MASTER 'S PROGRAMME
APPLIED MATHEMATICS - IN ENGLISH
2ND YEAR OF STUDY, 1ST SEMESTER

COURSE TITLE	ECONOMIC PROCESSES OPIMIZATION
COURSE CODE	**MA3OPE**
COURSE TYPE	full attendance/tutorial
COURSE LEVEL	2nd cycle (master's degree)
YEAR OF STUDY, SEMESTER	2nd year of study, 1st semester
NUMBER OF ECTS CREDITS	**6**
NUMBER OF HOURS PER WEEK	4 (2 lecture hours + 2 seminar/laboratory hours)
NAME OF LECTURE HOLDER	Dr. Rotenstein Eduard-Paul
NAME OF SEMINAR HOLDER	Dr. Rotenstein Eduard-Paul
PREREQUISITES	Curriculum: Analysis, Optimization theory, Probability theory Competencies: the use of basic notions of linear algebra, analysis and nonlinear analysis Language: advanced level of English

A GENERAL AND COURSE-SPECIFIC COMPETENCES

General competences:

- ✓ The use of informatics resources, the efficient use of carrier development; the making of a rigorous and clear mathematical project on a given theme
- ✓ The development of an efficient team work

Course-specific competences:

- ✓ The efficient use of notions, methods and mathematical models for economic framework applications
- ✓ The analysis of data provided by economic and informatics models
- ✓ The modelling, analysis and optimization of some phenomenon and economical processes
- ✓ Mathematical modelling and simulation of some linear/convex optimization problems used in economy and informatics

B LEARNING OUTCOMES

- ✓ To build, to approximate and simulate real models which describe economical processes using basic and advanced tools of convex analysis, probability theory, linear programming and dynamical programming
- ✓ After successfully completing this course, the students will be able to:
  - ✧ Identify and select adequate methods for solving linear optimization problems (parametric and non-parametric), which model production models
  - ✧ Know and use basic mathematical notions and tools used for the optimization of studied economical processes, in conformity to a minimal list related to the course content
  - ✧ Build, approximate and simulate models which describe economical processes using basic and advanced tools of convex analysis, probability theory, linear programming elements and dynamical programming

C LECTURE CONTENT

1. Elements of linear programming: a mathematical model describing real production models
2. Elements of linear programming: simplex algorithm, two phase method
3. Elements of linear programming: programming in integers, parametric programming
4. Elements of dynamical programming: the Bellman principle
5. Some economical models which use elements of dynamical programming
6. Elements of stock theory, a general approach
7. Stock models and Lagrange multipliers optimization methods
8. Stock models and convex optimization approaches
9. Stock models and dynamical programming approaches
10. Stochastic stock models

	11. Queuing M/M/1 systems 12. Queuing M/M/r systems 13. Elements of localization theory
D	**RECOMMENDED READING FOR LECTURES**
	1. Amihăesei, C., *Curs de cercetări operaționale*, Editura UAIC, Iași, 1987 2. Brandimarte, P., *Numerical Methods in Finance and Economics: A MATLAB-Based Introduction*, Wiley, 2002 3. Ching, W; Ng, M, *Markov Chains: Models, Algorithms and Applications*, Springer-Verlag, N.Y., 20061.
E	**SEMINAR CONTENT**
	1. Elements of linear programming: a mathematical model describing real production models 2. Elements of linear programming: simplex algorithm, two phase method 3. Elements of linear programming: programming in integers, parametric programming 4. Elements of dynamical programming: the Bellman principle 5. Some economical models which use elements of dynamical programming 6. Elements of stock theory, a general approach 7. Stock models and Lagrange multipliers optimization methods 8. Stock models and convex optimization approaches 9. Stock models and dynamical programming approaches 10. Stochastic stock models 11. Queuing M/M/1 systems 12. Queuing M/M/r systems 13. Elements of localization theory
F	**RECOMMENDED READING FOR SEMINARS**
	1. Amihăesei, C., *Curs de cercetări operaționale*, Editura UAIC, Iași, 1987 2. Ching, W; Ng, M, *Markov Chains: Models, Algorithms and Applications*, Springer-Verlag, N.Y., 20061.
G	**EDUCATION STYLE**
LEARNING AND TEACHING METHODS	Lectures: conversation, proof and problematization Seminars/laboratory: exercises, conversations
ASSESSMENT METHODS	Course: weight in the final grade 50% (written exam, oral examination) Class activity/homework: weight in the final grade 50% (written exam, presentation of a home project) Minimal requirements: 1. To identify and select correct models for solving easy exercises 2. To know and correctly use basic notions and mathematical tools studied at this course, in order to obtain optimal solutions for different types of economical models 3. To create and present a project on a given theme 4. Minimum grade 5
LANGUAGE OF INSTRUCTION	English