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Physical Sciences Educational Reviews

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Reviewed in this issue:

2 software packages
1 web site
22 books

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Physical Sciences Educational Reviews

Physical Sciences Educational Reviews is the journal of the Higher Education Academy Physical Sciences Centre. It is issued twice yearly in Spring and Autumn.

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Items for review and offers to contribute to the review process are welcomed. Please contact the Centre.

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Editorial

Welcome!

This is our first issue with the new livery of the **Higher Education Academy**. The name of the journal is the same and we continue to provide independent evaluations of resources for learning and teaching in the physical sciences. We have reviews of 25 resources in this issue, including one comparative report. There is also a fairly good spread across the disciplines of astronomy, chemistry and physics with additional reviews covering mathematics, forensic science and generic resources.

Don't forget to have a look at the information on p35 about **The Science Learning and Teaching Conference** which the Centre is involved in running next year.

Roger Gladwin
Editor

In this issue...

Chemogenesis

Subject area
Chemistry.

Description
Chemogenesis is a free web book dealing with chemical reactions and chemical reactivity. It examines the science between the periodic table and inorganic and organic chemistry.

Authors
Mark R Leach.

Last updated
10 May 04.

Level
A wide range of users.

Plugins required
None.

Other features used
Java, Javascript.

Reviewed using
Viglen Genie P3866 1GB, Janet network, Windows 2000 Prof, IE6.

Web address
http://www.meta-synthesis.com/webbook.html

Elizabeth Barron
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Midmills Campus
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Inverness
IV2 3NF
September 2004

A well planned, well laid out site, which deals with chemical reactions and chemical reactivity. Meta-synthesis is a publishing house, which aims to produce material that deals with the 'over' or 'meta' view of science. To this end, they have published a free web book entitled: "Chemogenesis" by Mark R Leach.

Summary Review

range: * poor to ***** good

Ease of navigation	***
Speed of response	****
Ease of learning	****
Content	*****
Relevance	*****
Accuracy	*****
Usefulness to student	****
Usefulness to teacher	****

Their approach to patterns in reaction chemistry aims to separate the wood from the trees; to separate the large-scale structure of reaction chemistry from the details of individual chemical species, their interactions and reactions.

The site has a good introduction page that introduces how chemical structure and reactivity 'emerge from the periodic table of the elements and develop into the rich science we experience'. The site then goes on to look at the main group elemental hydrides and five hydrogen probe experiments, which feed into a page that defines congeneric series and planars. Further pages look at how to quantify congeneric behaviour and the emergence of organic chemistry. The web-book then goes on to look at five reaction chemistries, unit and compound mechanisms, STAD, mechanism matrix and so on with more pages than could be effectively described in this review. There is also an excellent chemical thesaurus page and further reading list.

The site is continuing to evolve however, in that there are several pages under construction, for example a section on Linear behaviour and Chaos in Chemistry and Controlling reactions.

Although the site content is not suitable for the majority of my access or first year students, there are occasionally diagrams that explain things so well I could easily use them on the Higher Chemistry course. For example the Segre chart is particularly good, as are the periodic tables. Any advanced students that would like to investigate reaction chemistry further should have no problems navigating this site with minimal lecturer support. The vast majority of chemistry lecturers and teachers should also find something of interest here.

According to the site, "Chemogenesis" was designed for academic chemists, teachers of chemistry and students. The material was designed to be understood by a 'first year university chemistry major, a bright and interested school student, or a scientifically literate lay person'. However, I feel that students and lay people would get more from this web-book if the language used was simpler and perhaps if the diagrams were explained further in the text. If this were altered I feel this web book would be accessible to a wider range of users, although I acknowledge that this 'dumbing down' may put off the academic chemists. Another minor criticism would be that the intro page is very bland and most students would probably be put off by the page titles. A 'map of ideas' would probably pull lay people into the text more quickly, although then I suppose it would be less of a book and more of a website.

Overall I found it to be a fascinating site though. It is possible to navigate around it quickly enough and all the pictures downloaded with minimal effort.

An Introduction to Chemical Kinetics

Subject area
Physical Chemistry.

Description
This book flows from a look at instrumentation and experimental procedure, though the kinetic analysis of data, theories of chemical reactions and potential energy surfaces, to an examination of complex reactions in the gas phase and in solution.

Authors
Margaret Robson Wright.

Publishers/Suppliers
John Wiley and Sons Ltd (http://www.wiley.co.uk).

Date/Edition
2004.

ISBN
0-470-09059-6 (pbk.).

Level
Undergraduate.

Price
£27.50.

Paul S Francis
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Deakin University
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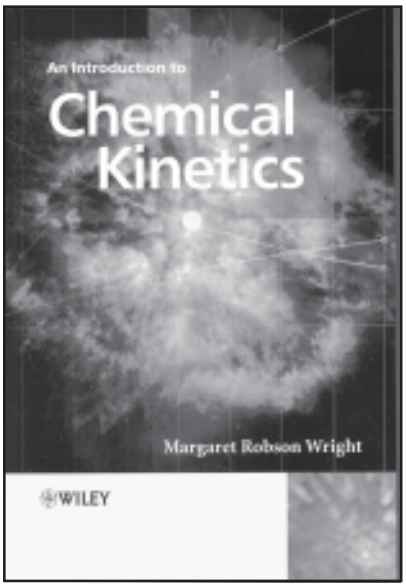
Australia
November 2004

Summary Review

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

There are two considerable hurdles for those wishing to assemble a book on this field. Firstly, chemical kinetics is taught to a wide range of students including chemists, chemical engineers, pharmacists and biochemists, which each approach the subject with different backgrounds and perspectives. Secondly, in spite of the enthusiasm and effort of many teachers of physical chemistry, a significant percentage of students recoil at the prospect of a quantitative topic laden with mathematical equations. Margaret Wright jumps both hurdles with style in “An Introduction to Chemical Kinetics” with her careful development of fundamental concepts including a large number of worked examples, laid out in a clear and intuitive fashion. The book flows from a look at instrumentation and experimental procedure, though the kinetic analysis of data, theories of chemical reactions and potential energy surfaces, to an examination of complex reactions in the gas phase and in solution. I found the final chapter entitled Examples of Reactions in Solution, to be a particularly useful extension of the preceding chapters, which were more theoretical but still contained many worked problems. One minor negative note was that the discussion on oscillating reactions is quite limited, in spite of the recent attention placed on this area in more general texts such as “Physical Chemistry” by David W Ball (2003, Brooks/Cole).



Each chapter begins with a list of learning objectives and finishes with numerous additional problems and recommendations for further reading, which includes books pitched at a similar level, such as “Introduction to Molecular Dynamics and Chemical Kinetics” (G D Billing, K V Mikkelsen; John Wiley & Sons: New York, 1996) and “Modern Liquid Phase Kinetics” (B G Cox; Oxford University Press: Oxford, 1994), and those aimed at more advanced students. In the further reading list, items that are out of print (but ‘should be available in University Libraries’) are indicated. At the back of the book there are the answers to problems, which are quite descriptive rather than simply a final figure, and a reference list of reactions used to illustrate points throughout the book.

The book is most appropriate for second year university students. It would also provide a useful resource for higher-level students as they progress to more advanced texts, such as the author’s “Fundamental Chemical Kinetics” (Horwood: Chichester, 1999) or others which can be found in the further reading lists. The book is reasonably priced and available in both hardback (0-470-09058-8) £85.00 / €127.50 / US $132.00 and paperback (0-470-09059-6) £27.50 / €41.30 / US $48.00.

Astronomy: journey to the cosmic frontier
Explorations: an introduction to astronomy

Subject area
Astronomy.

Description
Both books are aimed mainly at non-science students but may serve as backup for a first year course on astronomy given as part of a physics degree.

Authors
Astronomy: journey to the cosmic frontier by John D Fix.
Explorations: an introduction to astronomy by Thomas T Arny.

Publishers/Suppliers
Both from McGraw Hill (http://books.mcgraw-hill.co.uk).

Date/Edition
Astronomy: journey to the cosmic frontier: 2004/3rd edition.
Explorations: an introduction to astronomy: 2002/3rd edition.

ISBN
Astronomy: journey to the cosmic frontier: 0-07-248262-1.
Explorations: an introduction to astronomy: 0-07-241593-2.

Level
A-level, access, undergraduate.

Price
Astronomy: journey to the cosmic frontier: £83.99.
Explorations: an introduction to astronomy: £58.78.
(both prices obtained from http://www.amazon.co.uk).

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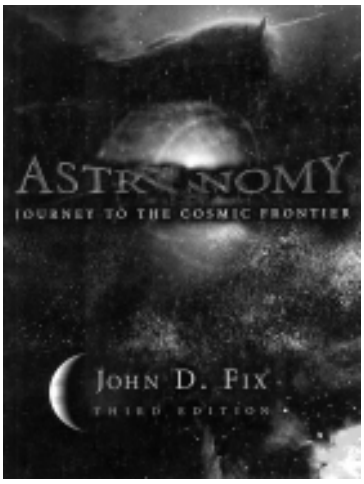
October 2004

Summary Review

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

In the American university system it is common for non-science students to be offered a course in introductory physics. Because of its obvious appeal, it is perhaps even more common for such students to be offered introductory courses in astronomy. There is no shortage of texts to accompany such courses; see, for example, the review in the last issue of this journal by Tom Brown and Bruce Sinclair[1] of "The Physics of Everyday Phenomena" by Griffith (editor) and "Conceptual Physics" by Hewitt. The two books under review here are most definitely aimed at this market. Brown and Sinclair noted the similarity in content of the two books that they reviewed. The same is most definitely true of the Arny and Fix books. In fact the similarity is even deeper here as the two books come from the same publisher, McGraw Hill. At first glance, it is difficult to understand why one publishing house would want a pair of stable-mates so similar in size, content and lay out. One possible explanation may be that the books themselves form only a part of McGraw Hill's marketing strategy. While the books may be very similar, the CDROM and online support content are essentially identical. Both books come bundled with a CDROM entitled Astronomy Essential Study Partner. This contains essays on topics in modern astronomy, practice quizzes, and animations designed to bring the subject material to life. In fact the sales hype on the back cover of each book is the same. Both books have an Online Learning Centre which is billed as an '…awesome website [that can] help you GET THAT "A"'. Both books give the student access to NetTutor a live, personalized tutoring service delivered via the Internet. Possibly the most important part of the marketing strategy is aimed at instructors rather than students. If an instructor adopts one of these books for his or her course, McGraw Hill will provide access to a set of teaching materials such as ready made Powerpoint lectures and a bank of multi-choice question sets. I am not convinced that many UK lecturers are currently prepared to accept such off-the-shelf teaching solutions, preferring to design and deliver their own courses. In fact, browsing through John Fix's teaching home-page[2] at the University of Alabama where he is Dean of Science, I discovered that, while relying on his own text heavily for his Astronomy 101 course, he does not seem to utilise any of the online instructor support packages that McGraw Hill make available.



So how comfortably do these books, designed firmly with the American system in mind, fit in to the UK system? I currently recommend "Introductory Astronomy & Astrophysics" by Zeilik and Gregory[3] as the main text for my first year astronomy/astrophysics unit. This book which gives a full mathematical treatment of the subject also serves as a useful reference for modules in later years. The major weakness of the Arny and Fix books is their lack of quantitative content. Being aimed at non-science majors, the mathematical content goes no further than GCSE maths level.

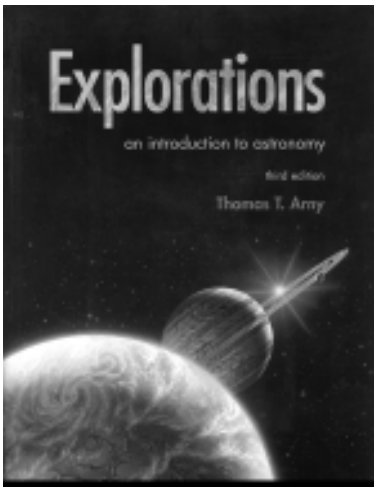
Astronomy: journey to the cosmic frontier Explorations: an introduction to astronomy

On the other hand, the lack of rigorous mathematical treatment is made up for by clear and detailed descriptions and explanations of the major astronomical phenomena that normally form the syllabus of first year astronomy/astrophysics modules found in most UK physics degrees. And this is where I believe their usefulness lies. Whilst these books do not challenge for pole-position as main course texts, I would certainly include them on my list of possible background reading for the interested student. The down-side is the high cover price which reflects the cost of the CDROM and online content which will be of limited use to UK students.

One of the things that attracts me to both books is their excellent treatment of the historical aspects of the subject. This is an area that students find fascinating and which can shed light on the process of scientific discovery in a wider sense but which is often neglected in the lecture hall due to the need to cover the more quantitative side of the subject in sufficient detail. Fix begins with a discussion based on the existence of patterns in the sky and the perceived movements of the heavenly bodies. He then delivers a well written exposition of ancient astronomy from the Babylonians to Ptolemy and finishes the historical tour with a review of the major developments in humanity's world view that took place during the Renaissance emphasising the importance of the work of Kepler and Galileo. This sets the stage for a simple but well written account of Newtonian gravity written from a modern perspective. Arny's book follows much the same path, the only real difference being that Newton is introduced from a more historical viewpoint, with the chapter on Newtonian gravity appearing as a separate section slightly further into the book. The other point of divergence in the two historical accounts is rather minor, but none the less interesting. While Arny devotes a page to Asian and Islamic contributions to astronomy, Fix offers a comparison of ancient Chinese and Mesoamerican world views. While both including a mention of Stonehenge, neither author has much to say on the subject of megalithic astronomy.

Another minor but also interesting difference between the two texts is the inclusion by Arny of a chapter on amateur or backyard astronomy. While most of the information in this chapter is also to be found in Fix's book, the organisation of the material by Arny is more coherent. In fact both these books make excellent additions to the libraries of amateur astronomers.

Fix gives a single chapter on light and telescopes whereas Arny separates the two topics giving light (and atoms) a well written chapter of their own. For the most part both books tackle the same subject matter in similar styles. Beginning with chapters on the Earth and Moon, the books then follow the same path from Mercury to Pluto. Fix provides a more detailed account, especially of Mars to which he devotes 26 pages compared to Arny's seven pages. Following a description of the minor solar system bodies, both authors switch their attention to stars. While Fix prefers to give a general outline of the properties of stars and then a detailed description of the Sun, Arny tackles the topic the other way around. Both are good, coherent accounts, but if I had to choose between them Arny just gets the decision based mainly on the order of presentation and his slightly more observational approach to discussing the properties of stars in general. The remainder of both books is very similar, moving firstly to the Milky Way Galaxy before describing galaxies in general. The move from galaxies to cosmology is seamless in both works although again to my mind Arny just sneaks past the winning post by including a few paragraphs on the observational evidence, in the form of high-redshift supernovae, for cosmological repulsion.



Both books end with a speculative chapter on astrobiology. Again my preference is for the Arny treatment where such ideas as panspermia – the idea that life is a universal phenomenon that spreads through the cosmos on dust grains and infects any suitable planet that it comes across – is touched upon.

In conclusion, both of these books provide readable and informed accounts of the main ideas covered in most first year astronomy and astrophysics modules offered by UK physics departments, but neither would suffice as a core text for such a course. Both are enlivened by enthusiastic and well informed writing from authors who not only have a deep understanding of their subject but a flair in explaining sometimes difficult concepts in a manner that should engage students. While the feel and look of the Fix book is a touch better than its competitor, my slight preference is for the Arny book which is a little shorter and slightly more up to date.

References

1. Brown, T and Sinclair, B *Phys Sci Ed Rev* Vol 5 (1) p29-30 (2004).
2. http://ptolemy.uah.edu/cosmos.html
3. Zeilik, M and Gregory, S A *Introductory Astronomy & Astrophysics* (4th edition), Thomson Learning, London (1998). ISBN 0-03-006228-4.

Crime Scene to Court: the essentials of forensic science

Subject area
Forensic Science.

Description
This book offers an authoritative review of modern forensic science and focuses on both historical developments and current trends.

Authors
P C White (editor).

Publishers/Suppliers
The Royal Society of Chemistry (http://www.rsc.org).

Date/Edition
2004/2nd Edition.

ISBN
0-85404-656-9.

Level
Undergraduate, research.

Price
£24.95
(http://www.amazon.co.uk).

Joanne Millington
Homicide Department
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November 2004

Summary Review

range: * poor to ***** good

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

The second edition of "Crime Scene to Court" offers an authoritative review of modern forensic science and appropriately focuses on both historical developments and current trends. Although, not exhaustive it provides a mostly robust reference text which would support the natural interest of any reader. The explosion of media coverage, the accelerating introduction of forensic science courses onto the higher educational syllabus and the innate fascination of the general public with this discipline have nurtured a rising misunderstanding of the potential and limitations of forensic science. I hope that this book will succeed in dispelling some of those misconceptions. (Chapter 15 brazenly quotes there being two higher degrees devoted to this specialism which in my view is a risky inclusion as any such figure is likely be outdated before publication if the current prolific rate is maintained).

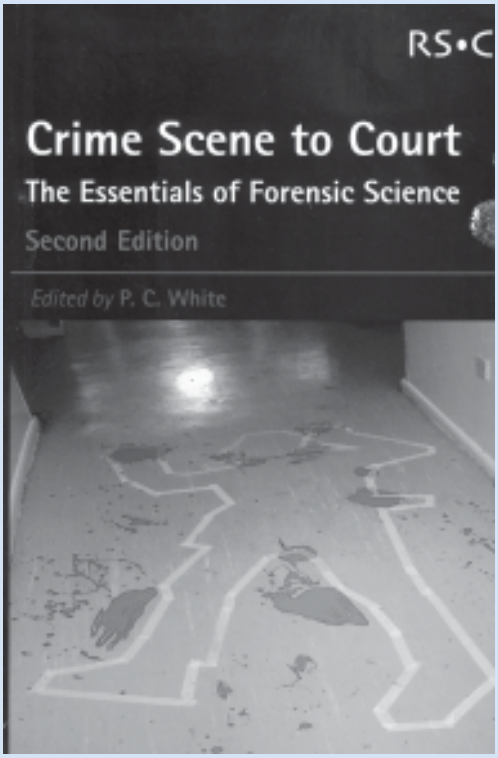
The contributors comprise a formidable team of experienced and respected forensic practitioners who present a well-structured and authoritative text.

In general, the format of each chapter presents a comprehensive historical context upon which the body of each chapter is built. Some adopt a more factual approach whilst others present case simulations in order to demonstrate the science. It is refreshing to see that many of the authors have used this opportunity to enthusiastically demonstrate their experience and expertise and as a result the reader is provided with a practical and experiential viewpoint which enriches this text and sets it apart from its contemporaries.

Throughout the book is scattered an important discussion on the central influence of quality assurance issues which is exemplified in a useful discussion on the Council for the Registration of Forensic Practitioners (CRFP), an accreditation body who offer registration to those who can demonstrate competence. This aspect of the text, in my view, expands the scope of the book and provides a practitioner-based focus which exposes the book to those who wish to register, maintain or solicit their expertise in the marketplace. There is further discussion on the development of standards which will, in the future, be offered to those who are involved in the validation of University degrees in this discipline. This again introduces the opportunities which are available to those in undergraduate teaching, who have been through, or are currently involved in this process and wish to supplement any validation which they might obtain through the Quality Assurance Agency (QAA) for Higher Education.

Central issues based on analytical techniques, the interpretation of scientific findings, their limitations and their potential are importantly balanced against the rationale that any findings should be evaluated against a framework of circumstances. As a direct consequence of this, the book seems to lack any in-depth discussion on the statistical considerations of such an evaluation and even a reference to such work would be beneficial. This could be further expanded to the inclusion of an extended reference list citing key texts, peer reviewed journals for example, which would provide the reader with a robust reference set from which they could widen their awareness.

Crime Scene to Court: the essentials of forensic science



From the publisher...

Crime Scene to Court: The Essentials of Forensic Science 2nd Edition

Edited by P C White, University of Lincoln, UK

Forensic science has been variously described as fascinating, challenging and even frightening. If you have only a vague concept of what forensic science is, this book will provide the answer. Aimed at non-scientists, or those with limited scientific knowledge, Crime Scene to Court covers all three main areas of an investigation where forensic science is practised, namely the scene of the crime, the forensic laboratory and the court.

Ideal for those studying forensic science or law, the book is intended primarily for teaching and training purposes. However, anyone with a role in an investigation, for example police, crime scene investigators or indeed those called for jury service, will find this text an excellent source of information.

0-85404-656-9 452pp 2004 £27.95

The inclusion of a chapter on Blood Pattern Analysis fills a gaping hole which was present in the first edition. In the current legal climate the existence of a DNA match is rarely contested in a case which involves the transfer of blood. Rather, the focus is increasingly on the method or activity by which the blood or body fluid came to be deposited. This chapter includes a refreshing use of modern terminology that is a welcome diversion from the velocity-based classification of bloodstains that is widely adopted in the States.

The further addition of a chapter on Computer Based Media provides a compelling read which introduces the reader to the central issues of this quickly evolving discipline. However, I cannot help but think that this particular input will soon be outdated. Reference to such things as maximum capacities and exact figures are at risk of prematurely aging the book.

The chapter devoted to the Analysis of Body Fluids tends to cover much of the biological and biochemical theory which could be gleaned from any biology text. This is not a criticism per se but I feel that this diversion reduces the opportunity to discuss issues which are directly related to forensic biology. However, we are ultimately presented with a good overview of the historical developments and recent advances and the chapter concludes with a brief discussion on future considerations in DNA testing.

Throughout the book are continued references to the synergy of the science with the judiciary and a direct reference on many occasions to the presentation of findings in a legal context. This is supplemented with the provision of an exemplar forensic report which provides a useful reference for any reader who might be completing assessments in this field.

There is a marked over reference to the tenet of Locard's transfer principle but in general all of the chapters are informative and contribute to a text which would sit well on the bookshelf of a student, of those whose reading is interest led or of those who are seeking to broaden their awareness and invest in their continued professional development.

In forensic science teaching particularly I believe that it is critical that students experience a wide range of scientific disciplines but that they supplement this with an exposure to specialist procedure. This book to some degree facilitates this, as many of the contributors are themselves active in forensic science teaching and research. As a direct result we are presented with a unique sophisticated text which will hopefully emerge as a key reference that encourages its readers to develop an autonomous approach to learning and research in forensic science. An invaluable resource.

Foundations of Modern Cosmology

Subject area
Astronomy.

Description
An account of the foundations of astronomy and cosmology, including key concepts from particle physics.

Authors
John Hawley and Katherine Holcomb.

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

Date/Edition
1998.

ISBN
0-19-510497-8

Level
A-level, access, undergraduate.

Price
£33.99.

Martin Counihan
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November 2004

Summary Review

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

A well-written and well-produced book, generous in length and wide-ranging in scope, John Hawley and Katherine Holcomb's "Foundations of Modern Cosmology" can be thoroughly recommended. However, to avoid any possible misunderstanding arising from the title, it has to be said that it is not just about modern cosmology: the book is historically based, giving accounts of ancient and medieval thinking before moving on to modern ideas. Moreover, this is not a book on mathematical cosmology, and the material is presented with a minimum of mathematics, as befits a book based on a course provided for liberal arts students at the University of Virginia. Nevertheless, there is enough solid science in this book for it to be very useful supplementary reading for any science student. The authors have given us an excellent account of the foundations of astronomy and cosmology, including key concepts from particle physics.

It is pleasing that the historical parts of the book are generally well-informed and well-balanced, avoiding the extremes of 'scientism' and anti-religious tub-thumping. Galileo, for example, is presented warts-and-all, making it clear that his own personality was largely to blame for the controversy which gathered around him. Occasionally, however, there are over-simplifications. It is a pity to write off the Dark Ages as a 'dismal period' of 'superstition and fear', ignoring, say, the extraordinary flowering of ideas associated with Eriugena in the West and with Al-Kindi in the East during the ninth century. Saying that the 'rediscovery of Greek culture... led ultimately to the Renaissance' misses the point that the Renaissance was a complex development for which various other causes can be put forward, ranging from the Black Death to the Fall of Constantinople. And it is highly questionable whether the new heliocentric cosmology was responsible for bringing about the Scientific Revolution: what about the impact of the great voyages of discovery?

A book of this kind naturally conveys its authors' philosophy of science. In a particularly useful part of their first chapter, Hawley and Holcomb explicitly spell out a commonsense 'scientific method' which includes inductive inference, Occam's Razor, and a dash of Popper. Later in the book the Anthropic Principle is mentioned, but the authors give it little prominence, in contrast with writers such as Martin Rees.

In its scientific content, "Foundations of Modern Cosmology" is excellent. No other recent book springs to mind which deals so confidently and comprehensively with fundamental physics and cosmology for a non-specialist but well-educated audience. Advanced topics such as vacuum energy and the role of quantum mechanics in cosmology are handled very well. However, although the book has just been put forward for review, it was published in 1998, and consequently some parts seem a little dated. It omits, for example, the recent evidence that distant regions of the universe are accelerating away from us so as to suggest that the universe is infinite. Should you buy the book? Well, you should certainly have bought it in 1998, but now you might prefer to wait for the new edition which is promised for February 2006.

Forensic Science

Subject area
Forensic Science.

Description
Introductory undergraduate textbook aimed at first year students studying forensic science courses or courses incorporating some element of forensic science.

Authors
Andrew R W Jackson and Julie M Jackson.

Publishers/Suppliers
Pearson
(http://www.pearsoned.co.uk).

Date/Edition
2004.

ISBN
0-13-043251-2.

Level
Undergraduate.

Price
£26.99
(http://www.amazon.co.uk).

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November 2004

Summary Review

range: * poor to ***** good

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

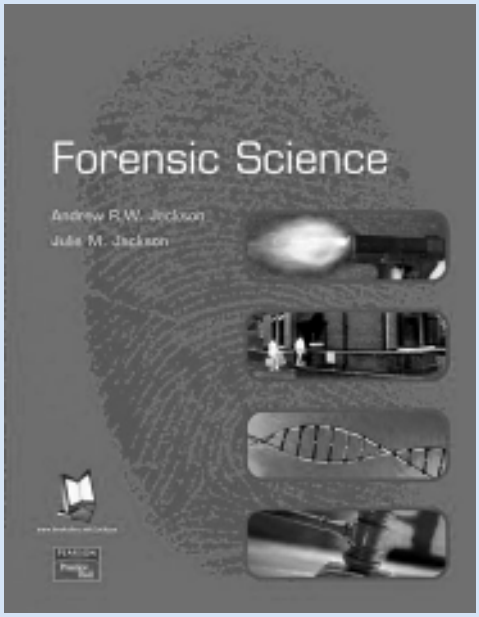
The number of undergraduate courses incorporating some aspect of forensic science has increased dramatically in recent years; any attempt to quantify this would almost certainly become inaccurate in the interval between writing and appearance of this review. In such a situation there is both the opportunity and need for supporting textbooks. However, the diversity of courses involving forensic science makes this a rather difficult task, so the question is 'can the authors accomplish this?'

There are many ways to categorize forensic science courses, but two obvious ones illustrate the difficulty of communicating to a diverse audience. The first contrasts those courses biased towards (and generally delivered within) a biological/biochemistry context with those biased towards (and delivered within) a chemical context. The second contrasts those that are vocationally driven with those that have a more fundamental emphasis. Coming from a Department with traditional strengths in the latter category, I recognize the need to demonstrate practical relevance and applicability; anecdotally, conversations with colleagues at institutions offering vocationally oriented courses reveal their concerns about setting the practicalities within a sufficiently rigorous framework. Thus, as we all play to our strengths, we seek a means - here, through the vehicle of a textbook - of incorporating those aspects upon which we have traditionally placed less emphasis. So, the challenge for authors of student texts on forensic science is whether one can write in a manner that is both accessible to and holds the interest of readers in all these categories.

The authors attempt to satisfy this diverse audience by a number of devices, some rather standard and others rather more innovative. Viewed at the macroscopic level of the chapter structure of the book, they sandwich the 'science' - diverse samples, analytical procedures and techniques - in the central majority of the book between the 'forensic' - legal - issues of professional standards, crime scene evidence collection and assessment, and courtroom presentation of evidence. This actually works rather well, since the crime scene dictates the nature of the samples and thus the relevant analytical techniques, while the legal process dictates the technical goals and standards. For the reader coming from a non-legal background, this greatly helps to frame the problem. Viewed at the microscopic level of the internal content of the chapters, the authors describe the likely samples, materials and evidence and their associated analytical procedures in the main text, but then interleave this with boxes describing the underlying fundamentals of the science behind the analytical procedures. To give the text real-world relevance, they also intersperse these with boxed examples of real cases, showing how the analytical procedures provided resolution of the case. This latter device is very successful in bringing the text to life.

Continued on page 10

Forensic Science



From the publisher...

Forensic Science

Andrew R W Jackson, Julie M Jackson

This text aims to provide a broad, scientifically rigorous introduction to Forensic Science. It covers processes from the crime scene to presentation of forensic science in court. It focuses on the chemical, biological and physical methods used in forensic examination. Techniques and procedures used in forensic science are fully covered. The book includes real-life case studies.

0-13-043251-2 420pp 2004 £26.99

Continued from page 9

As regards topics covered within the book, all the 'usual suspects' are present: trace evidence, fingerprints, body fluids, DNA, poisons, drugs, firearms, documents, fires and explosions, and human remains. All these topics are well illustrated, frequently with clear photographs, that add greatly to the clarity of the message. In the special case of the DNA analysis, the authors have adopted the slightly unusual approach of inviting a chapter from a guest co-author. By using common style with the other chapters, they manage to include all the advantages of the additional expertise, without paying the common price of discontinuity.

All the usual features of a good text are present, including a useful glossary of terms, a detailed index, example problems for the reader, and a selective bibliography. The authors have also clearly given considerable thought to presentation in the light of the likely readership. So, students who like to see objectives at the start of each chapter, bullet lists of key points, marginal notes explaining terms without having to turn to the glossary, and plenty of pictures to illustrate the text will not be disappointed.

This text also has the less common feature of a dedicated website with features for both lecturer and student. This provides extension of the material in the book in a variety of straightforward ways and via interactive features such as testing of (hopefully!) acquired knowledge. The site is well signposted, so even the first time browser will have no trouble in navigating it and finding useful explanatory and extension material.

So, at the end of all this, did I feel that the authors managed to appeal to all types of reader in adequate measure and to hold their interest throughout? In short, yes I did. The authors convey serious messages in a rigorous but accessible and engaging manner. I would thoroughly recommend this text as an educational resource for all those teaching the early stages of courses incorporating forensic science and as an insightful and well-organized summary for those they teach.

Fundamentals of Physics

Subject area
General Physics.

Description
General physics text-book.

Authors
Halliday, Resnick and Walker.

Publishers/Suppliers
John Wiley and Sons
(http://www.wiley.co.uk).

Date/Edition
7th Edition, extended.

ISBN
0-471-46508-9.

Level
Undergraduate.

Price
£37.95.

Simon Bates
School of Physics
University of Edinburgh
James Clerk Maxwell Building
The King's Buildings
Mayfield Road
Edinburgh
EH9 3JZ
November 2004

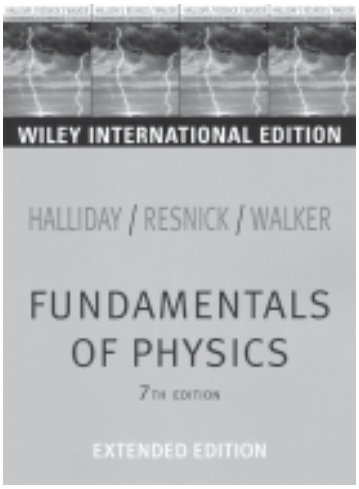
Where do you start to review a book of 1300 pages, the original edition of which was conceived 40 years ago? You should arguably start at the beginning and most of this review will focus on Part 1 and (a little of) Part 2 of this volume that relates to a first year undergraduate course in introductory physics taught here at Edinburgh.

Summary Review

range: * poor to ***** good

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

For those not familiar with the HRW series of editions, the scope of this edition is essentially the same as the previous one. It is huge; from the very foundations of the subject, through classical dynamics and mechanics, thermodynamics, electricity, magnetism, optics, to quantum, nuclear and particle physics. There is a whole range of different versions of this edition of the text; the extended one that I received contains an additional six chapters on quantum physics and cosmology. The material is also split into two separate hardcover volumes (comprising mechanics/thermodynamics and the rest) as well as five separate paperback volumes. Divide and conquer, it seems.



The new edition contains relatively little new material, but the look-and-feel of each chapter has been updated. I particularly liked the 'what is Physics' introductory paragraph at the start of each chapter, anchoring the material into everyday-life scenarios. I also liked the emphasis on worked examples within the text on Key Ideas, thus helping students to formulate a strategy for solving a problem, before simply diving for the equations. The somewhat quirky style is still there; questions have wombats moving along a branch for an example in one-dimensional kinematics; but that is part of what HRW is.

Much effort has gone into development of accompanying on-line resources to accompany this book. Some are of a more general type, such as the eGrade Plus system that is effectively a web-based course management tool for material delivery and assessment. Others, such as the interactive courseware problems are specific to the problems and examples within the book itself. A student can work through certain examples from the book, receiving detailed, context-sensitive feedback as they are led through the example. Aside from students learning the key ideas behind the physics, it is an excellent tool to emphasise good problem-solving practice in general. This level of interactivity is a major success of the material accompanying this book.

In summary, if you have used HRW editions in the past, then it is likely you will use this new edition as well. To our entrant undergraduates, we advise them that this is a book which maps onto the syllabus of the pre-Honours years very closely and one to which they will refer back many times in later years as well.

Giving a Lecture: from presenting to teaching

Subject area
General.

Description
This book is a primer to help those new to lecturing and a reminder for the experienced lecturer.

Authors
Kate Exley and Reg Dennick.

Publishers/Suppliers
RoutledgeFalmer
(http://www.tandf.co.uk/books).

Date/Edition
2004.

ISBN
0-415-30719-8.

Level
Academic.

Price
£15.99.

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

This is a friendly book, written by practitioners for practitioners. For a time some people suggested that lectures were on the way out, but the authors take the realistic view that, with increasing student numbers, lectures are here to stay. However, they are acutely aware that the *art* of lecturing may need to be rethought and maybe even overhauled. The mindless *covering* of a topic in a lecture without giving thought to the possible lack of learning among the students must be deplored. Although the book is aimed mainly to help beginners, there is much for the *experienced* lecturer to learn from it.

The recommendations in the book are based on the mild use of educational theory tempered with practical experience. At times the use of educational jargon intrudes, but this is seldom the case and so the text remains intelligible even to the uninitiated.

The chapter headings give a flavour of the practical nature of the work: Why lecture?; Preparing a lecture; Handling nerves, anxieties and discipline problems; Structuring lectures; Using your voice effectively and presenting material visually; Active learning in interactive lectures; Handouts; Computing and IT in lecturing; Student diversity; Evaluating lecturing. The treatment of these topics is often tantalisingly brief, but linkages to fuller treatments on the Web and elsewhere, are given in most chapters. In the computing and IT chapter, there is no *health warning* for those who might seek to cover their inadequate lecturing skills by recourse to some mechanical gimmick. The basics of good lecturing remain the same regardless of technique. One of the most telling paragraphs reads as follows.

'One of the commonest errors that lecturers make is trying to present too much material. Slide after slide, overhead after overhead, example after example the information pours out of the lecturer and the students end up trying to drink from a fire hose.'

This book is recommended as a companion for beginners, a corrective for those who think they know it all, and for use in Teaching and Learning courses.

Alex H Johnstone
formerly of
Centre for Science Education
University of Glasgow
Glasgow G3 6NH
October 2004

Handbook of Radiation Effects

Subject area
Materials Science, Engineering.

Description
A handbook covering the field of high-energy radiation effects on engineering materials.

Authors
Andrew Holmes-Siedle and Len Adams.

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

Date/Edition
2002/2nd Edition.

ISBN
0-19-850733-X.

Level
Undergraduate, research.

Price
£75.00.

John Leaver
11 Ridley Road
Lowerhouse
Bollington
Macclesfield
Cheshire
SK10 5HL
October 2004

Summary Review

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

The "Handbook of Radiation Effects" is intended for use primarily by engineers concerned with the effects on materials caused by high energy radiation and was originally conceived in the context of radiation in space environments. It is an exploration of the many problems which can arise when high energy radiation impinges on materials such as electronic components and polymers and describes the physical methods that may be employed to overcome these problems. The handbook would also, from time to time, be a useful reference for a variety of scientists and technologists, such as medical physicists, radio-chemists and so on, who may encounter, and need to solve, problems associated with such radiation effects. It is a book more likely to be used as a reference than read from cover to cover.

The first section, on radiation physics and measurement, provides a concise, but useful and readily intelligible introduction to these topics. Subsequent sections look at radiation environments, such as space, reactors, weapons, accelerators and natural terrestrial radiation problems such as radon in houses. The bulk of the remainder of the book describes and explores how various materials and devices are affected by high energy radiation. The coverage of topics is thorough and generally quite concise. To give a flavour of the content, there are extensive sections on: metal-oxide semiconductors, integrated circuits, diodes, solar cells, optical media, microelectronics, polymers and organic materials. There are also sections concerned with shielding, radiation testing and radiation hardening in other words the introduction of radiation tolerance into equipment for space, industrial or military use.

In the context of learning and teaching the "Handbook of Radiation Effects" would most likely be recommended to learners as a reference source or in the context of a research project in the field. The style is, however, very readable and easy to follow and sufficient background material is given to make most of the topics covered readily intelligible to a scientifically literate reader. A reader with a background in engineering, physics or chemistry at undergraduate level should have minimal difficulty using the book. Some sections will, however, be unfamiliar to those not directly involved in the field. For example, some of the sections on equipment hardening might very well be read in their entirety just because they are interesting to the non-specialist in terms of the problems and engineering solutions that are highlighted.

Each of the chapters is well provided with references and there is also a section on useful web references (and indeed a section concerned with completely irrelevant web resources - but these are in place of the usual dedicatory page!). Quite comprehensive author and subject indexes are provided. The book has been well researched and carefully written in a very accessible style. The content is accurate and reasonably up to date (2002), no factual errors were noted and the text is generally free from significant numbers of typographical errors.

Clearly this is not a textbook aimed primarily at teaching, but rather a specialist research reference. However, because of the clarity of the content, a student requiring information on certain aspects of radiation physics might very well find this to be a useful reference and some of the material could easily form the basis of an interesting essay topic.

Intelligent Data Analysis in Science

Subject area
Analytical Chemistry, Computer Science.

Description
This book is a graduate text in the interdisciplinary area between computer science and analytical chemistry.

Authors
H Cartwright (editor).

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

Date/Edition
2000/1st Edition.

ISBN
0-19-850233-8.

Level
Undergraduate.

Price
£47.50.

Summary Review

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

"Intelligent Data Analysis in Science" is intended for senior undergraduate students and graduates 'as they progress... to leadership in research'. The book gives an overview of the area, describing what the various artificial intelligence (AI) methods can do and how they can be used. In keeping with the stated aims, there is insufficient detail to build or run an AI system, as a research team leader would probably not be involved in the hands-on day-to-day operation of the group.

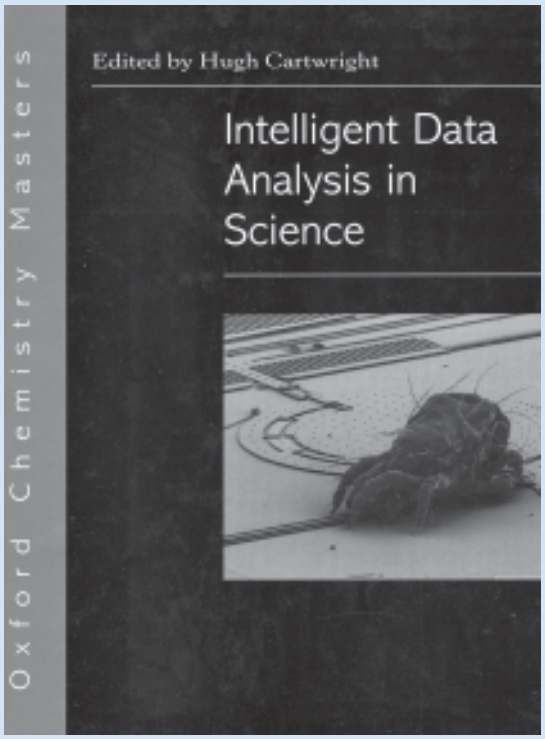
The book reviews the use of AI in analytical chemistry and related fields. Topics include expert systems (ESs), simple genetic algorithms (sGA), structured genetic algorithms (stGA), fuzzy logic, artificial neural networks (ANNs), and genetic programming (GP). These are intended to analyse data with minimal or no human supervision. In a typical analysis such as the spectrometric measurement of some analyte, a student or researcher would be expected to calibrate the instrument or method using known standards (a *learning set*) and then to convert measurements of one or more unknown samples to useful information. Often we would want to know properties or quantities such as the amount of substance, but increasingly we want a qualitative judgment, for example, if a sample meets specifications or is safe to eat. AI allows automation of the analysis and critical evaluation of data. Many expert systems require human intervention for the *learning* process, through the construction of rules or criteria, which summarise the *known* facts. On the other hand, artificial neural networks can use unsupervised learning to extract features or characteristics from the *learning set* before applying that information to the evaluation of data. The scope, advantages and limitations of the different methods are explained.

In some areas, the practice of using AI has departed from the original theoretical concepts in computer science. For example, Chapter 5 explains how and why binary numbers were used by pioneers of genetic algorithms, followed by a description of the disadvantages of binary data for real-world problems and the use of alternative representative schemes. However, such in-depth coverage of subtleties has not been given for each of the AI methods.

"Intelligent Data Analysis in Science" is not intended to be a 'how-do-I-do-this?' textbook. There are no revision questions or problem sets. The book is a 'what-can-this-technique-do' reference text. Each chapter has an extensive bibliography, totalling 23 pages of references or more than 10% of the book.

Kieran Fergus LIM
School of Biological and Chemical Sciences
Deakin University
Geelong, VIC 3217
Australia
November 2004

Intelligent Data Analysis in Science



From the publisher...

Intelligent Data Analysis in Science

Edited by H Cartwright, Physical and Theoretical Chemistry Laboratory, University of Oxford

This is a fundamental reference work for any scientist contemplating using AI for data analysis.
Readership: Any scientist contemplating using Artificial Intelligence for data analysis. Primarily for graduates and research workers across the range of physical and life sciences, but also to final-year undergraduate science students and computer science students.

0-19-850233-8 220pp 2000 £47.50

As the fourth volume in the Oxford Chemistry Masters series, this book is intended primarily for senior chemistry students and graduates. Practitioners and graduate students in related fields will also benefit from this book. Case studies in Chapter 6 illustrate how artificial neural networks were used to discriminate between biological samples on the basis of pyrolysis mass spectral data. Chapter 8 describes how genetic algorithms can be used to create computer programs to solve a particular problem without human supervision, and how such genetic programming (GP) can be used to design electronic circuits.

In my opinion, a more appropriate readership group are (senior) computer science students, for whom the case studies represent applications of computer science (ie future employment areas). Academics in computer science and related areas, such as the theory of mathematical optimisation, will be able to use the case studies in their classes. These students and their lecturers will understand and know all the nuances of the various methods and thus this book would be an extension of their existing theoretical knowledge of algorithms and concepts to real-world applications.

Introductory Nuclear Physics

Subject area
Nuclear Physics.

Description
Undergraduate and above introduction to Nuclear Physics.

Authors
P E Hodgson, E Gadioli and E Gadioli Erba.

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

Date/Edition
2003 reprint of 1997.

ISBN
0-19-851897-8.

Level
Undergraduate, research.

Price
£36.00.

John Leaver
11 Ridley Road
Lowerhouse
Bollington
Macclesfield
Cheshire
SK10 5HL
November 2004

Summary Review

range: * poor to ***** good

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

"Introductory Nuclear Physics" does just what one might deduce from its title, but in a reasonably comprehensive way which is likely to give the book a more enduring usefulness to its purchasers than if it did merely introduce the subject. It is aimed at undergraduate and graduate students and the coverage is likely to make it of value to both and in fact its comprehensive nature will also make it useful as a reference book.

The book is in the *classic textbook* style and some readers might find the approach to be a little *old fashioned*, however the content is generally clearly written in a scientific style that is very readable and easy to understand. The print production is generally clear but unfortunately some of the diagrams have not been reproduced as well as they might have been. This was perhaps to keep production costs down, although the book is not particularly inexpensive.

"Introductory Nuclear Physics" starts with an historical introduction and then covers radioactivity, various types of accelerator, detectors, and nuclear particles such as leptons, hadrons and quarks. The next section of the book comprises several chapters on nuclear forces and this is followed by a section on nuclear reactions. The concluding chapters look at nuclear reactors, cosmology and astrophysics.

Pre-requisites for appreciating the whole of this book include a background in physics or at least a reasonable knowledge of the physical sciences and also a suitable level of mathematical ability as the subject matter of many of the chapters is inherently mathematical. However, there are also many sections that will be intelligible to the general scientifically literate reader.

Problems are provided at the end of each chapter but these are, unfortunately, not discussed or answered and this somewhat reduces the usefulness of the text as a learning resource. This makes the book rather more of a reference textbook and will reduce its appeal to prospective purchasers embarking on undergraduate studies.

There do not seem to be significant numbers of typographical errors although the occasional grammatical peculiarity seems to have crept in. There are appendices which add some further explanatory material, tables of physical constants and a table of masses and isotopes. The bibliographical material provided for each chapter is quite comprehensive and there is also a general bibliography of useful references although as this is a reprint the references pre-date the original publication year of 1997.

"Introductory Nuclear Physics" can be recommended as a rather comprehensive text which introduces the subject effectively in clear language and with a thorough approach that will make it a useful reference, both to those working in the field and those from other disciplines who need to clarify some aspect of the subject (for example physical chemists or spectroscopists might refer to the brief section on the Mössbauer effect). The book is a reprint and it is a pity that it was not possible to update some aspects such as the addition of answers to problems and perhaps some more recent bibliographical material.

Maths for Chemists Volume I (Numbers, Functions and Calculus)

Subject area
Mathematics.

Description
A tutorial text.

Authors
Martin C R Cockett and Graham Doggett.

Publishers/Suppliers
Royal Society of Chemistry (http://www.rsc.org).

Date/Edition
2003.

ISBN
0-85404-677-1.

Level
A-level, access, undergraduate.

Price
£9.95 for Student Members.

Summary Review

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

This Tutorial Chemistry Text (tct) is the 18th in the RSC series; there were 23 titles last time I visited http://www.rsc.org/tct. According to the RSC, 'This new series of books consists of short, single-topic or modular books concentrating on the fundamental areas of chemistry taught in undergraduate science courses. Each book provides a concise account of the basic principles underlying a given subject, embodying an independent-learning philosophy and including worked examples'.

The RSC make much of their 'one topic-one book approach', and the RSC gives authors 200 pages maximum per volume. There are however two volumes with the "Maths for Chemists" title.

Volume I has the following Chapters:
Numbers and Algebra.
Functions and Equations: Their Form and Use.
Limits.
Differentiation.
Integration.
Differential Equations.

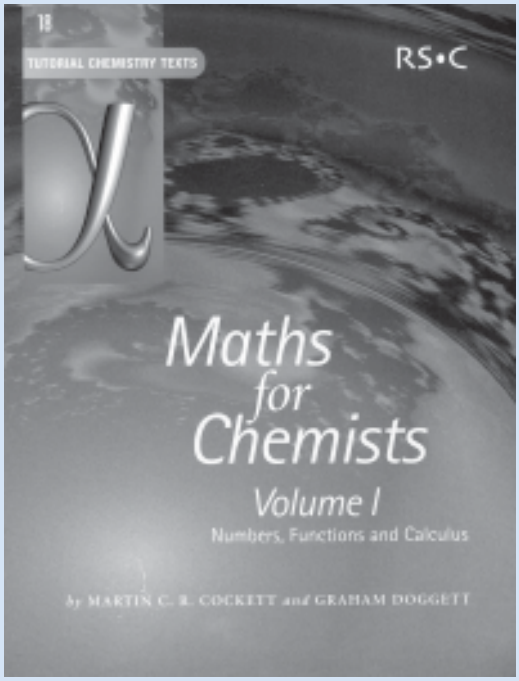
All very nicely done, Martin and Graham have used lots of attractive graphics and given a myriad of chemical examples (with answers). Aims are clearly stated, and key points summarized at the end of each Chapter.

I had to smile when I read the Preface, '… provide a sound foundation in the key mathematical topics required for degree level chemistry courses… we have chosen from the outset to place the mathematics in a chemical context…', for it reminded me of the cyclic nature of time. Many, many years ago, just about all chemistry undergraduates had A-levels in Chemistry, Physics and Maths. Then Biology appeared on the scene, and Chemistry undergraduates began to appear without A-level maths. Things went downhill as A-level and degree standards declined, as did the popularity of physical science degrees. These days, it is a brave (or foolish) chemistry department that insists on an A-level in maths for entry. We certainly don't. Until twenty years ago we (at UMIST, as we then were), entrusted the teaching of maths to the mathematicians. Eventually it became apparent that our students could not cope with rigorous mathematical thinking, and we argued that the best way forward was to teach *useful* maths ourselves. I helped design a course (Quantitative Methods for Chemists, QMC), which ran for a number of years. We concentrated on exactly the things that Martin and Graham list. We paid particular attention to quantity calculus (mathematicians are interested in equations such as $z^5 + 1 = 0$ where z is a (complex) number; chemists write equations like $pV = nRT$ where the physical quantities have a measure and a unit.), and the direct application of maths to chemistry. Summation of infinite series and tests for convergence went out the window.

Alan Hinchliffe
School of Chemistry
The University of Manchester
Sackville St
Manchester M60 1QD
November 2004

Continued on page 18

Maths for Chemists Volume I (Numbers, Functions and Calculus)



From the publisher...

Maths for Chemists Volume I: Numbers, Functions and Calculus

By M Cockett
University of York, UK
G Doggett
University of York, UK

The two volumes of Maths for Chemists provide an excellent resource for all undergraduate chemistry students but are particularly focussed on the needs of students who may not have studied mathematics beyond GCSE level (or equivalent). The texts are introductory in nature and adopt a sympathetic approach for students who need support and understanding in working with the diverse mathematical tools required in a typical chemistry degree course.

0-85404-677-1 180pp 2003 £14.95

Continued from page 17

My friends in maths detested our QMC course, likening it to a tourists' phrase book (amongst other expressions). To cut a long story short, a stern edict came from the Principal that maths at UMIST had to be taught by mathematicians. There was a proviso that the mathematicians had to listen to what the customers wanted, and we ended up with two very nice first year courses. One is for students who have succeeded at A-level maths, one for students who haven't. A diagnostic quiz in week 1 is used to decide who does what. Quantity calculus and the like are now absorbed into *skills* teaching, along with chemical drawing and MS/Office.

My main concern with Volume I is that the target audience is not defined clearly enough. According to the Preface, 'Since the target student readership possesses a wide range of mathematical experience, we have created a course of study in which selected key topics are treated without going too far into the finer mathematical details.' In fact, this Volume covers material from both our *beginners* and *advanced* first year courses.

Having said all that, I liked Martin and Graham's tct. It is in keeping with the spirit of the times, and does give many chemical applications. It will be interesting to see if it gets widely adopted.

Maths for Chemists Volume II (Power Series, Complex Numbers and Linear Algebra)

Subject area
Mathematics.

Description
A tutorial text.

Authors
Martin C R Cockett and Graham Doggett.

Publishers/Suppliers
Royal Society of Chemistry (http://www.rsc.org).

Date/Edition
2003.

ISBN
0-85404-495-7.

Level
A-level, access, undergraduate.

Price
£9.95 for Student Members.

Alan Hinchliffe
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Manchester M60 1QD
November 2004

This Tutorial Chemistry Text (tct) is the 19th in the RSC series, and my Review is essentially a continuation of the corresponding Review for Volume I (the 18th tct).

Summary Review

range: * poor to ***** good

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

1. Power Series.
This includes a discussion of sequences, finite series, infinite series and naturally a treatment of convergence. We then move on to the Maclaurin and Taylor series. There are clear statements of the educational aims of each Chapter, and a summary of key points.

2. Numbers Revisited: Complex numbers.
Here we learn about addition, subtraction and division of complex numbers, the Argand diagram and the polar form. Euler's formula and the de Moivre theorem come next and there is a brief introduction to complex functions.

3. Working with Arrays I: Determinants
This Chapter covers the obvious material; linear equations and expanding determinants. I find statements such as 'When expanding determinants of high order… it is best to use one of the widely available computer algebra systems…' rather bland. In fact the clue as to how they work is given just one paragraph up. As a general point, it would have been nice to have seen a greater emphasis on Mathematica/Mathcad/Maple throughout the text. Maths undergraduates use these tools all the time.

4. Working with Arrays II: Matrices and Matrix Algebra
This Chapter takes the prize for the highest density of definitions per printed page. We get through matrix multiplication, coordinate transformations, transposes, complex conjugates, trace, special matrices and the inverse in the shortest possible time. On the other hand, there are lots of problems. No clues are given as to how one finds inverses of high order, and again this is a field where the computer algebra systems can be used to good effect in teaching. Eigenvalue problems sneak into both tcts, it is a shame that they don't get a fair treatment here. The Chapter ends with a discussion of Molecular Symmetry and Group Theory.

5. Vectors
We cover all the usual material, up to scalar triple products. Very few authors will agree exactly as to what should be *in* and what should be *out* of a given text. For many years (when we were UMIST) we had a final year option in electromagnetism. You simply can't survive Maxwell's equations without vector calculus, of which there is no mention. Perhaps that's a bit too specialist, but even the molecular modellers speak about gradients.

Once again, I liked Martin and Graham's tct. It is in keeping with the spirit of the times, and does give many chemical applications.

I have a final concern about series such as the RSC tct and the Oxford Tutorial Series, to do with money (and the lack of it in undergraduate pockets). All the monographs I have seen have been well written and individually inexpensive, but you might need to buy a lot of them. At the RSC Student Member price of £9.95, the tct are individually good value for money. You have to consider that a typical *Atkins* costs just £35 (we actually give our first year students a free copy), so you only get a few monographs for the price of a complete text. No doubt my marketing friends at the RSC have thought long and hard about such issues.

Metal-Ligand Bonding

Subject area
Inorganic Chemistry.

Description
This short text describes the theory of transition metal-ligand bonding, written in a detailed, non-mathematical manner.

Authors
Rob Janes and Elaine Moore.

Publishers/Suppliers
Royal Society of Chemistry (http://www.rsc.org).

Date/Edition
2004.

ISBN
0-85404-979-7.

Level
Undergraduate.

Price
£24.95.

Brian Murphy
Department of Chemistry
United Arab Emirates University
College of Science
PO Box 17551, Al-Ain
UAE
November 2004

Summary Review

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

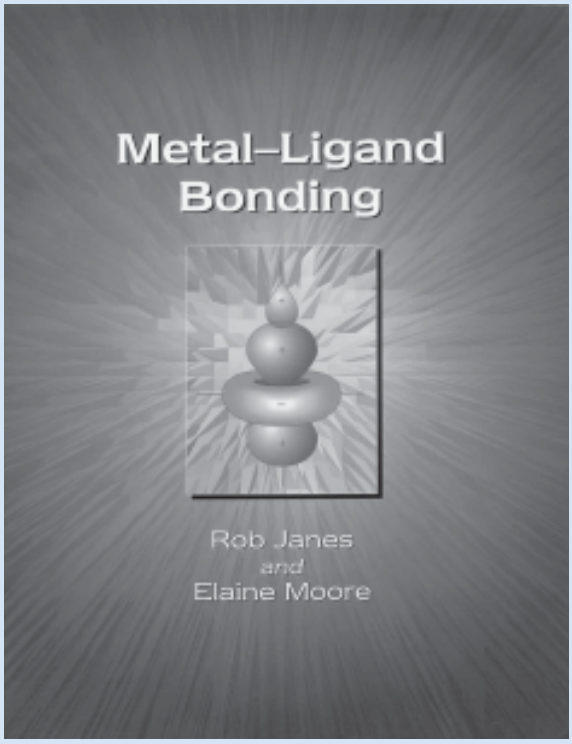
"Metal-Ligand Bonding" is a short primer type text (104 pages in total), published jointly by the Royal Society of Chemistry (RSC) and the Open University and provides an accessible description of the basic theory of transition-metal bonding, using a non-mathematical, conceptual approach of the theories themselves. The text itself consists of fifteen short chapters, which cover a basic introduction to the d-orbitals, crystal field theory (CFT), electronic spectra (including charge transfer), the magnetic properties and the molecular orbital theory (MOT) of transition-metal complexes. The manner in which the fundamental theoretical models of bonding can be used to rationalise many of the chemical and physical properties of transition metal complexes is emphasised throughout the text, and the relationship between CFT and MOT is well explained. MOT itself is treated with a basic knowledge of symmetry concepts, using a pictorial approach.

The text is well supported by nice graphical colour illustrations, which are especially useful in the explanation of MOT, and will be welcomed greatly by the undergraduate student reading this text. In addition, the book has an associated website, www.rsc.org/metalligand, where there is a Lecturer Resource link which contains PDF files of the colour illustrations in the text. This will be especially helpful for instructors delivering the course. In addition, the text contains a series of in-text questions, complete with answers and a series of revision exercises.

Overall, I would certainly recommend this text to both students and teachers. The text is concise and all the fundamentals are well covered. This text is useful as either a stand-alone text for a short one-semester course on basic transition metal chemistry or as a readable additional tutorial type text for students using a more advanced book in this area. Both CFT and MOT are very well explained, and I particularly liked the chapters on MOT, and the way the authors introduced the concepts. Furthermore, the text includes some interesting examples from the literature in places, such as the complex, tetrakis(1-norbornyl)cobalt(IV), reported by Theopold et al. at Cornell University in the US in 1986, involving the first example of a low-spin tetrahedral complex of a first-row transition metal.

However, despite the above, I did find the text lacking in places. It is true to say that if the text is to be used in a module strictly on metal-ligand bonding, it does address all of the key concepts. However, it is very likely that most instructors will use this text in a more general course on coordination chemistry, and hence, I felt that the authors would have lost little in the text by including a more expansive introductory chapter, which would include a more detailed treatment of complexes, ligands (e.g. unidentate, bidentate, chelate, macrocyclic ligands etc.), coordination number and stereochemistry, and a more comprehensive introduction to point group symmetry. Basic symmetry is used throughout the text. However, the area itself is only partially covered and the determination of point group symmetry is actually given as an appendix in the text. In addition, I found the presentation could have been so much better in places. It would have been much better if the publishers used coloured text boxes to introduce problems in the text, using a step-wise approach.

Metal-Ligand Bonding



From the publisher...

Metal-Ligand Bonding

By E A Moore and R Janes, The Open University, UK

To appreciate the chemistry and physical properties of complexes of the transition series, an understanding of metal-ligand interactions applied to complexes of the d-block is needed. **Metal Ligand Bonding** aims to provide this through an accessible, detailed, non-mathematical approach.

Initial chapters detail the crystal-field model, using it to describe the use of magnetic measurements to distinguish complexes with different electronic configurations and geometries. Subsequent chapters look at the molecular orbital theory of transition metal complexes using a pictorial approach. Bonding in octahedral complexes is explored and electronic spectra and magnetic properties are given extensive coverage.

0-85404-979-7 104pp 2004 £24.95

Furthermore, the text would benefit greatly if a series of practice questions on each respective chapter were placed at the end of the chapter. Such exercises could easily be compiled into 3-4 pages per chapter and would add significantly to the usefulness of the text, without lengthening the text to any great extent. With such additions, the book would be more complete and would be a real contender for the text of choice for anyone teaching this course. In its current format, I could easily use the book in an undergraduate course on this topic, but feel that I certainly would have to supplement the text in many places. Having said that, this book has a lot of positive aspects, and if a future second edition could include some of the above points, then it would be most appealing. The publishers should also perhaps consider creating a set of supporting PowerPoint slides to accompany the text as supplementary material, as well as creating a series of linked computer-aided learning tutorials. With the professional graphics already available, either could easily be incorporated into the overall package and would greatly strengthen the text, especially as many texts on coordination chemistry lack such computer-based supporting material.

Physical Chemistry: understanding our chemical world

Subject area
Physical Chemistry.

Description
Introductory undergraduate level physical chemistry text.

Authors
Paul Monk.

Publishers/Suppliers
John Wiley & Sons Ltd
(http://www.wiley.co.uk).

Date/Edition
2004.

ISBN
0-471-49181-0.

Level
Undergraduate.

Price
£24.95.

John Leaver
11 Ridley Road
Lowerhouse
Bollington
Macclesfield
Cheshire
SK10 5HL
November 2004

Summary Review

range: * poor to ***** good

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

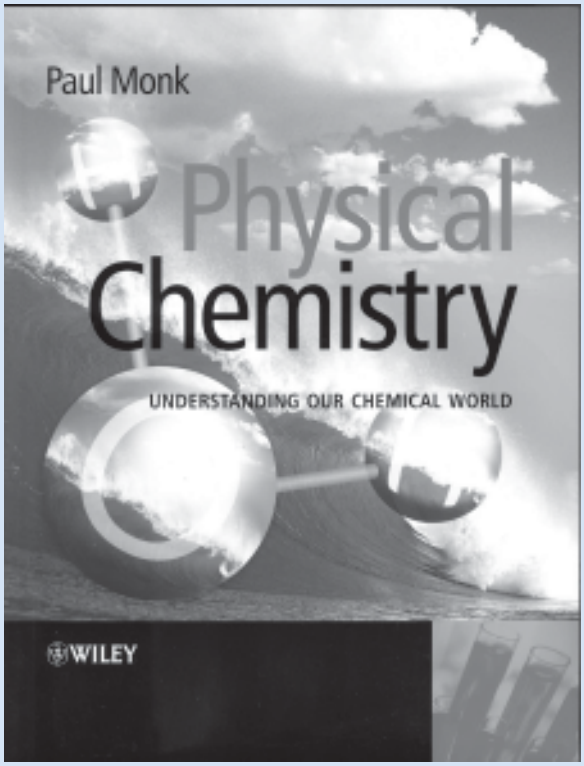
This physical chemistry text has a somewhat different approach than is commonly encountered and is described on the cover as a 'gentle introduction to the principles and applications of physical chemistry'. This is decidedly a teaching textbook. The coverage is what one might expect for an introductory text at undergraduate level; with chapters, after an introductory one, covering bonding, thermodynamics, phase equilibria, acid-base equilibria, electrochemistry, kinetics, spectroscopy and photochemistry, adsorption, colloids and micelles. The content is suitable for bridging the gap between levels 3 and 4 on the UK National Qualifications Framework.

What sets this textbook apart from others at this level is the style in which the material is delivered. It is aimed at students who might require some coaxing to realise the delights of physical chemistry and topics are introduced via questions that might occur to anyone (in some cases with prior knowledge to some extent) but where the answer has some bearing on the concepts of physical chemistry. Generally this works rather well, although occasionally one feels that the author had some difficulty in thinking up a good question and therefore used only an adequate one, because the question structure is fundamental to the book. Probably the best way to give a flavour of this style is to provide some examples. So, the ideal-gas equation is introduced within a discussion of the question, 'How does a bubble-jet printer work?'; enthalpy of solution is discussed in the context of the question, 'Why does our mouth feel cold after eating a peppermint?'; acid-base indicators are discussed after, 'Why do some hydrangea bushes look red and others blue?' and these are just the sort of questions that an inquisitive person (not necessarily doing a chemistry course) might ask. This structure makes the book very good to flick through until an interesting question is spotted and the answer read. The style is, in any case, very readable and would be accessible to the sort of student the book is aimed at.

This book could certainly be approached by a student with a fairly weak pre-existing knowledge of physical chemistry and it would lead them a long way down the path towards a useful comprehension of the subject. In fact it would probably fulfil the physical chemistry knowledge requirements of some undergraduate science courses for which chemistry is only a peripheral subject or if they are coming from a non-scientific background (for example some students on foundation years for science degrees or pre-medical courses for mature applicants lacking the relevant science background).

The book is very attractively produced with a variety of features to enhance its usefulness; including clear and relevant diagrams, worked examples, 'justification boxes' in which equations are derived and explained, asides in boxes to highlight assorted useful or interesting points outside the main flow of the text, study questions (with answers provided at the back of the book) and useful bibliographical material for each chapter. There is also an associated website.

Physical Chemistry: understanding our chemical world



From the publisher...

Physical Chemistry: Understanding our Chemical World

By Paul Monk

Understanding Physical Chemistry is a gentle introduction to the principles and applications of physical chemistry. The book aims to introduce the concepts and theories in a structured manner through a wide range of carefully chosen examples and case studies drawn from everyday life. These real-life examples and applications are presented first, with any necessary chemical and mathematical theory discussed afterwards. This makes the book extremely accessible and directly relevant to the reader.
Aimed at undergraduate students taking a first course in physical chemistry, this book offers an accessible applications/examples led approach to enhance understanding and encourage and inspire the reader to learn more about the subject.

0-471-49181-0 618pp 2004 £24.95

There do not seem to be many typographical or grammatical errors present, but the Henderson-Hasselbalch equation appears as the Henderson-Hasselbach equation (and strangely the word Hasselbalch does appear in the index where the instruction is, 'see Henderson-Hasselbach').

This text can be thoroughly recommended for students who need to know the basic principles and applications of physical chemistry, perhaps in the context of another scientific discipline for which some knowledge of physical chemistry is required and can equally well be recommended to tutors of such courses.

Quantum Mechanics for Chemists

Subject area
Physical Chemistry.

Description
A short tutorial text.

Authors
David O Haywood.

Publishers/Suppliers
Royal Society of Chemistry
(http://www.rsc.org).

Date/Edition
2002.

ISBN
0-85404-607-0.

Level
Undergraduate.

Price
£11.99.

John Leaver
11 Ridley Road
Lowerhouse
Bollington
Macclesfield
Cheshire
SK10 5HL
November 2004

Summary Review

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

"Quantum Mechanics for Chemists" is one of the excellent series of tutorial chemistry texts published by the Royal Society of Chemistry. It is aimed at chemistry undergraduates with the intention of allowing them to gain an understanding of the basics of quantum mechanics relevant to the study of chemistry at that level. It provides the theoretical background necessary to appreciate atomic and molecular orbitals and bonding at undergraduate level rather than the simpler picture presented in pre-university courses.

The topics covered by the eight chapters are Particle-wave Duality, Particle in a One-dimensional Box, Uncertainty Arising from the Wave Nature of Matter, One-dimensional Schrödinger Wave Equation, Rotational Motion, Hydrogen Atom, Further Concepts and Application to Many-electron Atoms and the Structure of Molecules. These chapters are all usefully subdivided so that particular topics are easy to locate in the table of contents. Each chapter also has a fairly brief list of references and suggestions for further reading. A rather concise index is provided, but it is sufficient for finding the main topics.

The book has been produced in an attractive style with clear text, excellent organisation of material and clearly produced diagrams that supplement the text effectively. The written style is clear and concise and should be readily intelligible to the intended audience. The chapters begin with well defined aims and conclude by summarising the key points and with both worked problems and problems for the student to attempt; answers to these problems are provided at the end of the book.

Some pre-requisite knowledge of chemical bonding and molecular orbitals is assumed and the intention is that the material covered would come after introductory courses in organic or inorganic chemistry and probably either towards the end of the first year or in the second year of an undergraduate chemistry course. The order in which the subject matter is presented is likely to be useful in helping students get to grips with the subject as the basic concepts of quantum mechanics are introduced with relatively straightforward examples that will help to overcome the initial conceptual problems that are not unusual on first encountering the topic. These basic quantum mechanical concepts are covered before the introduction of the Schrödinger equation.

The problems have been chosen carefully to help students to clarify the extent to which they have understood the topics covered. The worked problems are particularly useful and are placed at useful locations throughout the chapters. The non-worked questions are at the end of each chapter and provide plenty of scope for testing understanding as there are nearly sixty of them to try. The reviewer attempted a small random selection of the problems and the answers obtained agreed with those given at the end of the book, suggesting (hopefully) that no errors were present. The text is generally free from typographical and other errors.

This is a very useful book as it covers, in an attractive and efficient way, a topic that is often found *difficult* by chemistry students. It can certainly be recommended to students who require a more extensive explanation of the topic than will be found in the average undergraduate general physical chemistry text. The book is also reasonably priced.

Renormalization Methods: a guide for beginners

Subject area
Theoretical Physics.

Description
This book aims to introduce the ideas of renormalisation theory, and to provide a bridge between the treatment of critical phenomena in undergraduate texts and the formal treatment of field theories and the renormalisation group.

Authors
W D McComb.

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

Date/Edition
2004.

ISBN
0-19-850694-5.

Level
Undergraduate.

Price
£39.95.

Tony Harker
Department of Physics and Astronomy
University College London
Gower Street
London
WC1E 6BT
November 2004

Summary Review

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

Renormalisation theory has a certain mystique about it. Depending on the context in which it is first encountered, it appears either devious or magical. Within quantum field theories, renormalisation is often presented as a 'with one bound Jack was free' solution to the problem of theories that predict infinite results for physical quantities that have to be finite. In descriptions of phase transitions renormalisation appears as a way of tackling the fact that, at the critical point, all scale lengths occur in the description of the system. This book aims to show what the relationship is between these two aspects of renormalisation, and to demonstrate how renormalisation methods are used in practice.

The first three chapters are intended to be self-contained, and to form an introduction to the ideas. There are some useful pieces of mathematical background, and the ideas of fixed points are nicely illustrated. Perturbation theories and the need for renormalization, mean field theories and critical exponents, are introduced in a relatively straightforward manner. It is unfortunate that this section is rather carelessly constructed, as the misprints (for example, in Schrödinger's equation), typographical inconsistencies (Z and $\mathcal{Z}$ used interchangeably for the partition function, k and k_B for Boltzmann's constant) and errors (use of $\boldsymbol{m.B}$ instead of $-\boldsymbol{m.B}$ for the energy of a dipole in a magnetic field) may discourage the very readers that the author hopes to entice to read the more advanced sections.

The second section of the book introduces perturbation theory, including diagrammatic methods for analysing the series, starting in the field of non-linear systems and turbulence. The similarities and differences between turbulence theory and quantum field theory are carefully explained, and then renormalized perturbation theory is applied to the direct-interaction and local energy transfer models of turbulence. These applications, which reflect the author's own interests, set this book apart from most other texts on renormalization.

By now we are about half-way through the book, and a more traditional discussion of renormalisation group theory begins, but not before a further discussion of mean-field theories. The real-space and momentum-space renormalization groups are described, including the epsilon-expansion technique for solving in a space of dimensionality d-ε. The chapter on field-theoretic renormalization brings together the earlier material and shows how it applies to the ultraviolet and infrared divergence problems. Finally, the spotlight returns to nonlinear systems and fluid flow.

The reader should not expect to leave this book equipped for research in renormalization methods, but such is not the intention. The aim is to present some of the ideas in a way which would be accessible to final year undergraduates or first-year postgraduates. It is noticeable that there are only 33 entries in the reference list, and these are mainly to more advanced text books rather than to the original research papers. This is entirely appropriate for a book of this scope. Problems are included at the ends of most chapters, and detailed solutions (40 pages) are available from the Oxford University Press web site. All in all, the author succeeds in what he sets out to do, and the somewhat unusual emphasis on fluid flow problems makes this an interesting read.

Small Group Teaching: tutorials, seminars and beyond

Subject area
General.

Description
A primer for new and experienced lecturers, teaching assistants, tutors and demonstrators, trainees at all levels.

Authors
Kate Exley and Reg Dennick.

Publishers/Suppliers
RoutledgeFalmer
(http://www.tandf.co.uk/books).

Date/Edition
2004.

ISBN
0-415-30717-1.

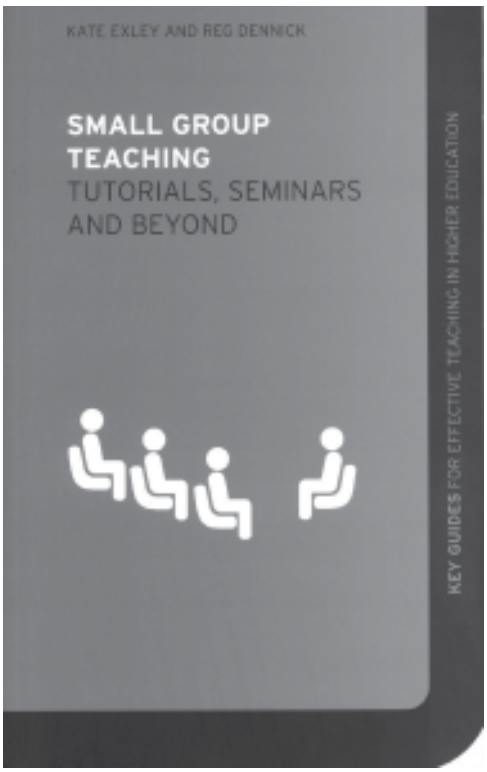
Level
Academic.

Price
£15.99.

Summary Review

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

One of the more valuable skills refresher courses I ever attended was *Small Group Teaching*, which I went to five years ago after 20 years of teaching practice at second, third and adult education levels. If I had been able to avail myself of this book at the time I need not have attended the course! The book is a mine of information and advice for both the trainee and recently qualified teacher, as well as the more experienced who might feel that it is time to review or even refresh their skills. It includes information on the setting up of the group in such a way that a positive dynamic is fostered from the start, and gives information on tried and tested small group teaching methods and techniques. However, the important fact is that some of these methods could just as easily be used to create a dynamic scenario in a larger group.



The effectiveness of the methods described could be inspirational to all teachers. Some of the ideas, like problem-based learning or tutorless groups might not be suitable for all academic classes but they do provide food for thought. There is also advice on self-evaluation and assessment of the methods. Each chapter includes examples of the theory in practice in different disciplines, including physics, but all of the ideas could be used in all subject areas.

The authors have produced a very useful text which has made me want to read more in the series. There are also numerous easily accessible references for further ideas, many of them from web-based sources.

Marie Walsh
Limerick Institute of Technology
Moylish Park
Limerick
ROI
November 2004

Structured fluids: polymers, colloids, surfactants

Subject area
Condensed-matter physics; physical chemistry.

Description
This book provides a comprehensive introduction to the physics of soft-matter systems – such as polymers, colloids, and surfactants – and presents a unified description using concepts such as scaling. The text is suitable for advanced chemistry and physics undergraduates, and postgraduates embarking on research in soft condensed matter physics.

Authors
Thomas A Witten with Philip A Pincus.

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

Date/Edition
2004.

ISBN
0-19-852688-1.

Level
Undergraduate, research.

Price
£39.95.

Philip J Camp
School of Chemistry
University of Edinburgh
West Mains Road
Edinburgh EH9 3JJ
October 2004

This new book is an introduction to the physics of soft-matter systems – such as polymers, colloids, and surfactants – and is intended to furnish the advanced undergraduate reader with a unified view of these complex materials using fundamental concepts in statistical physics.

Summary Review

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

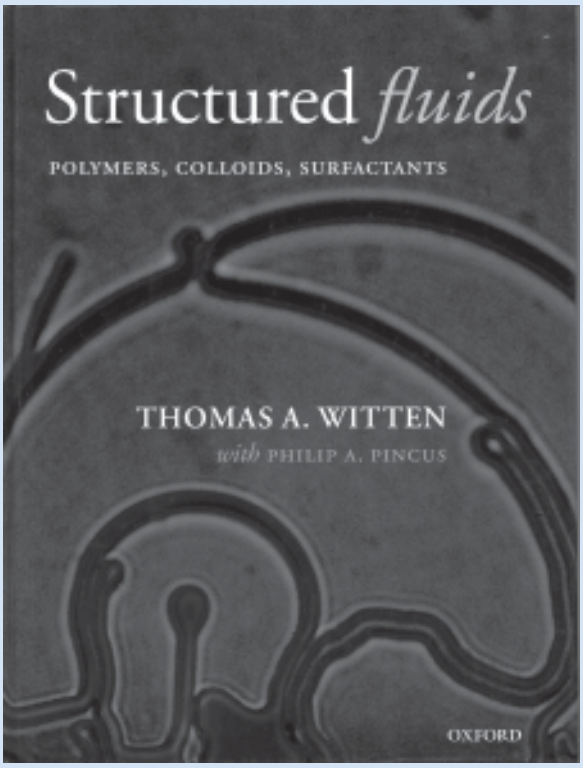
The text begins with a brief survey of the materials and phenomena to be explored throughout the book; the examples are well chosen, and they motivate the reader to find out more. The next chapter – entitled Fundamentals – lays down some fundamental ideas in statistical mechanics in an intuitive fashion that will probably be unfamiliar to most members of the target audience. Some of the standard results – such as the free energy of a lattice gas – seem to be obtained by routes more tortuous than are strictly necessary, but probably this just reflects my personal taste for a more dogmatic approach. Nonetheless, the central themes, e.g., the ability of a system to do work, underpin and unify much of what follows and hence I feel that this unconventional review would pay dividends for an inexperienced reader. The chapter also includes a description of experimental techniques for the study of soft matter, and a useful discussion on the viscosity of fluids. The remaining five chapters then explore specific areas of soft-matter physics, these being polymer molecules, polymer solutions, colloids (including colloidal crystals, ferrocolloids, and lyotropic liquid crystals), interfaces, and surfactants.

The chapters are individually well constructed and comprehensive, while as a whole they possess a coherence which helps achieve the stated goal of a unified treatment. For instance, scaling laws are carefully described in the chapters on polymers, and then employed throughout the text with such effectiveness that by the end one feels sufficiently well equipped to tackle new problems. The text was, perhaps, a little vague when describing chemical aspects of complex molecules, but then the focus is the description of the physical properties of soft matter, so I don't see this as a significant problem. There are sufficient references to help guide the reader towards the relevant primary literature. The style of writing is quite informal, which makes the text easy to read and complements the necessarily semi-quantitative treatments of such complex materials. The production quality of the book is generally very high; I could find no significant errors, although corrections and additions will be made available on the Oxford University Press web site.

Problems are distributed throughout the book, and these are important features that complete the logical progression of the text. I think that this device works well in treatments of more advanced undergraduate topics, although it would not be particularly helpful for lecturers aiming for more structured courses who might benefit from a collection of problems at the end of each chapter. Interestingly, the text is augmented by suggestions for illustrative experiments involving nothing more sophisticated than ordinary household materials and a laser pointer. I was motivated to try some of these experiments – such as the salting out of casein micelles from skimmed milk – and I think these are of enormous pedagogical value, and good fun!

Continued on page 28

Structured fluids: polymers, colloids, surfactants



From the publisher...

Structured Fluids - Polymers, Colloids, Surfactants

Thomas A Witten, James Franck Institute, University of Chicago, Illinois, USA

This book teaches undergraduates in physical science how to understand soft matter: fluids containing polymers, colloidal particles or surfactant molecules. These fluids are playing an increasing role in biotechnology and in basic science. The book gives a unified account of their distinctive properties such as their large viscosities or their weak elasticity using basic statistical principles.
Readership: Advanced undergraduate and beginning graduate students in physical and biological science, as well as chemical engineering. Will also be of use to industrial scientists.

0-19-852688-1 240pp 2004 £39.95

Continued from page 27

Soft condensed matter is of relevance in a wide variety of biological, chemical, physical, and industrial contexts, and it therefore deserves significant exposure in undergraduate chemistry and physics courses. Since the description of condensed matter systems requires grounding in statistical mechanics, the final years of study are probably most appropriate, and the text is indeed aimed primarily at advanced (US) undergraduates. Of course, this is not the first text to deal with soft-matter physics, and the authors preface the book with a comprehensive survey of relevant advanced texts, such as de Gennes' classic monograph, "Scaling concepts in polymer physics"[1] and Chaikin and Lubensky's, "Principles of condensed matter physics"[2]. What sets "Structured fluids" apart is that it should be fully accessible to an advanced undergraduate with a statistical mechanics course under their belt. In addition, I feel that the book provides a useful introduction to theoretical ideas for postgraduate students starting in, for instance, experimental condensed-matter research.

In summary, this book provides an extremely useful first introduction to the vast area of soft condensed matter physics. It should prove useful for advanced undergraduate lecture courses in polymer physics and colloid science, as well as a valuable introduction to the topic for starting postgraduates. Moreover, I can wholeheartedly recommend this text for anyone interested in discovering the diversity, excitement, and challenges of soft-matter physics.

References

1. de Gennes, P G *Scaling concepts in polymer physics*, Cornell University Press (1979).
2. Chaikin, P M and Lubensky, T C *Principles of condensed matter physics*, Cambridge University Press (1995).

The Quantum Theory of Light

Subject area
Quantum theory, quantum optics.

Description
A detailed account of the basic theory needed for an understanding of the quantum properties of light.

Authors
Rodney Loudon.

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

Date/Edition
2004/3rd Edition.

ISBN
0-19-850176-5.

Level
Research.

Price
£32.95.

Alan Hinchliffe
School of Chemistry
The University of Manchester
Sackville St
Manchester M60 1QD
November 2004

Summary Review

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

The First Edition of Loudon's classic text appeared in 1973, the Second Edition in 1983 and Third Edition in 2000. The third edition was reprinted in 2001, 2003 and 2004 so it is apparent that the field of quantum optics has witnessed significant theoretical and experimental advances over the last three decades. Indeed, more than half the material in this Third Edition is new.

It is good to read a Preface where the aims and likely audience are stated so clearly. I can't do better than quote the author '… the purpose of the book remains the provision of a detailed account of the basic theory needed for an understanding of the quantum properties of light. The material is intended to bridge the gap between standard quantum mechanics, electromagnetic theory and statistical mechanics, as taught at undergraduate level, and the theory needed to explain experiments in quantum optics.'

The audience is said to be '… final-year [physics] undergraduates,… first-year graduate students and… more advanced post-graduates and research workers.' That's exactly right, for a certain level of mathematical ability and precursor knowledge is assumed. Roughly speaking, if you are *au fait* with quanta and Maxwell's equations:

$$\mathrm{div}\,\mathbf{E} = \frac{\rho}{\varepsilon_0}$$

$$\mathrm{curl}\,\mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

$$\mathrm{div}\,\mathbf{B} = 0$$

$$\mathrm{curl}\,\mathbf{B} = \mu_0\left(\mathbf{j} + \frac{\partial \mathbf{D}}{\partial t}\right)$$

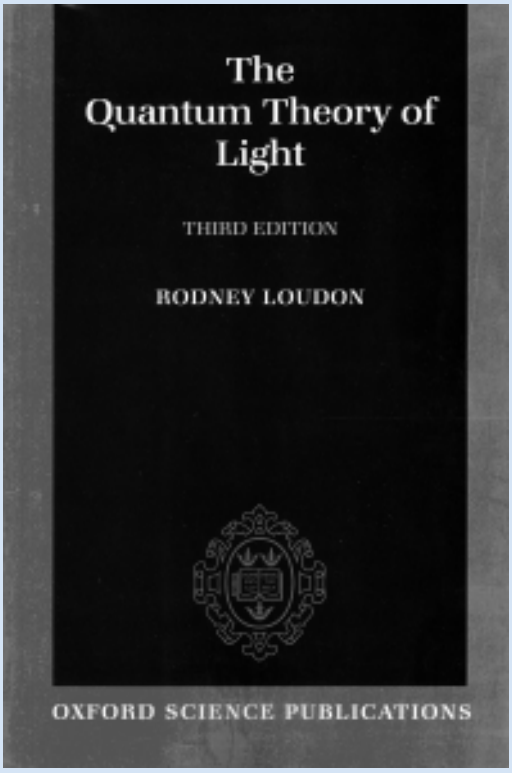
then you will be OK, and will benefit from the text. Otherwise you will have given up by page 5.

Loudon is a working textbook, not a research monograph. There are 100 problems distributed through the text, with as many key references as are needed to satisfy both beginner and improver in this exciting field. I spotted references to Dirac's 1930, "Principles of Quantum Mechanics"[1] and to Jackson's 1999, "Classical Electrodynamics"[2] amongst the well-known texts, plus many recent research citations (towards the end of the 438 pages).

Derivations are given with lucid explanation and with their physical content. The text is as clear and helpful as it was in the First Edition.

Continued on page 30

The Quantum Theory of Light



From the publisher...

The Quantum Theory of Light

Rodney Loudon, Professor of Theoretical Physics, Department of Electronic Systems Engineering, University of Essex

The present book provides an introduction to quantum optics, the study of optical effects that cannot be explained by classical theory. Its main concern is the theoretical background to the key experiments in quantum optics. More than half of the material in this third edition is new, the material that has appeared in the previous editions already has been updated. The level of the treatment as a whole is appropriate for postgraduate students and research workers, while earlier chapters are also suitable for final-year undergraduates.
Readership: Final-year physics undergraduates, physics graduate students, research workers in experimental and theoretical quantum optics. Graduate students and researchers in physical chemistry and electrical engineering.

0-19-850176-5 448pp 2004 £32.95

Continued from page 29

Contents are as follows:
Preface
1. Planck's radiation law and the Einstein coefficients
2. Quantum mechanics of the atom-radiation interaction
3. Classical theory of optical fluctuations and coherence
4. Quantization of the radiation field
5. Single-mode quantum optics
6. Multimode and continuous-mode quantum optics
7. Optical generation, attenuation and amplification
8. Resonance fluorescence and light scattering
9. Nonlinear quantum optics

The only competition that springs to mind is "Quantum Optics" by M O Scully and M S Zubairy[3]. This was published in 1997, and is possibly getting a bit long in the tooth.

Loudon Third Edition is a pleasure to read, nicely done and I read with a wry smile that it was typeset by the author.

It got me thinking.

References

1. Dirac, P A M *The Principles of Quantum Mechanics*, Clarendon Press, Oxford (1930).
2. Jackson, J D *Classical Electrodynamics* 3rd Edition, John Wiley & Sons Ltd, New York (1999).
3. Scully, M O and Zubairy, M S *Quantum Optics*, Cambridge University Press (1997).

The Role of the Solvent in Chemical Reactions

Subject area
Physical Chemistry.

Description
Text in the Oxford Chemistry Masters series covering the essentials of theory, modes of action and classification of solvents.

Authors
Erwin Buncel, Robert Stairs and Harold Wilson.

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

Date/Edition
2003.

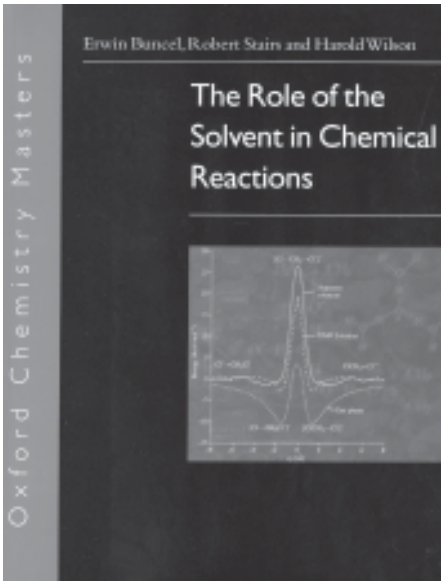
ISBN
0-19-851100-0.

Level
Research.

Price
£29.00.

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

Solvents are of daily relevance to the practical chemist and there are few good, comprehensive and modern texts on the subject. This 130 page monograph attempts to distil this wide subject down to the essentials of theory, modes of action and classification of solvents. It is a Herculean task and the authors are to be congratulated for having managed it so well. The book has a strong theoretical basis and is clearly written from the physical chemist's point of view but it is a very useful underpinning for chemistry graduates embarking on post-graduate research involving synthetic chemistry. The authors consider the solvent as a medium, the solvent as a participant and chemometrics in the first 80 pages. Then comes a 20 page chapter on theoretical modelling and the methodologies that have been used successfully in that field. The latter part of the book considers dipolar aprotic solvents and other examples of modern trends in solvent choice.



For me, as an organic chemist, the last 20 pages are the most interesting covering fascinating examples of the use of ionic liquids and 'green chemistry'. There is also a summary of the usefulness of chiral solvents in stereoselective preparations.

Although the book is very good, I was left wanting to hear more about applications and examples of solvent use and the conclusion on choosing solvent is rather short - only a page. However, there are some excellent references for further reading throughout the text: for guidance towards a deeper understanding of the theoretical aspects of the subject as well as some good practical guides to solvents and solvent effects in synthetic organic chemistry. There is too a handy appendix with data on solvent parameters as well as comprehensive references.

It's a fine book and would grace the shelves of a research lab as a handy reference and a good starting point for thinking about which solvent to choose for a new experiment or perhaps revisiting an old one.

David J Harwood
Director, Institute for Science Education
School of Earth Ocean and Environmental Sciences
University of Plymouth
Plymouth PL4 8AA
October 2004

Using C&IT to Support Teaching

Subject area
General.

Description
The book aims to describe the use of C&IT to support teaching and learning in higher education. It is targeted particularly at new lecturers, as well as those involved in part-time teaching, including postgraduates. It is also designed as a reference source for more experienced teachers.

Authors
Paul Chin.

Publishers/Suppliers
RoutledgeFalmer
(http://www.tandf.co.uk/books).

Date/Edition
2004.

ISBN
0-415-30715-5.

Level
Academic.

Price
£15.99.

Lowry McComb
Department of Physics
University of Durham
Science Laboratories
South Road
Durham DH1 3LE
November 2004

Paul Chin will be well known to readers of Physical Sciences Educational Reviews as Centre Manager for The LTSN Physical Sciences Subject Centre. In this book, Paul brings his experience in Teaching and Learning to focus on how computers and information technology can be used to support students in higher education.

Summary Review

range: * poor to ***** good

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

The book (which is part of a series entitled Key Guides for Effective Teaching in Higher Education) aims to describe the use of C&IT to support teaching and learning in higher education. It is targeted particularly at new lecturers, as well as those involved in part-time teaching, including postgraduates. It is also designed as a reference source for more experienced teachers.

The book begins with a brief review of the pedagogy of teaching in HE, from the standpoint of Kolb, and Honey and Mumford. The meat of the book is a practical discussion of the use of a number of C&IT solutions with chapters covering OHPs and Powerpoint, handouts, videos and slides, interactive whiteboards, electronic information resources, virtual learning environments (VLEs), e-learning, field trips, laboratory classes and ending with a chapter on evaluation.

Covering such a range of topics in such as small volume (~170 pages) inevitably means that coverage is a little patchy. There is, for instance, a lot of detail on interactive whiteboards, down to the level of discussing individual manufacturer's equipment. On the other hand the chapter on VLEs just skims the surface on what is becoming an increasingly important area of support in HE. However, there are useful references to the steadily-growing body of literature in these areas. There are a number of gaps in coverage – particularly some relevant to the support of distance students (telephone, e-mail, etc).

Of course, a danger with a book like this is that will very rapidly become out of date. There is, for instance, a lot of emphasis on the use of 35mm slides in the text – only last week there was a memo from my institution's AV support department saying that support for 35 mm slides in lecture theatres would be withdrawn over the next few years as it becomes impossible to replace the projectors.

Does the book succeed in its aims? On balance, I think it does. It will provide an introduction to the technology for the new HE teacher. Perhaps there is a little too much emphasis on the advantages of technology rather than the pitfalls. The more experienced teacher will find some new ideas in here.

I do not think this is a publication that will find its way onto every new lecturer's book shelves – the subject matter is rather too narrow for this. However, with the increasing emphasis on providing training for teaching in HE – both for new lecturers and, with the arrival of Roberts money, for postgraduates and postdocs, it will find a useful place in staff development libraries.

Absorb Physics for A-level

Subject area
General Physics.

Description
A multimedia A-level physics course.

Authors
Adrian Watt.

Suppliers/Distributors
Crocodile Clips (http://www.crocodile-clips.com/index.htm).

Date/Version
2002.

Level
A-level, access, undergraduate.

Type of package
Computer assisted learning.

Price
Site Licence £350-£650 depending on number of pupils.

Hardware required
Windows-compatible PC, Pentium processor or higher, 32MB RAM, 30MB free disk space.

Software required
Windows 98 or later, Internet Explorer 5 or later (compatible with Microsoft Class Server).

Gren Ireson
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November 2004

Whilst the intended audience for this package is GCE A-level students in the UK; its range of activity, from simple mechanics to quantum phenomena, make it of use well beyond this. Foundation year students, first year undergraduates and trainee teachers following a post graduate (PGCE) course will all find sections of this package useful.

The tutorial nature of the package makes it ideal for independent or directed self study with the embedded questions giving instant feedback.

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 animations and laboratory simulations, however, make this package truly outstanding. Students can perform laboratory based investigations on screen without needing access to any apparatus. Whilst this will obviously not replace the traditional laboratory class it does allow for more flexible self study and the option of greater interaction during a lecture or seminar presentation.

fig 1: An example animation showing the Doppler Effect

Having used this package with trainee physics teachers and an interactive whiteboard the feedback from the students was overwhelmingly positive. Those with a strong physics background commented on the new insight provided and those from an engineering background commented on the ease with which it refreshed past knowledge or got them up to speed in new topics.

The content of all sections used appears to be on a par with the best texts in terms of both coverage and accuracy. Overall I would recommend all schools with post sixteen students and all HEIs offering physics or subjects allied to physics obtain a copy for their resource area.

Absorb Physics for GCSE

Subject area
General Physics.

Description
A multimedia GCSE physics course.

Authors
David Fairhurst.

Suppliers/Distributors
Crocodile Clips (http://www.crocodile-clips.com/index.htm).

Date/Version
2002.

Level
Secondary.

Type of package
Computer assisted learning.

Price
Site Licence £350-£650 depending on number of pupils.

Hardware required
Windows-compatible PC, Pentium processor or higher, 32MB RAM, 30MB free disk space.

Software required
Windows 98 or later, Internet Explorer 5 or later (compatible with Microsoft Class Server).

Mark Robertson
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October 2004

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	*****

"Absorb Physics" is a complete multimedia based GCSE physics course. It should, however, be noted that this product has been reviewed with the Scottish examination courses in mind. In this respect, although it does not make for a complete course in its own right, the content allows for use in both the Standard Grade and more advanced Higher Still courses. The program can be installed in two forms: a basic stand alone version and a second version (not reviewed) compatible with the Microsoft Class Server (MCS) system. The site license for the program allows for student copies to be made and distributed as seen fit.

The program itself is divided into a number of different sections covering topics from motion and forces to atomic theory and radioactivity. Each section is further split into subsections comprising of areas of text with questions to check the progress of learning. These questions are structured to cover a range of abilities and allow for some degree of differentiation. The questions are marked by the program and so allow for instant feedback to the student. One drawback is that the program allows the answers to be changed at any time which may encourage some to guess until the correct answer is found. The version reviewed also allowed no feedback to the teacher making it difficult to keep track of individual student progress. It is believed that this is not the case with the MCS compatible version. This version also allows the teacher to set some of these questions as homework and for the answers to be emailed to the teacher for subsequent checking. Each subsection also includes a number of animations and simulations with which to develop students' understanding. The animations are Flash compatible and it is here I feel that the program is truly useful. These animations can be projected via a multimedia projector to allow students to visualise some important physics. For example, I have made good use of a scaled up animation of a reed relay to show the magnetic effect of current in a wire.

The computer simulations are also useful for individual and pair work and work via an included viewer so it is not necessary to have Crocodile Clips installed. A number of experiments can be carried out from projectiles and Newton's Canon to balanced see saws. Again it is possible to project these simulations for large group work. Both animations and simulations can be quickly accessed as stand alone sections removed from any distracting text.

The program includes a useful on-line tutorial to explain the basic workings of the program although the user interface is intuitive and easy to use. The program also contains an online glossary which is cross referenced to the individual course topics.

In summary, I believe that "Absorb Physics for GCSE" is very useful as a full teaching package for use, for example, with absent students or as an occasional resource to dip in to when necessary. The animations and simulations are excellent for multimedia projection and, from personal experience, are effective in illustrating areas where an equipment based class demonstration may be difficult. In all, a good program and worth the money.

The Science Learning and Teaching Conference 2005

27th - 28th June, 2005

University of Warwick

'towards excellent science teaching in university based education'

Summary

The aim of this national conference is to bring together practitioners in the teaching of science disciplines in HE to share their experiences, identify common challenges and an opportunity to share effective practice. The conference programme will include keynote lectures, short oral presentations, hands-on workshops, posters and exhibitions.

Organiser

The Higher Education Academy Centres for Bioscience, Materials and Physical Sciences.

The conference is sponsored by the FDTL projects: FAST, LeAP, PPLATO and OLAAF.

Contributions

Offers of contributions are invited for oral presentations (15 minutes), workshops (2 hours) and poster presentations. Contributions on any of the following themes are particularly welcome: recruitment, e-learning, assessment, sustainability, creativity, trends-on science.

Abstracts of approximately 300 words should be typed in Times New Roman 12pt and emailed as an attachment to Katie Glover at k.glover@hull.ac.uk by 31 December 2004.

Abstracts should include author(s) department(s), institution(s), contact email address and an informative title.

Registration

The registration fee for the conference with be £100 for those participants with an accepted abstract, otherwise the fee will be £150.
Registration will be open in January 2005.

Notes for reviewers

For those who undertake the many reviews we publish in this journal, here are the locations of the *guidelines for reviewers* and *on-line forms* on our web site.

Book Review Guidelines
http://www.physsci.heacademy.ac.uk/Resources/BookReviewsGuidelines.aspx

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