UNIVERSITY OF CRAIOVA
Faculty of Mathematics and Computer Science
Department of mathematics
Fundamental domain : Exact sciences
Domain: Mathematics
Master : Applied mathematics
Form : Day classes
Duration of studies : 2 years
Approved with academic year 2008-2009

Mathematical modeling with differential equations
Syllabus

Course coordinator: Lect.dr. Matei Andaluzia
Code: MA122
Second Cycle: MASTER
First Year , Semester 2, Course 28 hours, Seminar 14 hours
No. of credits: 6
Domain: Mathematics
Type : compulsory
Category: speciality

Objectives : To describe several models in mechanics, biologie or economy by using differential equations. The mathematical analysis of the models.
Necessary background : Theoretical mechanics, Ordinary differential equations, Partial differential equations.
Evaluation : Coloquium(C).

 Contents:

A.   **Modeling with ordinary differential equations**
A.1   Modeling the motion of the material point. Modeling the oscillations of the mass-spring-dashpot systems.
A.2   Modeling the populations dynamics.
A.3   Modeling the economic processes.

B.   Modeling with partial differential equations
B.1 Elastostatic models.
B.2 Viscoelastic models.
B.3 Modeling the contact between a deformable body and an obstacle.

Bibliography:

V. Barbu, Ecuatii diferentiale, Editura Junimea, Iasi, 1985.
L.C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, vol. 19, American Mathematical Society, 1998.
A. Novales, E. Fernandez, J. Ruiz, Economic Growth, Theory and Numerical Solution Methods, Springer 2009.
M. Shillor, M. Sofonea and J. Telega, Models and Variational Analysis of Quasistatic Contact, vol. 655, Springer, Berlin Heidelberg, 2004.
M. Sofonea and A. Matei, Variational Inequalities with Applications. A study of Antiplane Frictional Contact Problems, Advances in Mechanics and Mathematics, Vol.18, Springer, 2009.
W.B Zhang, Economic Growth Theory: Capital, Knowledge, and Economic Structures, Ashgate Publishing, Ltd., 2005, ISBN 0754645207, 9780754645207.