

MA32003: Operational Research Course Guide 2011 - 2012

Organization

The MA32003 module runs for 11 teaching weeks in the first semester. The course coordinator and lecturer is

Dr Niall Dodds,
Room 1.43F,
Mathematics Division,
MSI Building.

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email: ndodds@maths.dundee.ac.uk

You should make an appointment to see Dr Dodds if you have a problem regarding the course. You may also bring matters of concern about the course to the attention of the Mathematics Division Staff/Student Committee, which meets once each semester. A volunteer from level 3 will act as class representative to sit on the Staff-Student Committee; their name will be posted on Blackboard.

Syllabus

In order to take this course you should have passed modules MA21001 and MA22001, or have an equivalent qualification.

The application of mathematics to military operations during World War II (the deployment of radar and the management of convoys, for example) was called Operational (or Operations) Research. Today the term means a scientific approach to decision making. The intention is to determine how best or most efficiently to design and operate a system, often in the presence of scarce resources. The aim of this course is to introduce you to some of the mathematical techniques which are used in Operational Research; a particular objective is to study basic techniques for solving linear and combinatorial optimization problems that arise in applications.

Course Content

Linear Programming

Structure of Linear Programming problems, Graphical solutions, Simplex method, Duality, Integer linear programming, branch and bound method

Transportation problems

Transportation and assignment problems, initial basic feasible solution, primal-dual algorithm, Hungarian method.

Network Programming

Graphs, Minimum cost flow, Max flow-Min cut theorem, Ford-Fulkerson method.

Model Building

Examples to be included in the above as appropriate.

Assessment

There will be two class tests which together count for 20%. The remaining 80% will come from the degree examination, which will be held in the May diet of Degree Examinations. Honours degree examinations will be two hours in length. The pass mark will be 40% overall.

If you score less than 40% overall, you will be able to sit an examination in the resit Degree Examination Diet held in August. In this case 100% of the assessment mark is from this examination. The pass mark will be 40%. For the purposes of Honours Classification any pass achieved at the resit diet will be capped at 40%.

If you are unable to attend an element of assessment (such as a Class Test or a Degree Examination because of illness, **you must supply a medical certificate** covering the relevant period to your School Office. If illness prevents you from attending other meetings of the class, please keep your School Office informed of the reasons for your absence.

Feedback

At the end of each section of the module you will be asked to complete a confidential questionnaire regarding the content and presentation of the module. This is an important element in the University's Academic Standards procedures.

Recommended Books

There are many books in the Library which cover the material of the course. Some of these are listed here.

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| K. Trustrum | <i>Linear Programming</i>
Routledge and Kegan Paul, 1971 |
| D.M. Greig | <i>Optimisation</i>
Longman, 1980 |
| D.G. Luenberger | <i>Linear and Nonlinear Programming</i>
Addison-Wesley, Second Edition, 1984 |
| L.A. Wolsey | <i>Integer Programming</i>
Wiley, 1998 |
| H.P. Williams | <i>Model Building in Mathematical Programming</i>
Wiley, 1978 |
| W. L. Winston | <i>Operations Research</i>
Duxbury Press, 1994 |