School of Mathematics

Course 1S2 — Mathematics for Science students 2000–01

(JF Mathematics as a whole subject within the Natural Science Moderatorships (for those taking Physics). JF Computational Physics and Chemistry. JF Physics & Chemistry of Advanced Materials.)

Lecturer: Dr. B. Redmond

Requirements/prerequisites: None

Duration: 24 weeks

Number of lectures per week: 2 lectures per week plus a tutorial every third week.

Assessment: Two end-of-term assignments assignment will each count for 10% of the marks for section 2.

End-of-year Examination: Three 3-hour exam. Result is combined with results of 1S1 and 1S3.

Description: Vectors and linear algebra, differential equations, and applications to physical examples.
   More detailed outline:

- Vectors, addition, scalar product, cross product, vector equation of a line in 3 dimensions, triple vector product, differentiation. (Anton (Calculus): 13.1–13.6)

  Parametric equations (Anton (Calculus): 1.7); cylindrical coordinates (Anton (Calculus): 13.8).

- Matrices, systems of linear equations, determinants. (Anton&Rorres: Chapters 1-2)

- Ordinary Differential Equations of first and second order. Linear differential equations with constant coefficients. Nonhomogeneous. (Kreysig: from Chapter 1-2)

- Applications/Examples: Simple Harmonic motion, with and without resistance. Electric circuits. Radiocative decay. Motion in a resisting 1-dmensional medium. (Anton (Calculus): Chapter 10, Kreysig: from Chapter 1–2)

Essential Reference

1. Howard Anton, Calculus: a new horizon (6th edition), Wiley, 1998.

Recommended references

1. Howard Anton and Chris Rorres, Elementary Linear Algebra applications version, (7th edition) Wiley 1994.

2. Erwin Kreyszig, Advanced Engineering Mathematics, (7th edition) Wiley, 1993.

3. Kenneth A. Stroud, Engineering mathematics : programmes and problems, (4th edition) Macmillan, 1995.

4. G. B. Thomas & R.L. Finney, Calculus and Analytic Geometry (9th edition), Addison Wesley, 1996.

October 19, 2000