Course syllabus

Matematisk modellering
Mathematical Modelling

FMAA10, 3 credits, G1 (First Cycle)

Valid for: 2016/17
Decided by: Education Board B
Date of Decision: 2016-03-29

General Information
Main field: Technology.
Compulsory for: Pi1
Language of instruction: The course will be given in Swedish

Aim
The aim of the course is to give awareness of the problems of mathematical modelling, i.e., what it means to create quantitative models which can give understanding of phenomena in reality. A further aim is that the student should learn to master some general tools and structures which can be used in modelling, and learn engineering ways of thinking. The course should also provide further acquaintance with Matlab and its use for simulation and computation. Furthermore, the course should develop the student’s abilities in oral and written presentation.

Learning outcomes
Knowledge and understanding
For a passing grade the student must

• be able to clearly explain and use the basic concepts of mathematical modelling, in particular be able to explain what a mathematical model is.
• be able to describe and informally explain the process of mathematical modelling, including identification of the problem, formulation, analysis, computation, simulation and feed-back.
Competences and skills
For a passing grade the student must
be able to, independently or in a group, apply the mathematical modelling process on
simple and realistic, but vaguely formulated problems, of which some are connected to
environmental issues. More specifically, the student should show good ability to:

• identify and judge how different factors affect a system,
• formulate a problem in mathematical terms, equations and constraints,
• judge the validity and limitations of a model, and how it can be refined,
• analyse and carry out simple simulations on a model,
• consider and interpret the solution model in relation to the original problem, and judge
  the validity and limitations of the solution.

independently, using appropriate documentation, be able to write Matlab programs to
solve mathematical problems within the framework of the course.

in writing as well as orally, with proper terminology, in a well-structured manner and
with clear logic be able to explain the solution to a modelling problem.

Judgement and approach
For a passing grade the student must

• develop an attitude to the world around us and mathematics, where the use of
  mathematics in quantitative descriptions of reality seems natural and possible.
• be able to tolerate redundancy in or missing data, and in such cases to have an
  engineering attitude in making considerations.

Contents
Modelling: The couplings between model and reality. Validation of a model. Some
modelling tools. Simple simulations using Matlab.

Examination details
Grading scale: UG
Assessment: Written and oral reports of project work, carried out individually and in
groups. Compulsory attendance at the project reports.

Admission
Required prior knowledge: FMA420 Linear Algebra. The first part of the course
FMAA01/FMAA05.
The number of participants is limited to: No
The course overlaps following course/s: FMA045

Reading list

Contact and other information
Course coordinator: Studierektor Anders Holst, Studierektor@math.lth.se
Course homepage: http://www.maths.lth.se/course/fmaa10/