



## OPERATIONAL RESEARCH

**12S20-OPR**

**ECTS: 3**

**YEAR: 2020L**

### COURSE CONTENT CLASSES

Basic methods of solving optimization problems. Allocation theory. Introduction to linear programming, graphic solution, simplex method, principle of duality, sensitivity analysis. Transport problem. Allocation problem. Network programming.

### LECTURES

Basic methods of solving optimization problems. Allocation theory. Introduction to linear programming, graphic solution, simplex method, principle of duality, sensitivity analysis. Transport problem. Allocation problem. The traveling salesman problem. Network programming.

### EDUCATIONAL OBJECTIVE:

Acquiring basic knowledge in the field of application of operational research in company management

### DESCRIPTION OF LEARNING OUTCOMES FOR THE COURSE IN RELATION TO FIELD AND MAJOR LEARNING OUTCOMES

Codes of learning outcomes in a major field of study: S/EFA\_P7S\_UW+, S/NZJA\_P7S\_KK+, S/NZJA\_P7S\_UW+, S/NZJA\_P7S\_WG+,

Codes of learning outcomes in a major area of study: KP7\_KK1+, KP7\_UW1++, KP7\_WG4+,

### LEARNING OUTCOMES:

#### Knowledge

W1 - The student is able to use the operational research models in organization management

#### Skills

U1 - The student is able to use in practice simple models in the field of operations research

#### Social competence

K1 - The student is able to communicate the results of the analyzes in a communicative way

### BASIC LITERATURE

1) Stacho J., Department of Industrial Engin, Introduction to Operations Research Deterministic Models, wyd. Columbia University In The City Of New York, 2014 ; 2) Jędrzejczyk Z., Kukuła K. (red.), Skrzypek J., Walkosz A., Badania operacyjne w przykładach i zadaniach, wyd. Wydawnictwo naukowe PWN, 2011

### SUPPLEMENTARY LITERATURE

1) J.K. Sharma, Operations Research: theory and application,, wyd. Macmillan Publishers, 2002 ; 2) Trzaskalik T., Wprowadzenie do badań operacyjnych z komputerem, wyd. Polskie Wydawnictwo Ekonomiczne, 2008 ; 3) Grzywińska-Rąpca M. Markowski L., Employment and economic entities in the Polish financial sector from 2005-2016, wyd. Econometrics. Advances in Applied Data Analysis, 2018, t. 1(59), s. 79-93; 4) Markowski L., Wędrowska E., Zastosowanie metody k-średnich do klasyfikacji spółek giełdowych sektora IT, wyd. Monografie i opracowania SGH, Współczesne aspekty informacji, Warszawa, 2012, t. IV, s. 155-167; 5) Markowski L., Rutkowska-Ziarko A., The effectiveness of simple diversification in comparison to Markowitz portfolio theory, wyd. Olsztyn Economic Journal, Wydawnictwo UWM w Olsztynie, 201, t. 6(1), s. 143-154

### Course/module:

Operational Research

### Fields of education:

**Course status:** mandatory

**Course group:** B - przedmioty kierunkowe

**ECTS code:**

**Field of study:** Management

**Specialty area:** Management

**Educational profile:** General academic

**Form of study:**

**Level of study:**

**Year/semester:** 1 / 2

### Type of course:

Classes, Lecture

**Number of hours per semester/week:** Classes: 30, Lecture: 15

### Teaching forms and methods

Classes(K1, U1, W1) : Solving problems on the blackboard and using computers., Lecture(K1, U1, W1) : Online work - an informative lecture in the form of a multimedia presentation

### Form and terms of the verification results:

CLASSES: Colloquium test - The student solves the problem of network programming(K1, U1, W1) ; CLASSES: Colloquium test - The student solves and describes problems in linear programming and carries out a sensitivity analysis. The student solves the transport problem(K1, U1, W1) ; LECTURE: Written exam - Student solves optimization problems(K1, U1, W1)

**Number of ECTS points:** 3

**Language of instruction:** Polish

### Introductory courses:

maths

### Preliminary requirements:

basic knowledge of higher mathematics, matrix and differential calculus

### Name of the organizational unit offering the course:

Instytut Ekonomii i Finansów,

### Person in charge of the course:

dr Lesław Markowski,

### Course coordinators:

dr Lesław Markowski,

### Notes:

## Detailed description of the awarded ECTS points - part B

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The awarded number of ECTS points is composed of:

#### 1. Contact hours with the academic teacher:

- participation in: classes	30 h.
- participation in: lecture	15 h.
- consultation	4 h.
	49 h.

#### 2. Student's independent work:

- homework and preparing to the lesson	10 h.
- preparing to the exam	6 h.
- preparing to the test	10 h.
	26 h.

1 ECTS point = 25-30 h of the average student's work, number of ECTS points = 75 h : 25 h/ECTS = 3,00 ECTS  
on average: **3 ECTS**

- including the number of ECTS points for contact hours with direct participation of the academic teacher:	1,96 ECTS points,
- including the number of ECTS points for hours completed in the form of the student's independent work:	1,04 ECTS points,