Module F1.1ME3 ALGEBRA 3 2008

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Aims of course

This course is an introduction to graph theory, a subject with wide-ranging applications: graphs can be used both to represent problems and to help in solving them. I shall also use graph theory as way of explaining the basic ideas behind mathematical proofs.

SYLLABUS

1. **Introduction to graphs.** The use of graphs to represent and help solve problems is described. Graph theory terminology is introduced.

2. **The adjacency matrix.** With each graph we can associate a square matrix. This matrix can be used to calculate information about the graph. In this section, I shall also describe proof by induction.

3. **Trees.** A tree is a special kind of graph. The main goal of this section is to describe Prim's algorithm which can be used to find minimum spanning trees in weighted graphs.

4. **Planar graphs.** A graph is planar if it can be drawn without edges crossing. The most important result in this section is Euler's formula which links the number of edges, the number of vertices, and the number of faces in a planar graph.

5. **Vertex colouring.** Colouring maps so that neighbouring countries have different colours leads to the idea of colouring the vertices of a graph so that adjacent vertices have different colours. This idea is used in Scheduling. I'll describe the famous Four Colour Theorem and prove the Five Colour Theorem.

6. **Eulerian graphs.** A graph is Eulerian if it is possible to draw in one continuous line, without doubling back. An algorithm will be described for finding such a line if it exists.

ASSESSMENT

The module will be assessed by means of two tests (together worth 10% of the overall assessment), and an end of term examination (worth 90% of the overall assessment). **More information on the tests will be announced in the lectures**. The pass mark for the module is 40%.

If you do not pass the module you may attempt a resit examination in August/September 2008. The assessment for the resit is based entirely on a two hour examination paper.

Past papers: the relevant past papers are 2005, 2006 and 2007 and are on the departmental website. I do not provide solutions, but I am happy to mark any work you do.

Calculators in examinations

Students must supply their own calculators in university examinations and only the following may be used in mathematics examinations: Casio fx-85WA, Casio fx-85MS, Casio fx-85ES, Casio fx-83MS, Casio fx-83ES. Thus you will not be allowed to use a calculator with graphics or text-retrieval facilities in the examination.

More information about the module can be found on its Web home page

http://www.ma.hw.ac.uk/maths/modules/F11ME3/

The same information can be found from the VLE at http://vision.hw.ac.uk.