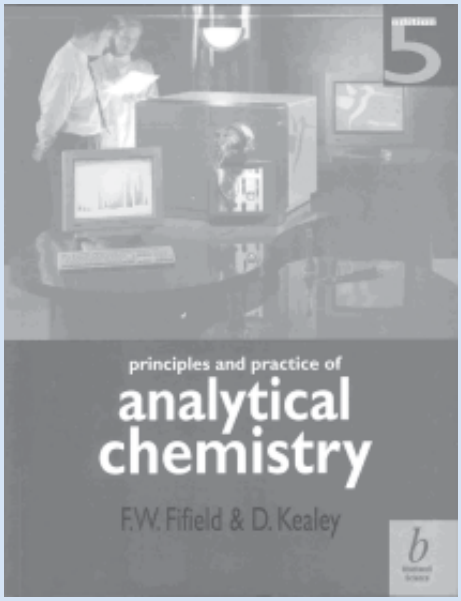
One instinctively feels that we must be due a new edition soon, particularly to revise the concluding chapters which deal with automation and the role of computers in analytical chemistry. While these provide useful introductory material and background theory, there is a sense that they need to be updated. However, the core aim of the book is to build up the reader's theoretical knowledge of analytical techniques, and increased accessibility to systems interfacing with IT components should not distract from the basics. The authors are to be applauded for remaining true to this aim.

The book comprises thirteen chapters, each of which ends with references for further reading. There is also an area for revision, since many of the references are themselves classic texts which have been superseded by later editions. Many of the chapters also have a section of problems and exercises, and answers to these are included at the back of the book. Chapter one puts the field of chemical analysis in context, looking at its scope and function. While regular practice of techniques, be they bench analysis or instrumental, cannot be replaced by theory alone, the book does provide the means of a basic understanding of the principles. This chapter includes a useful glossary of terms.

The second chapter encourages the analyst to develop a critical attitude to the results obtained in analysis and guides them through the mathematical and statistical assessment of data. Although most of this theory should be covered in other modules or texts in an undergraduate course, this again is a useful contextualisation of the role of statistics in analysis.

Subsequent chapters deal with a range of techniques, with the amount of space devoted to each determined by its application in industry - the latter estimated by the authors from the results of a national survey of analytical laboratories. This edition has omitted some little used techniques altogether. The aim of the authors has been to emphasise unifying themes common to groups of techniques, and there are useful short summaries at the beginning of each section.

Principles and Practice of Analytical Chemistry



From the publisher...

Principles and Practice of Analytical Chemistry

By Fifield, F. W. Kealey, D.

This text provides a concise overview of the principles and practice of analytical chemistry. The fifth edition includes more coverage of data handling, together with new material covering rapidly developing subject areas of molecular spectrometry, atomic spectrometry and separation techniques.

0-632-05384-4 576pp 2000 £32.99

The chapters actually dealing with various methods of analysis are as follows:

- pH, Complexation and Solubility Equilibria: reactions in solution, solvents, acid-base equilibria, complexation equilibria and solubility equilibria.
- Separation Techniques: solvent extraction, solid phase extraction, chromatography, electrophoresis.
- Titrimetry and Gravimetry
- Electrochemical Techniques: potentiometry, polarography, electrogravimetry, conductometric titrations.
- Analytical Spectrometry: an introduction to this area which again reviews the basic principles which underpin the techniques covered in the following sections.
- Atomic Spectrometry
- Molecular Spectrometry
- Radiochemical Methods in Analysis
- Thermal Techniques

As the authors have repeated from the first edition, "Analytical chemistry is a branch of chemistry which is both broad in scope and requires a specialised and disciplined approach. Its applications extend to all parts of industrialised society". The book gives a foundation in a broad range of methods which are pertinent to environmental analyses, pharmaceutical testing, forensics investigation and materials manufacturing. It also addresses on-going developments. One example is the expansion of the section on Near Infrared Spectrometry to reflect its growing use in Process Analytical Technology. Another is the section on Solid Phase Extraction, which is increasingly used in sample preparation. In spite of the little niggle about the age of the references there is a sense that these authors are keen to give the most state-of-the-art account of the applications of chemical analytical techniques as possible.

Frederick Fifield and David Kealey have acknowledged that analytical chemistry in the 21st century will continue to develop greater degrees of sophistication, through automation, computerisation, sensors and miniaturisation but they have emphasised very effectively the need for analysts to know what is happening and understand from first principles.

This is a highly recommended text, and should be first choice for undergraduate reading lists. It could be used for establishing first principles in foundation modules, and then more sophisticated ideas in advanced modules. It is also a useful update book for practicing analysts.

Principles of Bloodstain Pattern Analysis

Subject area
Forensic science

Description
The text covers practical aspects of criminal and forensic investigation related to bloodstain pattern analysis

Authors
Stuart H James, Paul E Kish and T Paulette Sutton

Publishers/Suppliers
CRC Press, Taylor & Francis Group
(www.taylorandfrancis.co.uk)

Date/Edition
2005

ISBN
0-8493-2014-3

Level
Undergraduate, professional

Price
£79.99

Simon W Lewis,
Department of Applied Chemistry,
Curtin University of Technology,
GPO Box U1987 Perth,
Western Australia 6845
January 2007

This text aims to be a comprehensive text covering all aspects of modern bloodstain pattern analysis and is part of the CRC Press series in *Practical Aspects of Criminal and Forensic Investigations*.

Summary Review

range: * poor to ***** good	
Academic content	***
Usefulness to student	***
Usefulness to teacher	***
Meets objectives	****
Accuracy	****

The book is divided into 20 chapters with accompanying appendices. Chapter 1 is an introduction with an historical overview of blood stain pattern analysis and lays the ground work for the remaining chapters. Chapters 2 and 3 cover the medical background of bloodshed and the biological and physical aspects of human blood. Chapters 4 to 9 deal with the formation of different blood stain patterns and the mechanisms of said formation. Chapters 10 and 11 are concerned with the interpretation of bloodstains in terms of area of origin and directional analysis. Chapters 12 and 13 deal with the practical aspects of bloodstain pattern analysis at the crime scene. This includes documentation and the evaluation of patterns in different settings. Chapters 15 to 16 cover presumptive biological and chemical testing and enhancement including a whole chapter devoted to the luminol reaction. Finally, Chapters 17 through 20 cover the legal and ethical aspects of bloodstain pattern analysis, including case management, report writing and giving expert testimony. The appendices include mathematical tables, scene and laboratory checklists, biohazard safety precautions and lists of US court decisions concerning bloodstain pattern analysis and presumptive testing.

As can be seen the book covers a lot of ground, and at the current time is probably the only widely available text dealing at this length with the issue of bloodstain pattern analysis. It is clearly aimed at the forensic practitioner rather than the student, and so its suitability for use in an undergraduate course should be assessed on that basis. Where it could be very useful is an example of how one kind of evidence and its interpretation is presented and dealt with in a courtroom context (chapters 17 to 20) with the normal caveat that it is based very much on the authors' experiences in the US. The text is also lavishly illustrated, with many colour photographs, which considering the subject matter may well be disturbing to some readers.

It should be noted, that much of the material is replicated from earlier books. This is alluded to in the preface for chapters 18 through to 20, which are updated chapters from *Scientific and Legal Applications of Bloodstain Pattern Interpretation*, however earlier chapters are clearly re-writes of chapters from *Interpretation of Bloodstain Evidence at Crime Scenes* by S H James and W G Eckert, 2nd edition, 1999, CRC Press. In some cases the revision is extremely superficial, for example the chapter on luminol is almost word for word identical to the chapter on luminol in the earlier text. In truth this **Principles of Bloodstain Pattern Analysis** is more like a 3rd edition of the earlier *Interpretation of Bloodstain Evidence at Crime Scenes* rather than a completely new text.

A final caution, the cover of the book has some very graphic photographs; it has to be questioned as to whether this is really appropriate as this is meant to be a professional text.

Relativity: special, general and cosmological

Subject area
General science

Description
A comprehensive survey of the foundations of relativistic mechanics, optics and electrodynamics with applications in gravitation theory and dynamical cosmology

Authors
Wolfgang Rindler

Publishers/Suppliers
Oxford University Press
(www.oup.co.uk)

Date/Edition
2006/2nd Edition

ISBN
978-0-19-856732-5

Level
Undergraduate, research

Price
£57.50 (hardback)
£29.95 (paperback)

James Collett,
School of Physics, Astronomy & Mathematics,
University of Hertfordshire,
College Lane,
Hatfield AL10 9AB
May 2007

Summary Review

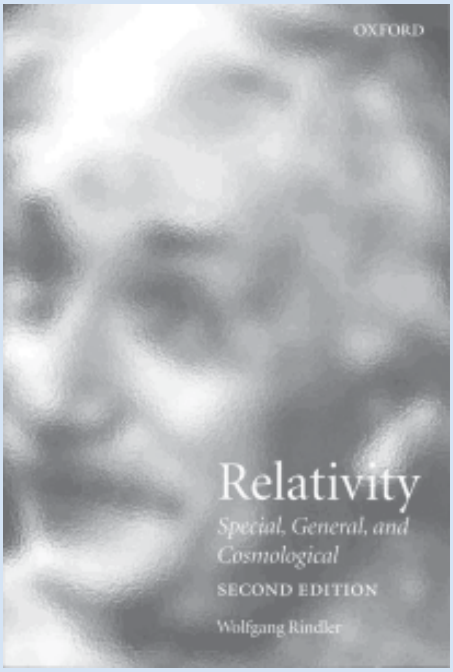
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

I have never heard anyone talk about relativity with a greater care for its meaning than the late Hermann Bondi. The same benign clarity that accompanied his talks permeated *Relativity and Common Sense*, his novel introductory approach to special relativity. Back in the sixties, Alfred, Brian, Charles and David - I wonder what they would be called today - flashed stroboscopic light signals at each other and noted the frequencies at which they were received as they moved relative to each other. Bondi made of the simple composition of frequencies a beautiful natural law that you felt grateful to find in our universe's particular canon. He thus simultaneously downplayed the common introduction of relativity as a rather unfortunate theory that makes the common sense addition of velocities unusable (albeit under some extreme rarely-experienced conditions), and renders intuition dangerous, and to be attempted only with a full suit of algebraic armour. A few years ago, I tried to teach a course following Bondi's approach, incorporating some more advanced topics such as uniform acceleration. I enjoyed the challenge (probably more than the class did), but students without fluency in hyperbolic functions were able to tackle interesting questions about interstellar travel, which seemed an advantage.

Wolfgang Rindler is no apologist for relativity either and his book is suffused with the concerns of a practicing physicist. Alongside Bondi's book, this was the key recommendation on my suggested reading list and, from the contents of the new edition, would remain so on a future course. When I was an undergraduate, I think we learnt the transformations (of coordinates and velocity) mechanically, tried to understand their content by following the beautiful problems and elegant spacetime diagrams in Taylor and Wheeler's *Spacetime Physics*, and then chickened out under exam conditions and became computing machines again. At that time, Rindler's book (then called *Essential Relativity*) had a narrower focus than it does now, but was no less authoritative. **Relativity** has the subtitle **Special, General and Cosmological**, so that it potentially covers everything from an introductory Level 1 ideas of physics course to a Masters level module in, for instance, general relativity, gravitational waves or theoretical cosmology: the style is so pleasant that this is genuinely feasible. Amongst the features of this book that I like so much are the details. You'll see the runner attempting to squeeze an overlong pole into a barn by exploiting length contraction or careering over a suddenly hazardous drain in many texts but you might not have been aware that the resolution of the paradoxes of these problems arose out of a class discussion stimulated by one of Rindler's students. There is even a rather nice short memoir written by the student concerned – James Gilson – at arxiv.org/PS_cache/physics/pdf/0703/0703134v1.pdf.

Continued on page 44

Relativity: special, general and cosmological



From the publisher...

Relativity
Special, General, and Cosmological
Second Edition
By Wolfgang Rindler

A thinking person's introduction to relativity.
Up-to-date, second edition of well established text-book.
Offers high density of physical insight, even for those who know the subject.
Great care with concepts, logic, motivation.
Addresses all of the apparent paradoxes.
Includes full and pleasant introduction from scratch to all the necessary mathematics.
An easy style. A fun read. Over 300 exercises.

978-0-19-856732-5 448pp 2006 £29.95

Continued from page 43

Reading this memoir will also comfort the reader that Rindler's transparent mastery of his material comes at the end of much deep thought about its meaning. One other example which I particularly liked was problem 7.29 on the energy of a parallel plate capacitor – easy to state but with an interesting resolution. You really learn something in doing these problems and if you have time to attempt them, you'll enjoy relativity as something that actually informs your physical understanding: as a student, until the (non-relativistic) question was posed in relativity, I hadn't even thought how the free back end of the pole discovers how to stop when the front end hits the wall of the barn. This second edition of **Relativity** has updated sections, principally in the final chapters on cosmological models that mean, for instance, that those who want to follow the dynamical consequences of dark energy are well served. Unlike one of its equally illustrious rivals - Misner, Thorne and Wheeler's *Gravitation* – Rindler's **Relativity** will not endanger your excess baggage limit on a long flight and should prove a constantly enlightening travelling companion.

The elements: a very short introduction

Subject area
General chemistry

Description
This Very Short Introduction traces the history and cultural impact of the elements on humankind, and examines why people have long sought to identify the substances around them

Authors
Philip Ball

Publishers/Suppliers
Oxford University Press (www.oup.co.uk)

Date/Edition
2004

ISBN
0-19-284099-1

Level
A-level, access, foundation

Price
£6.99

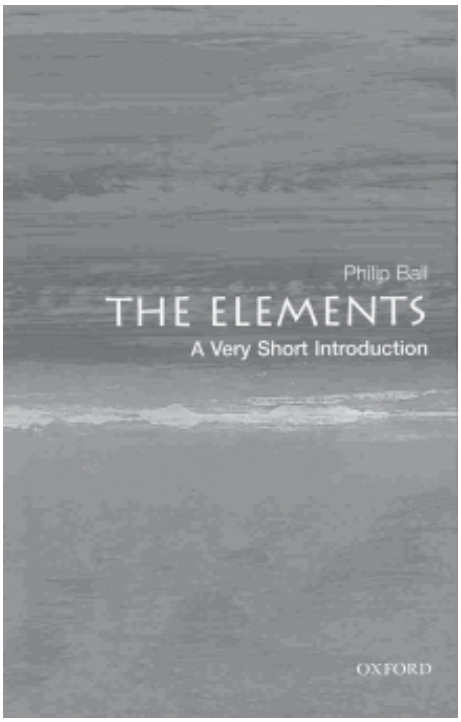
This is an excellent introduction to the historical developments surrounding the quest of "what is the world made from?".

Full of anecdotes, the book is very informative, well written and a pleasure to read as it spans from the early discoveries of individual chemical substances, to the harnessing of the energy stored in nuclei, to modern applications of some elements and their isotopes.

Summary Review

range: * poor to ***** good

Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	****
Accuracy	*****



The level would equally suit experts and novices with a style which can easily captivate the interest of many.

Marialuisa Aliotta,
School of Physics,
University of Edinburgh,
JCMB - King's Buildings,
Mayfield Road,
Edinburgh EH9 3JZ
June 2007

The Flying Circus of Physics

Subject area
General physics

Description
This book features more than 700 thoroughly intriguing questions about relevant, fun, and completely real physical phenomena

Authors
Jearl Walker

Publishers/Suppliers
John Wiley & Sons Ltd
(eu.wiley.com/WileyCDA)

Date/Edition
2nd edition

ISBN
0-471-76273-3

Level
Undergraduate

Price
£14.95

Simon Bates,
School of Physics,
University of Edinburgh,
Edinburgh EH9 3JZ
May 2007

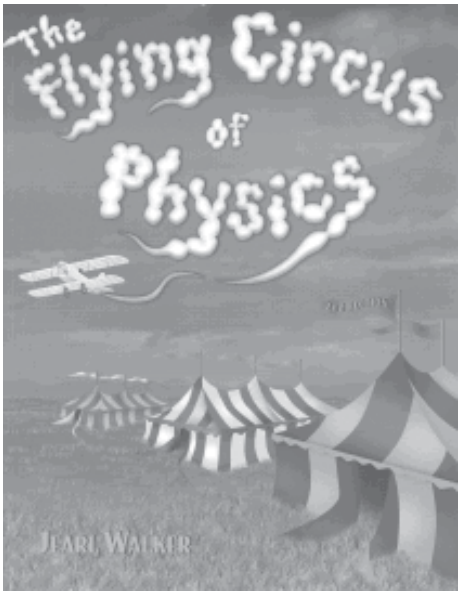
The first version of this book was published over thirty years ago. In his preface, Jearl Walker describes its origin in a challenge laid down to him by a student, wanting concrete examples of where Physics impacted on everyday life. His difficulty in providing such examples led to the creation of resources that grew and developed into the first edition of this book.

Summary Review

range: * poor to ***** good

Academic content	*****
Usefulness to student	****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

The second edition, produced many years later confirms Walker's response to the student that Physics has everything to do with everyday life. The sheer breadth of physical phenomena that the book covers is staggering; hundreds of examples spanning the topics of motion, fluids, optics, thermal processes and electricity and magnetism. Within these chapters are questions and answers on topics as diverse as rattlebacks to sundogs, poorly-designed teapots to cooling coffee, and even a plausible physics explanation of why JFK is unlikely to have been shot by more than one person, as conspiracy theorists have asserted.



The companion website that accompanies the book (www.flyingcircusofphysics.com) is more than just the book replicated on the web (which would probably have undermined the book, if this had been the case). Instead, it offers a wealth of reference material and citations (over 10,000 in total, graded according to the level of complexity and difficulty) to dig deeper into the topics, having whetted your appetite on the explanations in the book itself.

It is hard to assess this book's usefulness to students. For staff, it is an essential reference to dip into and browse. It contains a broad range of material, from the obscure to the everyday examples, which I am willing to wager have been used by most, if not all, Physics lecturers at some point in their career: falling cats, the Tacoma Narrows bridge collapse and many others. There's a wealth of material here for use in activities that foster the kinds of skills we want our students to acquire during a Physics degree. A treasure trove of painstakingly detailed and accurate material that should be in every departmental library and staff common room.

The New Cosmic Onion

Subject area
General physics

Description
A revised and updated edition of the 1983 classic, *The Cosmic Onion*. This edition introduces the reader to particle physics including the top and bottom quarks and quantum chromodynamics in a way which is accessible in terms of both the text and mathematics used

Authors
Frank Close

Publishers/Suppliers
CRC Press, Taylor & Francis Group (www.crcpress.com/default.asp)

Date/Edition
2006

ISBN
1-58488-798-2

Level
A-level, access, foundation

Price
£22.99

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

After the best part of twenty five years the revised edition of *The Cosmic Onion* has arrived. Having been one of the early readers of the original text I had very high hopes for **The New Cosmic Onion**. This hope was based on the two facts; a. the original had such a good pedigree and b. the revision was made by Frank Close. Having read **The New Cosmic Onion** my hopes were fully met and one can assume that this edition will sell as well as the first.

The book itself is in 14 chapters starting with the nature of the universe and ending, via atoms, the nucleus, the forces of nature, nuclear particles and the eightfold way, quarks, quantum chromodynamics, the electroweak force, from top to charm, the LEP era, CP violations and B-factories, neutrinos, beyond the standard model, with cosmology, particle physics and the big bang.

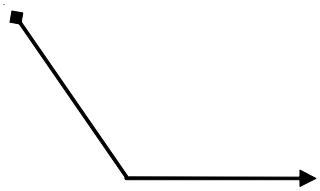
As with everything else by Frank Close you get a text which is lucid, engaging and accurate. The use of 'tables' to expand on or further elucidate topics, without disrupting the flow of the main text, serves to enhance the readability of the text whilst the extensive use of diagrams serves to aid understanding. Mathematics is used sparingly with, for example, SU(2) and SU(3) getting a mention rather than being dwelt on and quantum mechanics being skilfully sidestepped. However for a lay-reader a knowledge of matrices and trigonometry would help but if the reader is willing to invest some thinking time they should be able to cope with most of the text.

In thinking about where the text could be used the logical development of the material makes it very easy. Chapters one to six will more than adequately cover the requirements of GCE A-level and university foundation year physics. In these chapters the quark model with up, down and strange and the octet and decuplet are clearly developed. The remaining chapters could serve as extension material for students and teachers alike.

Alternatively the whole text makes an excellent introduction for undergraduates, revising material they have studied and gently introducing new topics, for example charm and top and CP violations.

The final chapter neatly draws the text to a close by tying the previous chapters into the big bang and by, via string theory, perhaps leaving open the door for the *newest cosmic onion.*

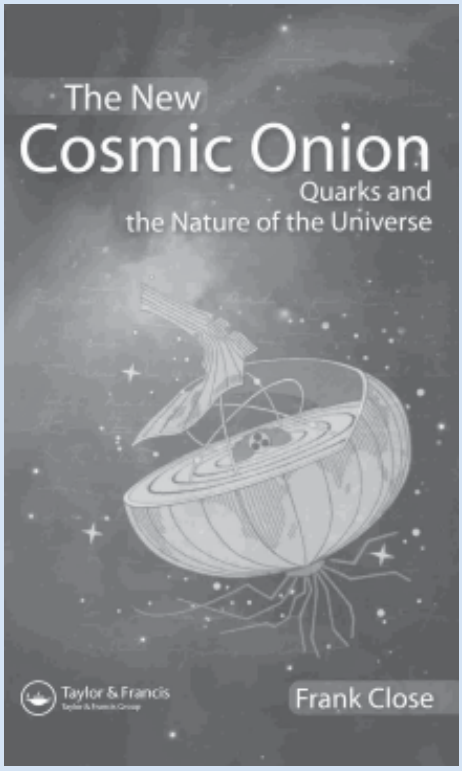
Very few minor points appear to have escaped the proof readers but, for me, the arrow head on figure 6.3(b):



Gren Ireson,
Matthew Arnold Building,
Loughborough University,
Loughborough LE11 3TU
May 2007

Continued on page 48

The New Cosmic Onion



From the publisher...

The New Cosmic Onion: Quarks and the Nature of the Universe

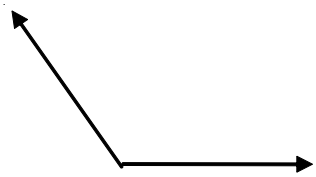
By Frank Close University of Oxford, UK

Examines what are likely to be enduring developments rather than the latest popular notions.
Presents a modernized description of particle physics.
Explains the newest information on quantum chromodynamics, the LEP era, as well as matter and antimatter.
Discusses the latest findings that prove neutrinos are not simply massless particles traveling at light speed.
Offers the next generation of scientists a new starting point.

1-58488-798-2 219pp 2006 £22.99

Continued from page 47

rather than



and the use of Lisa rather than Lise Meitner should have been picked up, although the latter does seem to be used on a number of websites.

Overall what one gets with this text is an excellent and accessible introduction to particle physics and quantumchromodynamics (QCD) which will serve both the pre-university and undergraduate markets. However, if you are looking for an introductory text for undergraduates and have a copies of both *The Cosmic Onion* (1983) and Close's *Particle Physics – A Very Short Introduction* (2004) then I'm not convinced that you need this text since, in my view, it does not add very much to the sum of these two texts.

The RoutledgeFalmer Reader in Science Education

Subject area
General

Description
This book offers material on a wide-ranging selection of topics that reflects the comparative maturity of science education

Authors
John Gilbert (editor)

Publishers/Suppliers
Routledge Falmer
(www.routledge.com)

Date/Edition
2003

ISBN
0-415-32778-4

Level
Teachers

Price
£25.99

Summary Review	
range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Meets objectives	*****
Accuracy	*****

This book is part of a series of *Readers* in various areas of Education. The volume is edited by John Gilbert (Professor Emeritus at Reading), the long-standing Editor-in-Chief of the prestigious *International Journal of Science Education*. Gilbert is in an excellent position to edit such a volume, knowing virtually everyone active in science education and having personally overseen the publication of much key work. However, Gilbert did not choose to opt for a purely personal view of the field, but rather involved colleagues from over a dozen countries in helping prioritise the agenda for the book.

The outcome of this process is a *Reader* that offers material on a wide-ranging selection of topics that reflects the comparative maturity of science education as a field in its own right (certainly in relative terms, education itself being something of a newcomer as a formal discipline within the Academy). The book is arranged in 5 sections offering 14 substantive readings, supported by editorial material. The themes of the main sections are certainly open to question, but that is perhaps inevitable in any product that could be considered to originate from a committee. However, what is beyond doubt is the book offers readings on key issues of wide interest, and that it includes some exemplary contributions.

In regard to the issues covered, the book includes chapters that consider globalisation; economic development; scientific literacy; conceptual change; classroom language; teaching about scientific argumentation; interactive multimedia; communicating science to the public; science and religion; assessment; ways forward for science and environmental education; planning for change; and teacher development. What might seem surprising is the limited emphasis given to the vast research into students' ideas (represented in the chapter on conceptual change) and on models and modelling (which is discussed in the chapter on multimedia) as these are both areas where Gilbert himself has made extremely significant contributions. Of course much material is readily available in both these areas, and the limited coverage in specific areas reinforces the breadth of science education as a general area of scholarship.

There are some very familiar contributors to the volume: such as Paul Black on assessment (in the section on 'Trends in science education at National Level', although clearly a contribution of relevance well beyond national boundaries) - someone who would be recognised an international authority on his topic well beyond science education. Phil Scott's 1998 paper from *Studies in Science Education* looking at classroom talk from a Vygotskyian perspective deserves being more widely available (as *Studies* does not currently offer electronic access to articles, unlike many journals). The paper on argumentation in school science by the late Ros Driver with Paul Newton and Jonathan Osborne indicates an important area of work that is only now starting to significantly influence mainstream science teaching (and perhaps not yet internationally). It is always interesting to read Glen Aikenhead on cultural aspects of science and science learning, an area where he has made major contributions. Reinders Duit and David Treagust are among the most respected scholars in science education, and their paper on conceptual change offers a suitably authoritative review of work on conceptual change in science education - a topic clearly central to anyone involved in teaching students at whatever level. These are just

Continued on page 50

Keith S Taber,
Faculty of Education,
University of Cambridge,
184 Hills Rd,
Cambridge CB2 2PQ
June 2007

The RoutledgeFalmer Reader in Science Education

From the publisher...

RoutledgeFalmer Reader in Science Education

By John Gilbert (Editor)

This Reader brings together a wide range of material to present an international perspective on topical issues in science education today. In order to identify what themes should be addressed in the book, thirty-eight science educators from around the world responded to the question: 'What issues are currently important in science education in your country?' The outcome is this lively and authoritative Reader, which features topics as varied as: globalisation: assessment: pupil's views on science education: environmental education; teaching approaches; teacher development multimedia and ICT ; constructivism.
With a specially written introduction from the editor, providing a much-needed context to the current education climate, students of science education will find this Reader an important route map to further reading and understanding.

0-415-32778-4 296pp 2003 £25.99

Continued from page 49

some of the diverse and thought-provoking foci of the book. That diversity is reflected in the range of authors who contribute. The chapter on scientific literacy is from an OECD (Organisation for Economic Co-operation and Development) publication, whilst one of the chapters is co-written by a student. The latter contribution is the one on science and religion, where Wolff-Michael Roth, another highly respected scholar, shares authorship of his paper with Todd Alexander, one of his students. The chapter considers how student viewpoints (their ontological and epistemological commitments, rather than just their religious commitments) influenced how they relate scientific learning to their religious beliefs. This is a fascinating paper, and Roth reports his procedures, including the good practice in such qualitative work of asking his informants to check his interpretations of their comments and views. He goes further, however, and Todd (as one of the cases studied, and one with a rather sophisticated world view), was enrolled as a co-learner in the research process rather than just a 'subject' of the research: something that seems both appropriate and admirable. The paper offers a useful framework for considering why different students respond differently to scientific knowledge despite superficially having the 'same' religious views. My own bias led me to delve into chapters such as this, those concerned with the processes of classroom teaching and learning: but other readers, say those concerned more with issues of education policy, will find other contributions more significant.

Overall then, this *Reader* achieves a great deal in presenting a set of key readings that give a good flavour of the range of scholarship in science education. Presumably the main markets for such a book will be in enabling libraries to make a set of key references readily available, and for those who need an overview of the field - such as those training to be science teachers and expected to read and write about such a diverse range of issues. Within higher education, this is a book that anyone in the field of science education itself should have. I suspect that the book will seem less central to those teaching science disciplines at University level, who would consider themselves primarily as chemists or physicists (etc) rather than science educators. That is a shame. There is a great deal of interesting material here: much of which is relevant to those working in science education regardless of the level of their students.

Understanding Physics

Subject area
Physics

Description
This text is intended for use in calculus-based introductory physics courses. The book is based on the immensely successful text *Fundamentals of Physics* by David Halliday, Robert Resnick and Jearl Walker (6th edition) and covers the material in parts one to four of this textbook. This includes a broad overview of classical physics including mechanics, waves and oscillations, acoustics, optics, thermodynamics and electromagnetism as well as a chapter on special relativity

Authors
Karen Cummings, Priscilla Laws, Edward Redish and Patrick Cooney

Publishers/Suppliers
John Wiley & Sons Ltd
(eu.wiley.com/WileyCDA)

Date/Edition
2004/1st edition

ISBN
978-0-471-37099-4

Level
Undergraduate

Price
£96.95

Antje Kohnle,
School of Physics and Astronomy,
University of St Andrews,
The North Haugh,
St Andrews KY16 9SS
May 2007

"Students will master more physics if they learn how to read an 'understandable' textbook carefully." This motivated the authors to build on the excellent *Fundamentals of Physics by* Halliday, Resnick and Walker (HRW) text and to rewrite it in a way to make it easier to understand. The authors have succeeded in creating an excellent text.

Summary Review

range: * poor to ***** good	
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	****
Meets objectives	*****
Accuracy	****

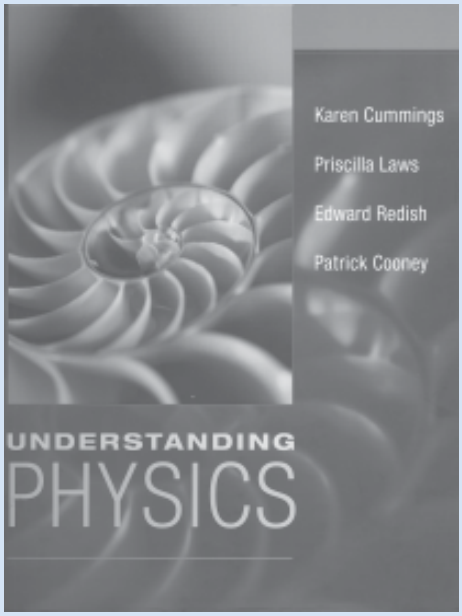
Chapters start with an introduction which discusses the importance of the concepts to be covered in that chapter and links these concepts to previous chapters. The introduction of new concepts builds on ideas from everyday experience and stresses conceptual and qualitative understanding. The text employs the principle of 'idea first, name after', using everyday language first to help build patterns of association between new concepts and existing knowledge. Concepts are often introduced by experiment-based theory building, starting from everyday observations. Graphs show realistic rather than idealised data (data from computer-based laboratory tools) to help the students understand the role of data evaluation and analysis. The text continually makes connections between mathematical equations and conceptual ideas. There is extensive forward and backward referencing to reinforce connections between topics. In comparison with HRW, there is more text to read, but the quality of the text amply justifies the added text volume.

The chapter ordering mostly follows HRW, with the important exception of chapters 3 to 10. These chapters follow a sequence known as 'New Mechanics' which addresses difficulties students have understanding projectile motions without dynamics and working with vectors. Instead of the traditional ordering of kinematics followed by dynamics, the text starts with one-dimensional kinematics and dynamics followed by the introduction of vectors and two-dimensional kinematics and dynamics. The concept of momentum is discussed prior to the concepts of work and energy. Maths is introduced in a 'just-in-time' fashion. Examples of this are the introduction of vectors in chapter 4, just prior to the discussion of two-dimensional kinematics and dynamics, the introduction of dot products in chapter 9 just prior to the discussion of the concept of physical work, and the introduction of cross products in chapter 11 in association with the treatment of torque. Care is taken with notation, balancing the desire for familiar notation and the desire to avoid confusion by using the same symbol side-by-side for different variables. For example, P is used for pressure, as both momentum (p) and pressure appear in the kinetic theory derivation. Appendices include the SI system of units, physics constants, conversion factors, mathematical formulas, properties of common elements and the periodic table of elements.

The current version does not include HRW's extended section 5 which gives a brief introduction to quantum physics, atomic, nuclear and particle physics. This would be a useful addition that will hopefully be included in the next version.

Continued on page 52

Understanding Physics



From the publisher...

Understanding Physics, 1st Edition

By Karen Cummings, Priscilla W. Laws, Edward F. Redish, Patrick J. Cooney

Built on the foundations of Halliday, Resnick, and Walker's Fundamentals of Physics Sixth Edition, this text is designed to work with interactive learning strategies that are increasingly being used in physics instruction (for example, microcomputer-based labs, interactive lectures, etc.). In doing so, it incorporates new approaches based upon Physics Education Research (PER), aligns with courses that use computer-based laboratory tools, and promotes Activity Based Physics in lectures, labs, and recitations.

978-0-471-37099-4 1224pp 2004 £96.95

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In order to promote interactive and thoughtful reading, the text includes a variety of active learning opportunities. Each chapter section ends with so-called Reading Exercises ('Checkpoints' in HRW), which are mainly conceptual questions that relate directly to the material of that section. The text includes worked examples (so-called 'Touchstone Examples') that illustrate key problem solving skills. The 'Touchstone Examples' use a subset of the HRW worked examples along with new ones. There are fewer worked examples than in HRW: this helps the flow of text, but may make it more difficult for students to master the end-of-chapter problems. These end-of-chapter problems include about half of the HRW problems. Unfortunately, the excellent, more qualitative HRW end-of-chapter 'Questions' have been omitted. The authors have included more open-ended, qualitative or context rich alternative problems, so-called 'Additional Problems' based on their knowledge of student difficulties. These alternative problems can require careful qualitative reasoning, estimation or video analysis. All end-of-chapter problems have titles in bold type, helpful for locating problems quickly. An appendix provides detailed answers to the 'Reading Exercises' and final solutions for the odd-numbered HRW end-of-chapter problems.

Even the best textbook will only be of use if students actually read it. The authors suggest a number of ways instructors can encourage effective reading habits such as assigning reading, reading exercises, chapter summaries, computer-based quizzes of reading material and other reading questions. Chapter summaries have been omitted as the authors feel that this is a particularly effective assignment. The authors stress the importance of giving credit for these assignments to increase the efficiency of these measures. The book also comes with a wide range of supplementary material, including an instructor's manual, laboratory, workshop and tutorial material, videos, interactive simulations and a computerised test bank.

In summary, **Understanding Physics** can be highly recommended for all students struggling with physics concepts that find the HRW text difficult. It requires fewer prerequisites than the HRW text. Hopefully the UK price (currently more than twice the UK price of HRW) will come down in the future.

Cabri 3D

Subject area
General science, mathematics

Description
Interactive space geometry software for teaching

Authors
Sophie and Pierre René de Cotret (Montréal, Québec, Canada).
English Translation: Simon Horn

Suppliers/Distributors
Chartwell-Yorke, 114 High Street, Belmont Village, Bolton, Lancashire, BL7 8AL (www.chartwellyorke.com)

Date/Version
2006/2nd edition

Level
Secondary, A-level

Type of package
Computer aided learning

Price
Single user: £59 + vat
10-user: £195 + vat
Site licence: £395 + vat
Extended site licence: £625 + vat, then £200 pa for the second and subsequent years.
Discounts available to registered Cabri Geometry II Plus users

Hardware required
PC: Windows 98 IE5, Me, NT4, 2000, XP. Minimum configuration: 800 MHz or greater CPU, 256 MB or more RAM, OpenGL compatible graphic card with 64 MB or more RAM.
Macintosh: Mac OS X, version 10.3 or higher

Software required
Macromedia Flash Player is required to run the tutorials. Adobe pdf Player is needed to obtain printed versions of the tutorials and to view the Manual on screen

Colin D Kennedy,
5 Putsham Mead,
Kilve Bridgwater,
Somerset TA5 1DZ
April 2007

Summary Review

range: * poor to ***** good

Ease of use	****
Ease of learning	*****
Documentation quality	*****
Academic content	*****
Usefulness to student	*****
Usefulness to teacher	*****
Portability	****
Meets objectives	*****
Accuracy	****

The package consists of a CDROM and a short but well produced and clearly written manual, both contained in a hard plastic wallet. The review copy also contained an additional CDROM, not present in the usual commercial product, with examples from the fields of chemistry, physics and 3D geometry.

Installation was easy. On first launch the product key, printed inside the wallet, had to be entered to fully activate the program. For downloaded versions an appropriate licence must be purchased from the Cabri website.

The initial screen shows a grey 'Visible Plane' (VP). Objects constructed on this plane or its extension, the 'Non-Visible Plane' (NVP), or in spaces above or below it, may be viewed from any angle by rotating the image using the right hand mouse button. In the centre of the VP are placed three Cartesian unit vectors, with the z vector perpendicular to the grey VP. The Menu Bar has six drop-down menus, 'File', 'Edit', 'Display', 'Document, Window' and 'Help'. Below the Menu Bar is a ten section Tool Bar, each with its own drop-down menu. A very useful, but optional, feature is a clearly thought out 'Tool Help' panel which appears whenever the mouse pointer passes over the items in a Tool Bar drop-down menu. For new users this considerably accelerates the learning curve.

Like Version 1 of this package, **Cabri 3D** version 2, gives the student an intuitive understanding of 3D geometry which is difficult on paper or blackboard. Polygons, spheres, cones, cylinders, prisms, regular and non-regular polyhedra are easily created. There are tools for constructing parallel planes and lines, perpendicular bisectors, midpoints, and vector sums. Polyhedra may be cut along any plane or joined to other polyhedra on any face to give more complex solids; they may also be unfolded. Symmetry operations on complex solid objects are available and easily applied. However, in Version 2 there are some significant additional facilities, for example, the ability to animate constructions and to use a Trace facility to follow the paths described by points, segments, vectors, lines and circles as the animation proceeds is now possible. In addition Version 2 can show the Cartesian coordinates of points, angles and the algebraic equations of line, planes and spheres, all of which are automatically updated on the screen as the construction is manipulated. An on-screen calculator is now included which interacts usefully with lengths and angles selected in the construction. The range of functions on the calculator rather exceeds their likely use in the program, which suggests that the authors have plans for future development of this software. In the Windows drop-down menu there is an item 'Coordinates' which, when selected, shows a panel on the screen with spaces to enter x, y and z coordinates and a button labelled 'Apply'. I could not find this mentioned in the Manual, nor could I get it to function in any way. Possibly this too relates to future development of this software.

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Cabri 3D

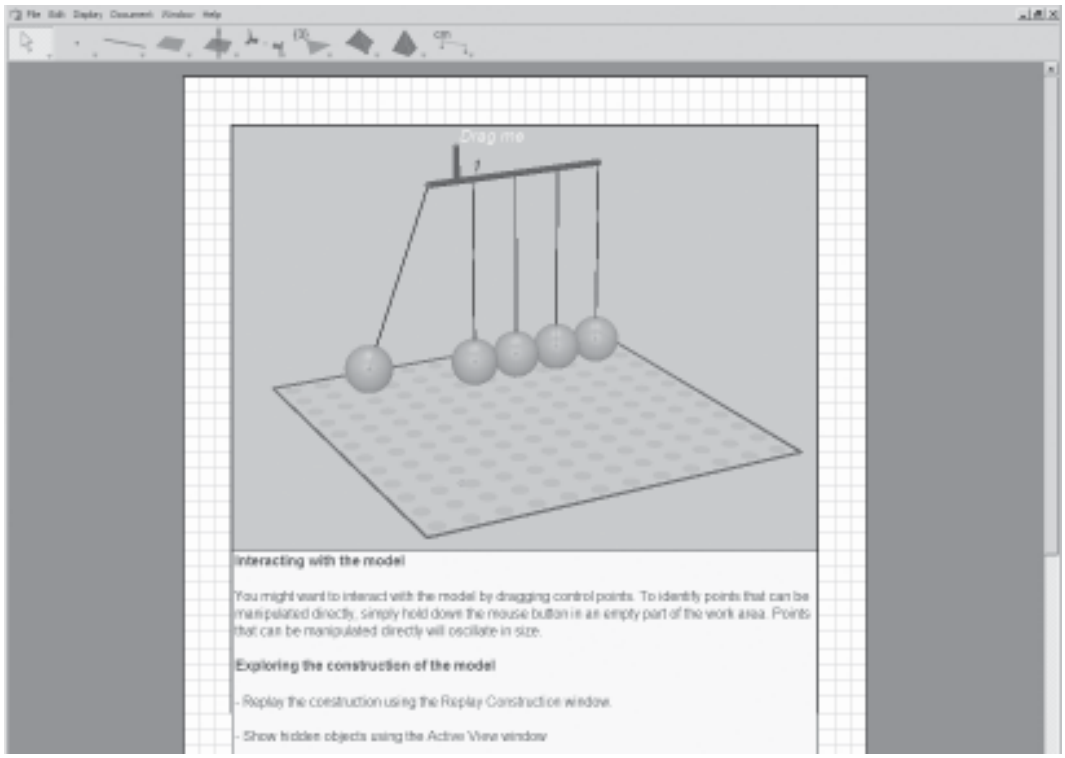

fig 1: Example from the physics simulations with Cabri 3D

Continued from page 53

It is not possible here to describe all the facilities in this software, but most of those that one might expect or hope for are present. There is no noticeable delay between the operation of the mouse and on-screen implementation, although too fast a click speed sometimes failed to illicit the desired response. Parts of constructions may be hidden if needed, the characteristics of surfaces, may changed by patterning, for instance, to show the internal structure of solids. Points, lines and surfaces may be coloured. Figures can be labelled and text areas created on the page.

The work area can be moved or resized using the mouse and new work areas can be created with a copious choice of different viewpoints, including six different views suitable for technical drawing etc. With two views on screen, any changes made to one view are also seen in the other. If desired, extra pages can be created each with a different perspective.

Images may be exported in bitmap form and as a dynamic image on a web page using a line of HTML code. On a PC, the plug-in which allows this is installed automatically with Cabri 3D. However, on a Macintosh the Cabri3D Internet Plug-In must be installed manually from the disc. On a PC, a dynamic image of a construction may be inserted into MS Word or MS PowerPoint. Once there, it may be rotated and resized as if in the source program.

For whom is this software intended? This innovative product is highly appropriate for use in the upper stages of the GCSE mathematics curriculum. It has already won a 2007 BETT Award for this purpose. Also available through Chartwell-Yorke is *Cabri Geometry II plus* which provides a 2D companion to the software reviewed here. Teachers who already use Version 1 of this software would benefit by upgrading to Version 2 as there are a significant number of useful additions. It may have some uses in A-level mathematics although here the approach tends to be more algebraic than geometric. In other fields, such as physics and chemistry, **Cabri 3D** has some illustrative uses, as are shown on the CDROM which accompanied the product. If the software is already available with a site licence, teachers in these other disciplines may find it useful. At college or university level, students are more likely to be using multipurpose maths software such as *Mathematica*, *Maple*, *Mathcad*, etc.

In conclusion, I find this software fun to use, innovative, and admirably suited to its principal objectives. It is not expensive and teachers and students should benefit from the investment. If already available on site as an aid to mathematics teaching, it could well find applications in other fields.

LEPLA: learning environment for physics laboratory activities

Subject area
General physics

Description
A collection of ready to use experiments for physics

Authors
LEPLA

Suppliers/Distributors
This resource was created as part of a transnational project supported by the EU Socrates Minerva Programme within the eEurope initiative. Expanded in cooperation with T^3 (Teachers Teaching with Technology) Europe Science Interest Group (www.lepla.org/en/index.php)

Date/Version
2006

Level
A-level, access, foundation

Type of package
Simulation

Price
Free to registered users (registration is free)

Hardware required
The basic equipment required includes voltage probe, temperature probe, accelerometer, light probe, pressure probe, force meter. Some experiments require additional equipment - see website

Software required
None apart from that provided through LEPLA

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June 2007

Summary Review

range: * poor to ***** good

Ease of use	****
Ease of learning	****
Documentation quality	***
Academic content	****
Usefulness to student	*****
Usefulness to teacher	***
Portability	*****
Meets objectives	*****
Accuracy	****

When the **LEPLA** software arrived on my desk, I have to admit, I was quite excited. I am at heart an experimentalist, and believe that well constructed and engaging experiments have an extremely valuable role in undergraduate physics education. **LEPLA** is the Learning Environment for Physics Laboratory Activities, and is a project that has developed from a European-wide effort to design an innovative, student oriented environment that facilitates and encourages the learning of modern experimental physics skills. It is supplied as a CDROM together with an attractive A4 booklet, though the CDROM simply reproduces the contents of a well maintained and updated web page.

At the heart of the project is the use of a handheld data acquisition device, resembling a scientific calculator, into which a multitude of sensors may be connected. Sensors include, for example, thermometers, pressure sensors, microphones and Geiger-Mueller tubes. The **LEPLA** resources provide a series of fairly-well thought out experiments which, using the sensors, aim to address various physical phenomena, giving an insight both to the underlying physics as well as to issues of experimental physics, such as how to deal with experimental uncertainty and techniques for improving the quality of one's results. Each of the experiments has well stated aims, clear instructions, and a set of questions and discussion topics to encourage thinking and reflection.

In the present age of mobile phones with high resolution colourful graphics, the hand held devices look rather dated and clunky, but the functionality is sufficient and, once you get used to the menu system, setting up the appropriate acquisition settings is fairly easy. Indeed, I suspect one of the true benefits of this kind of approach is that it makes the user think about the parameters to be measured. While improved hand held devices are now becoming available, the version I had access to had such low resolution that when in the graphical presentation mode only the most gross features were discernable. It is possible to export the collected data to a PC, but that would seem to negate the main features of the technology, portability and independence.

The **LEPLA** resources, especially the web pages, provide a good range of experiments, which in general are academically suitable for high-school/A-level up to 1st year undergraduate teaching. A little bit of inventive thinking and it is easy enough to come up with one's own experiments since the sensors have a reasonable dynamic range. However, one down side with this technology is that it is too easy to approach experiment design from a perspective of 'what can I do with this device' rather than 'I wish to explore this phenomenon - how can this technology help'. Furthermore, the clear intention in using this package is that it becomes the centrepiece for an experimental laboratory, and if one has a limited budget and cannot implement a full range of sensors, the implication is that whole topics of physics become excluded.

Continued on page 56

LEPLA: learning environment for physics laboratory activities

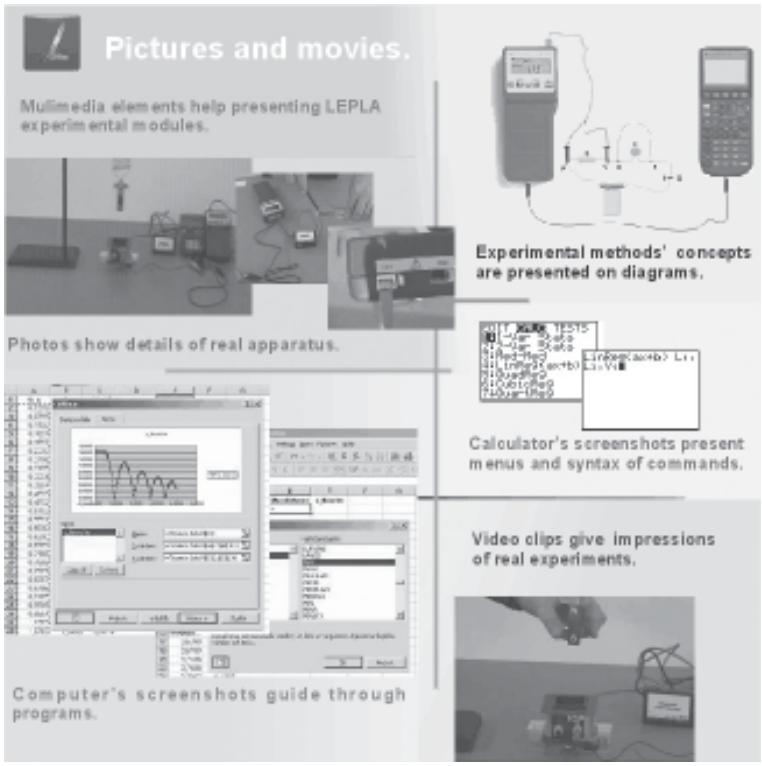

fig 1: Example experiments from LEPLA (from LEPLA website)

Continued from page 55

Overall, I am left with a positive view of the **LEPLA** package. However, its limitations should be recognised and additional resources will be needed. For example, the available **LEPLA** resources are essentially composed of the 'Experiment Descriptions' and the necessary downloads of software - there are no follow up quizzes, extended links to further information on the topics raised, or complementary textbook resources.

As such, even though this provides a set of well constructed experimental activities, with the significant added benefit of immersing students into an environment in which independent learning, technology and data acquisition techniques become second nature, this should not be considered an off-the-shelf substitute for spending time and effort in developing a high quality teaching laboratory.

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- This is our new web site and we will be adding further content over the summer.
- Our old web site at www.physsci.heacademy.ac.uk will still be 'live' during this changeover period
- re-direction from our old web site will continue but from September please change bookmarks to the new address