School of Mathematics

Course 1S3 — Mathematics for Science students 2005–06
(JF Mathematics as a whole subject within the Science Moderatorships. JF Human Genetics. JF Computational Chemistry. JF Medicinal Chemistry. JF Physics & Chemistry of Advanced Materials.)

Lecturer: Dr. R. M. Timoney

Requirements/prerequisites: None

Duration: 24 weeks

Number of lectures per week: 2 lectures per week plus a tutorial every second week. Computer lab in first term.

Assessment: Practical work, assignments, tutorial work and computer lab assignment results will count for 20% of the marks, with the paper counting for the remaining 80%

End-of-year Examination: Three hour exam. Result is combined with results of 1S1 and 1S2.

Description:

• Practical computing work
  General use of UNIX computer system (email, web page creation, use of network); use of Mathematica. One hour per week in Michaelmas Term.

• Introduction to computing
  Binary, octal and hexadecimal integers; storage of integers and floating point numbers in computers (via bits).

• Introduction to symbolic computing
  Anton, Bivens & David, Calculus (8th edition): 1.2, 1.7, Chapter 4, exercises in Chapters 3, 5–10 marked CAS or ‘graphing utility’.
  Mathematica book Part 1 (less than what is in section 1.1–1.9).

• Differential Calculus
  Maxima and minima and plotting (with the aid of symbolic computation); parametric plots. Linear approximation, root finding using Newton’s method.
  Anton, Bivens & David, Calculus (8th edition): Chapter 4 (except 4.7) and section 3.9.

• Integration
  The concept of a definite integral (area or Riemann sum). Elementary algorithms for computing definite integrals (trapezoidal and Simpson’s rules). Fundamental Theorem of
Calculus and antiderivatives Techniques of integration and standard applications (backed up by practical work using computer algebra).

Anton, Bivens & David, Calculus (8th edition): 5.1, 5.4–5.6, 6.1–6.4, 8.5-8.8.

• An introduction to probability and statistics

  The notion of a probability on a sample space, mean and standard deviation for random variables, sample mean and sample variance, the binomial, poisson and normal distributions.


There is a web page for this part of the course, which is updated during the year. The address is http://www.maths.tcd.ie/~richardt/1S3.

Essential Reference


Recommended references


October 19, 2005