APPLIES TO ACADEMIC YEAR 2010/2011

ELE 3728 Management Science

Programme

Responsible for the course

Department

Term
According to study plan

ECTS Credits
7,5

Language of instruction
English

Introduction
In modern organizations, decision-making is becoming increasingly quantitative, and the use and abuse of quantitative techniques has become an important concern for management. Management science is the discipline of using analytical methods such as mathematical modelling to improve practical business management decisions. The course will give an introduction to the use of the most common modelling techniques such as linear programming (LP), integer programming (IP), mixed-integer programming (MIP) and nonlinear programming (NLP), as well as queuing models. Applications of these methods in a broad range of disciplines, such as marketing, finance, logistics/operations, and strategy, will be demonstrated through spreadsheet exercises.

Learning outcome
Acquired knowledge
Students should develop skills in quantitative modelling of business problems and opportunities, and they should understand how such modeling techniques can be used to assist the decision-maker, when they are applicable, and what the main challenges in practical applications are. Students should also get an understanding of why some problems are hard to solve while other problems can be easily solved using standard software.

Acquired skills
For a given verbal description of a decision problem, students should be able to distinguish between input data and decision variables, identify the objective function and restrictions, formulate the corresponding mathematical model (LP or MIP), implement and solve the model using a spreadsheet optimizer such as Excel Solver, and finally interpret and analyze the model results.

Reflection
By taking this course, students will learn to appreciate the value of analytical precision in business decision-making.

Prerequisites
Either MET 1180 Mathematics and MET 1190 Statistics, MET 2910 Mathematics and MET 2920 Statistics or EXC 2910 Mathematics and EXC 2904 Statistics.

Compulsory reading
Books:
Taylor, Bernard W.. 2010. Introduction to management science. 10th ed. Boston : Pearson. Kap. 1, 2, 3, 4, 5, 6, 10, 13

Recommended reading

Course outline
- Introduction to modelling.
- Modelling with linear programming (LP).
- Solving LP models in spreadsheets.
- Simplex method
- Sensitivity analysis

- Practical examples of LP models.
- Integer programming (IP) models.
- Mixed-integer programming (MIP) models.
- Solving IP and MIP models in spreadsheets.
- Solving IP and MIP models through branch and bound.
- Practical examples of IP and MIP models.
- Nonlinear programming (NLP) models.
- Queuing models

Computer-based tools
Microsoft Excel Solver

Learning process and workload
Basic concepts and motivational examples will be provided through lectures.
Technical skills and deeper understanding requires active problem-solving by students in groups, using software.

Recommended workload in hours

Activity	**Hours**
Participation in lectures	21
Prepartion for lectures / reading literature	54
Participation in lectures and tutorials	30
Problem-solving individually or in small groups	80
Participation in problem discussions in bigger groups	15
Total use of hours recommended	**200**

Use of hours
21 hours - Lectures
9 hours - Technical tutorials (groups)
15 hours - Feedback on assignments (groups).
45 hours total

Student assistants (M.Sc. students) are needed for technical tutorials and assignment feedback.

Examination
A five hour individual written examination concludes the course.

Examination code(s)
ELE 37281– written exam that accounts for 100% of the grade in the course ELE 3728 Management Science, 7.5 ECTS credits.

Examination support materials
All support materials are allowed.

Re-sit examination

Additional information