Aston Business School
Birmingham

BNM820 OPERATIONAL RESEARCH METHODS

Academic Year 2011/12

Number of Aston Credits: 15

Number of ECTS Credits: 7.5

Staff Member Responsible for the Module:

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Availability: see office hours and make an appointment with Ozren
through his web calendar available at http://bit.ly/despic
or contact the operations and information Group Administrator, John Morley, ABS266,
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Pre-requisites for the module:

None.

Mode of Attendance:

On Campus

Module Objectives and Learning Outcomes:

- To understand the role of other Operational Research methods, including transportation model, integer programming, decision analysis and project scheduling models as aids to decision making in organisations.
- To develop skills in quantitative model building.
- To understand the role of mathematical programming as an analytical aid to decision-making in organisations.
- To interpret output from linear programming software to aid decision making.
- To build up appropriate models for decision making.
- To apply the theoretical knowledge and practical solution methods from Operational Research to business situations.

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Module Content:

Week 1: Introduction into mathematical modelling and optimisation. The role of uncertainty and basic decision making models, resource allocation problem using AHP and Excel Solver.

Week 2: Introduction to Linear Programming, formulation and solution by graphical means

Week 3: Sensitivity analysis in linear programming and interpretation of results (shadow prices, reduce cost, etc) using LINDO

Week 4: Application examples of linear programming including transportation model.

Week 5: Integer Programming – Formulation and solution, binary variables and logical constraints

Week 6: Multi-objective decision making - Goal programming, Pareto optimality & trade-off curves

Week 7: Decision making under uncertainty, Bayes' rule and multistage decision problems

Week 8: Project scheduling models- Critical Path and PERT methods in project management and investigating time-cost trade-offs using Linear Programming.

Week 9: Revision

Week 10: **Examination.**

Corporate Connections:

Looking into a specific problem of how Network Modelling was used in making optimal allocation of DVDs to the on-line DVD rental customers: "Cinema Paradiso" case study. Throughout the module, case studies from different areas and many examples of real world applications are used to demonstrate the usefulness of the mathematical modelling. The main purpose of using the real world applications in the module will be to clarify the theoretical concepts learned.

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International Dimensions:

The course material is virtually exclusively technical but where applications of the methods are concerned examples will be drawn internationally.

Contribution of Research:

The techniques in this module are widely used in academic research. New theoretical developments in the area that come from the lecturers' research agenda will only be briefly mentioned to highlight some possible extensions to be basic techniques learned.

Method of Teaching:

- 1 hour and 15 minutes lecture per week, followed by half an hour break, followed by 1 hour and 15 minutes tutorial/consolidation computer lab session as appropriate.
- Expert Choice, LINDO and Excel packages will be used in the practical sessions. It is essential that students attend both lectures and tutorials in order to understand the subject.
- Handouts will be provided at lecture as well as the computer instructions where appropriate to create a dynamic learning environment with student hands-on participation in the application of concepts covered.

Method of Assessment and Feedback:

The module is assessed 40% by assignment and 60% by examination. In the assignment, you will receive a complex business case which you have to model and solve by means of linear and integer programming. Feedback regarding your performance will be returned through assignment feedback sheets. In the final examination, you will be given smaller tasks from different areas taught in the module in order to test your ability to apply your knowledge from the module, i.e. to solve decision problems using appropriate techniques.

Learning Hours:

Contact Hours	32
Work on the Assignment	46
Private Study/Group Work	70
Assessment	2
Total	**150**

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The following essential and recommended readings are subject to change. Students should not therefore purchase textbooks prior to commencing their course. If students wish to undertake background reading before starting the course, many of the chapters/readings are available in electronic form via on-line library catalogues and other resources.

Essential Reading

Course handouts and at least one of these two books:

Albright, S. C. and Winston, W. L., Management Science Modeling (revised third edition, 2009), published by South Western (Cengage Learning), ISBN 9780324663464

Anderson, D. R., Sweeney D. J., Williams T. A. and Wisniewski M., An Introduction to Management Science - Quantitative Approaches to Decision Making (first edition, 2009), published by South Western (Cengage Learning), ISBN 9781844805952

Additional Recommended Reading:

Taha, H. A.: Operations Research - An Introduction (any edition), published by Prentice Hall or Pearson Education

Williams, H. P., Model Building in Mathematical Programming (any edition) published by John Wiley & Sons.

de Neufville R., Applied Systems Analysis: Engineering Planning and Technology Management, published by McGraw-Hill, Inc; New York, USA, 1990.