POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematical economics

Course

Field of study	Year/Semester
Mathematics in Technology	3/5
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	polish language
Form of study	Requirements
full-time	elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	0	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

dr Ewa Bakinowska

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Faculty of Control, Robotics and Electrical
Engineering

Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student knows the concepts of differential calculus of functions of one variable, knows the concepts of differential calculus of several variables. Student knows how to calculate first partial derivatives and second order derivatives of function of several variables. He can determine the gradient, hessian. Student knows the relationship the Hessian matrix with concavity. Student knows the basic concepts of matrix algebra: -The product of vectors and matrices - Inverse matrix -The determinant of a matrix - Negative defined matrix -Non-singular matrix   - Eigenvalues and eigenvectors Student can determine the extreme values of functions of one variable. Student can determine the extreme of functions of several variables. The student knows how to multiply vectors, matrices, count determinantStudent can determine the inverse matrix and the eigenvalues and eigenvectors

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Course objective

The aim of the course is to acquaint students with selected problems of mathematical economics: the theory of consumer demand, the theory of supply the manufacturer, the market equilibrium theory, the theory of productive economy and use of learned theories to solve problems using mathematical tools.

Course-related learning outcomes

Knowledge

1. The student has a basic knowledge: of demand theory; of the theory of supply; of the theory of market equilibrium. The student knows the basic problem of the consumer. The student knows the basic problem of the manufacturer. The student knows the laws: demand, production, market equilibrium.

2. The student has a basic knowledge necessary to understand the economic conditions of the various activities e.g. in the engineering

Skills

1. Student is able to maximize the utility of the consumer. Student is able to determine the function of consumer demand for a fixed income. Student is able to maximize income (minimize cost) of producer.

2. Student is able to determine the structure of equilibrium prices. Student is able to determine (for the matrix inputs of productive economy) the optimal vector of production, vector of optimal price and determine the percentage growth of the economy.

3. Student in formulating tasks for various activities e.g. in engineering, is able to see the economic aspects.

Social competences

1. The student is aware of the level of his knowledge in relation to the conducted research .

2. Student is able to think and work in a creative way.

3. Student understands the need to work systematically on all tasks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Assessment of knowledge and skills acquired during the lecture is verified on the basis of a written test. During the test, students have to solve practical tasks based on theoretical concepts and formulas learned during the lecture.

Programme content

1.The theory of preferences. Space of goods. A metric space. Relations and their properties. Preference relation and strong preferences. Contours. Continuity of preference relations. Preferred basket of goods.

2.The theory of demand. The utility function and its properties. Deficiency. Marginal utility. Marginal rate of substitution. Budget constraint. The function of demand. The demand Hicks function. The function of cost of the consumer. Demand equation. Slutsky equation. Compensating for price changes. The conclusions of the demand equation. Elasticities.

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3.The theory of supply. Scalar function of production. Marginal efficiency. Substitution and elasticities (scale of production). Costs and income. The production demand function. The supply function. Equation of production and conclusions. Cost function. The average cost. The marginal cost.

4.The theory of equilibrium. The exchange of goods. Market exchange. The excessive demand function. Equilibrium price.

5.The economic growth. Leontief model of the economy. Matrix of expenditures. Leontief space of economy. The productivity of the economy. Cleaner production. The efficiency of the process and production. Technological and economic efficiency. Von Neumann equilibrium.

Teaching methods

The lecture conducted with a multimedia presentation supplemented by examples given on the board. The lecture was conducted in an interactive way with the formulation of current questions to a group of students. Students actively participate in the lecture. They receive a list of practical tasks (illustrating this theory) and solve them during the lecture with the lecturer. The task solved by the Student himself is placed on eCourses. Each presentation of a new topic is preceded by a reminder of content related to the issue (content known to students in other subjects)

Bibliography

Basic

1. Emil Panek: Ekonomia matematyczna, AE Poznań 2000.

2. Emil Panek: Podstawy Ekonomii Matematycznej. Materiały do ćwiczeń, MD nr 125, AE Poznań 2002.

3. Stanisława Kanas: Podstawy ekonomii matematycznej ,Wydawnictwo Naukowe PWN, 2011.

Additional

1. Grzybowska Urszula: Ekonomia Matematyczna. Teoria. Przykłady. Zadania. SGGW

2. M. Konopczynski, R. Kiedrowski: Podstawy Ekonomii Matematycznej. Elementy teorii popytu i równowagi rynkowej, MD nr 165, red. Emil Panek, AE Poznan, 2005.

3. Alpha C. Chiang: Podstawy ekonomii matematycznej, PWE 1994

4. Joanna Górka , Witold Orzeszko , Marcin Wata: Ekonomia Matematyczna. Materiały do ćwiczeń, C.H. Beck 2009

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Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, calculation of tasks presented in the lecture, preparation for the written test) [1]	20	1,0

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[1] delete or add other activities as appropriate