**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**

# Evolution equations
# Syllabus

**Course coordinator:** Prof. dr. Micu Sorin
**Code:** MA123
**Second Cycle:** MASTER
First year, Second Semester, Course 28 hours, Seminar 28 hours
**No of credits:** 6
**Domain:** Mathematics
**Type :** compulsory
**Category:** speciality

**Objectives:** We study the existence, uniqueness, regularity and asymptotic behavior of the solutions of linear and semi-linear equations of evolution.
**Necessary background:** Functional analysis, Partial differential equations
**Evaluation :** Exam (E)

**Contents:**
Introduction
Unbounded operators. Semigroups. Hille-Yosida Theorem. Classical and weak solutions of the homogeneous and nonhomogeneous equations of evolution.
Diagonalizable operators in Hilbert space. Spaces scale of sequences and functions. Fundamental properties. Bounded perturbations.
Semi-linear heat equation: local and global existence. Finite time blowup.
Semi-linear wave equation: local and global existence. Finite time blowup.
Asymptotic behavior of solutions of evolution equations. Bounded solutions. Invariance principle of LaSalle.
Introduction in control theory

**References:**

H. Brezis: *Analyse fonctionelle: Théorie et applications*, Masson, Paris, 1983.
V. Barbu: *Probleme la limită pentru ecuaţiile cu derivate parţiale*, Ed. Academiei, Bucureşti, 1993.
T. Cazenave şi A. Haraux: *Introduction aux problemes d'evolution semi-lineaires*, Ellipses, Paris, 1990.