Department of Mathematics

Course Profile

Course Number: MATH426	**Course Title: Mathematical Modeling**
Required / Elective: Elective	**Prerequisites:** None
Catalog Description: Fundamental equations and problems of elasticity theory; uniqueness theorems and variational principles; methods of stress functions and displacement potential; applications. Fundamental equations and problems of fluids; Navier-Stokes equation for viscous fluids, cartesian tensors, stress-strain relations. Applications.	**Textbook / Required Material:** J. N. KAPUR, *Mathematical Modeling***,** (1990), Wiley Eastern
Course Structure / Schedule: (3+0+0) 3/ 7 ECTS	
Solving real problems by finding out how they are transformed into mathematical models and learning the methods of solution. This course covers classical mechanical models as well as some non-mechanical models such as heat transfer and population dynamics and other engineering problems.	
Design content: None	**Computer usage:** Some

Course Outcomes: By the end of the course the students should be able to:

1. apply mathematical techniques to solve a wide range of practical and theoretical engineering problems **[2,3,6],**
2. select, apply and interpret results from the models used **[2,6],**
3. describe potential roles of mathematical modeling in engineering problems **[2,6],**
4. implement mathematical models ranging from simple to complex using tools **[2,6],**
5. recognize the mathematical basis of the models **[2,6],**
6. identify appropriate models for different scenarios, and identify the differences in prediction using different models **[2,3,6],**
7. complete a simple uncertainty analysis of model estimates **[2,6].**

[2] demonstrate knowledge of mathematics to construct, analyze and interpret mathematical models,
[3] demonstrate the ability to apply mathematics to the solutions of problems,
[6] have a basic knowledge of the main fields of mathematics, including analysis, algebra, differential equations, differential geometry.

Recommended reading:

Teaching and Learning Marhematical Models, Innovation, Investigation and Applications;

Albion Publishing Ltd, Coll House, Westergate, Chichester, England-

Editors: S.K. Houdson, W. Blum, I.D. Huntley, T.Neill

Teaching methods: Three hours theoretical presentation with illustrative problem solving.

Assessment methods:

Homework, quiz, midterm and final exams.
Student workload: Pre-reading .....30 hrs Lectures ……45 hrs Preparatory reading …….. 40 hrs Literature review for presentation…… 40 hrs Team work for presentation ……20 hrs **TOTAL …… 175 hrs …… to match 25x7 ECTS**

Prepared by: Prof.Dr.Esin İnan	Revision Date: 08.02.2010