X52 DYNAMIC MATHEMATICS

COURSE OUTLINE

1. GENERAL

SCHOOL	ECONOMIC SCIENCES		
DEPARTMENT	ECONOMICS AND SUSTAINABLE DEVELOPMENT		
LEVEL OF STUDY	*Undergraduate*		
COURSE UNIT CODE	X52	**SEMESTER OF STUDY**	5th
COURSE TITLE	**Dynamic Mathematics**		

COURSEWORK BREAKDOWN	TEACHING WEEKLY HOURS	ECTS Credits
Lectures	**4**	**7,5**

COURSE UNIT TYPE	Compulsory
PREREQUISITES :	NO
LANGUAGE OF INSTRUCTION/EXAMS:	English
COURSE DELIVERED TO ERASMUS STUDENTS	YES in English
MODULE WEB PAGE (URL)	

2. LEARNING OUTCOMES

Learning Outcomes

The main purpose of this course is to introduce students to the basic notions of dynamic mathematics and their interface with economy. Specifically, certain topics will be developed from the theory of differential equations and difference equations. The course also includes exercises with MATHEMATICA to familiarize students with this computer tool.
On successful completion of this module the learner will be able to:
- Understand and solve differential equations,
- Understand and solve difference equations,
- Understand, apply, and analyze dynamical economic models,
- Use computer software MATHEMATICA.

General Skills

- Retrieve, analyze and synthesize data and information, with the use of necessary technologies.
- Make decisions.
- Advance free, creative and causative thinking.

3. COURSE CONTENTS

Introduction to Dynamical Mathematics and Economy. The notion of Differential Equation (DE). DE of Separable Variables – Homogeneous DE. – Exact DE.
Linear DE of first Order – Bernoulli.

Second order linear differential equations with constant coefficients, homogeneous, nonhomogeneous, variation of parameters, judicious guessing.
Linear differential equations with constant coefficients of higher order.
Systems of linear differential equations. Phase Diagrams, a first approach.
Introduction to Difference Equations- Solving Linear Difference Equations.
Economical Applications: The dynamical supply demand model, Samuelson Model. Samuelson Hicks Model.
All the above topics are illustrated with MATHEMATICA.

4. TEACHING METHODS - ASSESSMENT

MODE OF DELIVERY	Lectures in the classroom	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	Electronic Presentations Mathematica Moodle e-learning platform	
TEACHING METHODS	*Method description*	*Semester Workload*
	Lectures	39
	Practice in the lab - Programming Assignments	13
	Personal Study	128
	Total	*180*
ASSESSMENT METHODS	Final written examination (100%)	

5. RESOURCES

Recommended Book Resources:
2. Martin Brown, Differential Equations and their Applications, Springer, 1975.
3. Richard Bronson, Gabriel B. Costa, Schaum's outlines Differential Equations,McGraw Hill, 2006.
4. Burkhard Heer, Alfred Maussner, Dynamical General Equilibrium Modeling, Computational Methods and Applications, Springer, 2009.
5. Alpha C. Chiang, Kevin Wainwright, Fundamental methods of Mathematical Economics, McGraw Hill, 2005.
6. Giancarlo Gandolfo, Economic Dynamics, Springer, 2009.