Essential Mathematics and Statistics for Science

Subject area
Mathematics, General Science

Description
Mathematics and statistics text for undergraduate science students of 'modest mathematical ability'.

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

Date/Edition
2005

ISBN
0-470-02229-9

Level
Undergraduate

Price
£24.95

The authors claim that the text is written to support undergraduates of a number of science programmes; "biological, environmental, chemical, forensic and sport sciences." They further state that the "introductory level of the book assumes that the reader will have studied mathematics with moderate success to year 11 (age 16 in UK) of normal schooling."

Summary Review

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

The text, whilst not divided as such, is in two parts with chapters 1 to 6 covering mathematics and chapters 7 to 13 covering statistics and experimental design.

Starting with chapters 1 to 6 I find it difficult to see a student with grade C GCSE mathematics, especially if they have taken a foundation paper, being able to cope with the rapid pace. For example, differentiation appears as just part of the final chapter and, including examples, runs to just over three pages. The first example here is the solution of:

$$dy/dx \text{ where } y = AeBx$$

This is followed by a table of differential coefficient for common equation formats. If students follow this I fear that their approach will be entirely mechanistic and not develop the deeper understanding most tutors will want to see. My fear is that students of modest mathematical ability, ie the intended readership, will not follow it and require more formal teaching or recourse to the help currently available on campus.

A second example of this rapid pace is early in chapter 3, equations in science, where the reader is introduced to 'substitution of values'. This sub-topic is introduced via the solution of a quadratic using the standard formula, which is fine. Unfortunately the student of modest mathematical ability at GCSE has not been re-acquainted with either quadratic equations or the reason for two solutions. Again I fear that the intended reader will be at a loss in terms of developing any mathematical understanding.

However it must be said that the linked website, available at: eu.wiley.com/legacy/wileychi/currellmaths, allows more practice and access to additional questions. This does not though address the question of developing understanding.

Moving into the second half of the book; students are, in my view, further disadvantaged by the fact that they are unlikely to have been exposed to anything beyond mean, median, mode and simple probability during their school based mathematics. Again my fear is that this text drives students to adopt a mechanistic approach to their analysis.

A positive side to this half of the book is the sub-section on experimental design. The pity is that it only runs from page 304 to page 312 and doesn't come at the start of chapter 7 allowing the remainder of the text to be set in this context.
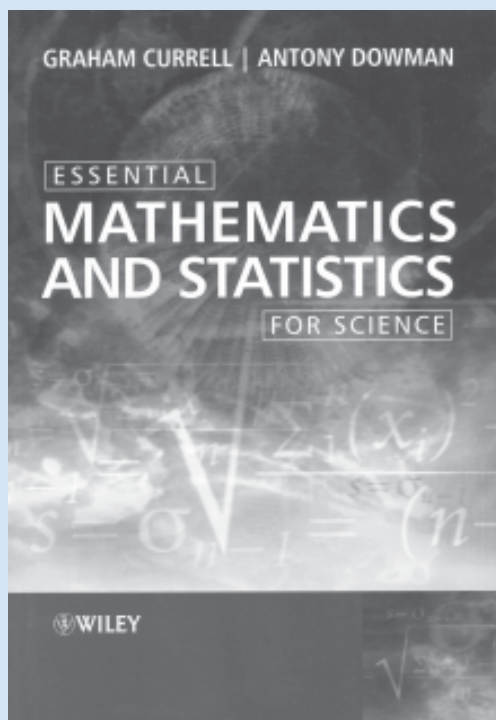
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From the publisher...

Essential Mathematics and Statistics for Science

By Graham Currell, Antony Dowman

Basic Mathematics and Statistics for Science is a low-level introduction to the essential techniques students need to understand. It assumes little prior knowledge, and adopts a gentle approach that leads through examples in the book and website.

No other text provides this range of educational support for science students. The integration between book and website provides study options that would be impossible through a book alone, and allows students to study in ways that suit their own circumstances and preferences.

The book develops the mathematics and statistics through examples and questions that reflect the scientific context, and has succeeded in being relevant to a range of undergraduate science programmes.

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A further positive to take from the text is the fact that the authors take the trouble to set their examples and questions in a scientific context which, this time, I see as a benefit for the student of modest mathematical ability. At least the student can recognise the situation under analysis which may alleviate some of their fears.

To summarise I feel the text misses its target audience and I see this more as a refresher text for students who are starting well beyond a grade C GCSE mathematics. Having made this judgement I then wonder how many physical science undergraduates would be in the position of starting their undergraduate study with a grade C GCSE mathematics. Perhaps the text is better suited to being a class-text for an access course where students are carefully guided by a tutor through the overly complex presentation, taking advantage of the context led examples and the availability of the web-based materials.