PH2130 Mathematical Methods

Book List

Lecturer: Professor B Cowan

I recommend you do *not* purchase a text book at the start of this course. Some books are mentioned below; you should look at them, particularly when the course gives particular references. You will probably hate the style and approaches of some books, but your researches should uncover a book that is really on your wavelength. If you are intending a career as a physicist then you should probably think in terms of purchasing a book that will be of continuing use, that covers more material than this course alone.

Key reading for this course

1. *Advanced Engineering Mathematics* by E. Kreyszig, J. Wiley, 7th edition, 1993. Library class: 510.245 KRE

   This book treats much of this course in a clear and concise manner, with plenty of examples relating to physical systems. The worked examples give very good indications of how problems should be tackled. I think the clarity might be deceptive, achieved through very careful choice of material; the author seems to stop whenever things start to get really interesting! However this book is a good read and the author is definitely on the reader's "side". You might find a second hand copy, even of an earlier edition, for purchase.

2. *Mathematica manual for Advanced Engineering Mathematics* by E. Kreyszig and E. J. Norminton, J. Wiley, 1995. Library class: 510.245 KRE

   This book is the Mathematica supplement to the above book. It introduces Mathematica commands chapter by chapter and it is useful guide to using Mathematica in realistic applications.

3. *From Calculus to Chaos* by D. Acheson, Oxford University Press, 1997. Library class: 515.34 ACH

   This book treats the important topic of *visualising* the meaning of differential equations in terms of flows in real or phase space. By using Mathematica this can be a very powerful technique of understanding the physical content of a differential equation, before embarking on numerical or analytic solution.

Further reading

4. *Modern Engineering Mathematics* by G. James, Addison-Wesley, 2nd edition, 1996. Library class: 510.245 JAM

   You might have purchased/used this book in your first year. It has some material relevant to this course.

5. *Mathematical Techniques* by D. W. Jordan and P. Smith, Oxford University Press, 1994. Library class: 510.245 JOR

   You might have purchased/used this book in your first year. It has some material relevant to this course.

6. *Mathematical Methods for the Physical Sciences* by K. F. Riley, Cambridge University Press, 1974. Library class: 510.245 RIL

   This is a rather informal approach to many of the topics of this course. It is often worthwhile looking here if you don't fully follow what the more "sophisticated" books are saying.

7. *Mathematical Methods of Physics* by J. Mathews and R. L. Walker, Addison-Wesley, 1970. Library class: 530.15 MAT

   This book is based on lectures of the legendary Richard Feynman. The selection of topics is somewhat idiosyncratic, but the clarity is exceptional and you can always see what the physical applications might be, even when not explicitly stated.