



The
University
Of
Sheffield.

Electronic &
Electrical
Engineering.

MAS243 MATHEMATICS 4

Credits: 10

Course Description including Aims

To develop new mathematical skills needed for Electronic and Electrical Engineering with particular emphasis on electromagnetics.

Outline Syllabus

Optimization: stationary points; maxima, minima and saddle points; constraints and Lagrange multipliers.

Multiple integration: surface and volume integrals; cylindrical and spherical co-ordinates; integration over circles; spheres and cylinders; change of variable.

Vector analysis: scalar and vector fields; grad, div and curl; vector identities; line, surface and volume integrals; Gauss \diamond divergence and Stokes \diamond theorem; polar co-ordinate forms.

Time Allocation

22 lectures, 11 tutorials

Recommended Previous Courses

MAS156, MAS242

Assessment

One two-hour written examination. Format: Attempt all four questions.

Recommended Books

James, G. *Advanced Modern Engineering Mathematics*

Objectives

At the end of the course students should be able to:

- determine stationary points for scalar functions with and without simple constraints
- understand the difference between scalar and vector fields
- differentiate and integrate these fields in space and/or time in simple cases
- understand the physical significance of these processes
- recognise when alternative co-ordinate systems are useful and how to apply them

Detailed Syllabus

Optimization

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Multiple integration

surface and volume integrals; cylindrical and spherical co-ordinates; integration over

circles;spheres and cylinders; change of variable.

Vector analysis

scalar and vector fields; grad, div and curl; vector identities; line, surface and volume integrals; Gauss' divergence and Stokes' theorem; polar co-ordinate forms.