

# *the little blue book*

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This paper will discuss the production of a reference book written as a special service for second year mathematics students at the University of Sydney. The book contains the definitions, formulas and techniques from first year calculus and algebra courses that are assumed in second year. The paper discusses the reasons for writing such a book, how the content was decided upon, and the potential benefits for students arising from their use of the book. Results of a student survey on the book are given.

## **Background**

Many second year mathematics students are significantly hampered in their ability to complete assignments and to understand lectures and tutorials because they do not have at their fingertips important results from first year mathematics that are assumed by their tutors and lecturers.

First year mathematics involves a large and wide-ranging syllabus, much of which is new to the students. Particularly in mathematics, it is important that the students understand that second year work builds on first year material, and that certain results are absolutely fundamental and must be remembered and understood. Many students, however, find it difficult to identify the important results in previous work. When these students run into difficulties in second year, they are often unable to distinguish those which are due to a lack of assumed knowledge from those which arise in the new material. This is a particular problem for weaker students, and for those students who are not interested in mathematics, but are required to study it for their degree. (At the University of Sydney many engineering students, all of whom are required to study a significant amount of mathematics in second year, fall into this category.) Such students tend to forget their mathematics very quickly once the first year exams are over.

It was felt that these students could be helped by having available a reference book which would summarise all the important results from first year and which would be compact enough to carry to their classes each day.

## **Writing the book**

The aim was to produce a book which contained all the important definitions, formulas and techniques taught in first year which are assumed by second year lecturers. It was not the intention to produce another textbook or set of course notes, but rather a reference book which would allow students to be reminded of results and techniques which they learnt in first year, but might have forgotten. It was therefore decided that topics would be treated very briefly, and that results would be simply stated, without detailed explanations or derivations. The hope was that such a book would not only be an invaluable extra resource, but would help students identify those areas requiring remedial action and enable them to determine whether

their difficulties were due to a lack of assumed knowledge or an inability to understand new work.

The three authors of the book (Sandra Britton, Clare Coleman and Jenny Henderson) began working on it in August 1998. The first task was to make a thorough survey of all our first and second year courses. A considerable amount of time was therefore spent examining second year syllabuses and problem sheets, in order to properly differentiate new material from assumed material. Second year lecturers were interviewed, and asked which topics they believed students could be assumed to know. The information accumulated through this process was not only essential for writing the book, but has proved useful in other ways as well. Those involved in second year teaching valued the explicit reminder of exactly what had been taught in first year. Occasionally it was found that a little too much had been assumed, or that some material was being unnecessarily repeated in second year.

The process produced what we believed was a comprehensive list of topics to be included in the book. Each chapter of the book deals with a specific topic area, and concludes with a list of references in which students may find further information, or more detailed explanations. Chapter headings are:

- Functions
- Complex numbers
- Integration
- Vectors
- Matrices and systems of equations
- Solving differential equations
- Other useful information

Worked examples are used throughout in order to illustrate techniques. An extensive index was prepared so that particular results could easily be found.

The book was named *the little blue book* [1] and was ready for the beginning of semester 1 1999. All second year lecturers were given a copy, and were asked to make its existence known to their students.

### Student response

By the end of semester 1 1999, the first print run of 500 copies had been sold. At the end of that semester, one of the large second year classes was surveyed on their opinions of the book. The number of students who responded was 331, of whom 212 (64%) owned a copy of *the little blue book*. Those 212 students responded as follows to a series of questions:

Finding what you want in *the little blue book* is

Really difficult	Difficult	Quite easy	Very easy
1%	7%	74%	18%

The layout and presentation of the text in *the little blue book* are

Confusing	Just OK	Clear	Very clear
2%	19.5%	65.5%	13%

The mathematics in *the little blue book* is explained

Very badly	Badly	Well	Very well
1.5%	8.5%	83%	7%

The number of worked examples in *the little blue book* is

Inadequate	Just OK	Good	Very good
17%	49%	30%	4%

As a reference book, *the little blue book* is

Useless	Somewhat useful	Useful	Very useful
4%	30%	52%	14%

How often have you used *the little blue book*, on average?

Less than once/week	About once/week	More than once/week
72%	23%	5%

Students were also asked to say how they thought the book could be improved. The most common response to this was “more worked examples” (41 students), followed by “more detailed explanations” (10 students). While this was not surprising, we felt that it indicated that these students wanted, in effect, another textbook, and had missed the point of this book. (The book begins with a page explaining that it is meant as a reminder only, and therefore does not contain detailed explanations.) Eight students specifically requested more difficult worked examples.

## Future editions

We intend to revise the book, in response to comments from students and staff. At the next printing some harder worked examples will be included and new sections will be written on composite functions and the Intermediate Value Theorem (topics omitted from the first edition but requested by students). If time permits, the next printing will also include self-diagnostic tests.

## Conclusion

We believe that *the little blue book* has been beneficial for a significant number of students, and we plan to have it printed annually for the foreseeable future. A majority of second year students has purchased the book, and the overall response to it has been positive. (Third year students have asked when there would be a similar book for third year.) The survey results suggest that while students find the book useful when they use it, they do not use it particularly often. We intend, therefore, to encourage more students to take the book with them to tutorials, and to ask second year lecturers and tutors to refer to it whenever appropriate.

Colleagues in other universities who have seen the book have been enthusiastic, and one other university in Sydney intends to recommend it as a reference book for their engineering students.

## Acknowledgements

The production of *the little blue book* was funded by a grant of \$15 000 from the Faculty of Science (Student Progression Assistance Scheme) and by the School of Mathematics and Statistics. The funds provided partial teaching relief for the authors of this paper, and the employment of the book's third author (Clare Coleman) as a half-time Research Assistant for six months. We are immensely grateful to Clare for her contribution to the project. In addition to sharing in the task of writing the material, Clare was responsible for the detailed examination of the first and second year syllabuses, and for the typesetting of the book.

We are indebted to Steve Barry, ADFA (UNSW), whose *Essential Mathematics Scheme* [2] planted the seed for the idea which grew into *the little blue book*. We first heard Steve talk of his scheme at  $\Delta$ '97.

## References

- [1] S.C. Britton, C.E. Coleman, J. Henderson, 1999, *the little blue book*, School of Mathematics and Statistics, University of Sydney.
- [2] S.I. Barry and S. Davis, 1998, Essential mathematical skills for undergraduate students, *The Australian Mathematical Society Gazette* Vol 25 no 1, 6–14.