



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Computer methods [N2Bud1-IPB>MK]

### Course

Field of study

Civil Engineering

Year/Semester

1/2

Area of study (specialization)

Construction Engineering and Management

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

### Number of hours

Lecture

18

Laboratory classes

18

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

4,00

### Coordinators

dr inż. Tomasz Wiatr

tomasz.wiatr@put.poznan.pl

dr inż. Marcin Gajzler

marcin.gajzler@put.poznan.pl

### Lecturers

### Prerequisites

Student knows the basics of the probability theory and methods of solving linear equations and inequalities, knows the concepts of utility and expected value. He knows the basics of planning construction projects and also in the basic scope of the Ms Project planning program, basic knowledge of the CAD program. Student is able to formulate a mathematical model for a problem, can identify the basic elements of a construction project, the structure of construction processes and works, and assign resources to these works. He can use CAD programs

### Course objective

Getting to know software and methods supporting solving decision problems based on operational research, building a decision matrix and decision tree. Getting to know the possibilities of effective support of the planning process of construction projects with the use of the Ms Project program.

### Course-related learning outcomes

#### Knowledge:

1. Student knows selected methods of operational research (linear programming, transport and allocation issues) with application in the engineering of construction projects.
2. Student knows the possibilities of using the decision matrix and the decision tree in decision problems occurring in the investment process.
3. Student knows the possibilities of software for planning construction projects.

#### Skills:

1. Student, using the methods of operational research and computer applications, is able to determine a solution for optimization problems: selection of the product range and allocation of production means, selection of the technological process, production and warehouse management and investment location.
2. Student is able to describe a decision problem under conditions of uncertainty and is able to use to solve a decision problem in the field of construction production, a decision matrix and a decision tree with the use of computer applications.
3. Student can plan the course of construction works with the use of project planning software and conduct a time and cost analysis using this software.

#### Social competences:

1. Student knows the possibilities of use and can propose the use of operational research methods in engineering practice in the field of construction.
2. Student understands what cooperation is all about and is ready to cooperate with various participants of the decision-making process and the investment process.
3. Student is aware and is able to convey the role played and the possibilities offered by the use of software for planning construction projects.
4. Student can realise how important it is to take care of health and physical fitness.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Lectures: written exam, consisting of two parts. Part 1 is designed to test your knowledge and consists of answering 10 questions. Part 2 is to test your skills - it consists in solving 1 task.

Exercises in a computer laboratory include passing each of several tasks solved with the use of dedicated software. The student is required to demonstrate knowledge of the software and to present the solution of the task using this software

Lecture - written exam (open questions)

### Programme content

The genesis of operations research, linear programming methods - 2D and 3D graphics methods, the basics of the simplex method, duality in linear programming, transport problem, allocation problem, selection of the shortest route. Matrices, decision trees and goal trees. Basic principles of managing construction projects. Software supporting the management of these projects.

### Course topics

Linear programming: graphical methods and duality. Transportation problem. Allocation problems. Traveling salesman problem. Gradient methods

### Teaching methods

Informative lecture supported by multimedia presentation / problem lecture;  
Laboratory: problem method, case study, project method, team work

### Bibliography

#### Basic

1. Badania operacyjne w przykładach i zadaniach. Red. Kukuła K. PWN, Warszawa 1993
2. Teoria podejmowania decyzji - wstęp do BO. Sadowski W, PWE, Warszawa 1976
3. Podstawy zarządzania organizacjami, Griffin R.W., PWN, W-wa, 1999
4. Informatyka stosowana w inżynierii produkcji budowlanej (praca zbiorowa), red. O. Kapliński,

Wydawnictwo Politechniki Poznańskiej, Poznań, 1996

5. MS Project 2010 - Efektywne zarządzanie projektem i portfelem projektów, S. Wilczewski, Helion, Gliwice, 2011

6. Zarządzanie projektami z wykorzystaniem darmowego oprogramowania, P. Wróblewski, Helion, Gliwice, 2009

Additional

1. Wprowadzenie do badań operacyjnych z komputerem, T. Trzaskalik, PWE, Warszawa, 2008

2. Metody i modele badań w inżynierii przedsięwzięć budowlanych, pr. zb. pod red. O. Kaplińskiego, PAN, KILiW IPPT Studia z zakresu inżynierii Nr 57, Warszawa, 2007

3. Wspomaganie procesów decyzyjnych, Tom III Badania operacyjne, M. Lipiec Zwierzchowska (red.), Wyd. C.H. Beck, Warszawa, 2003

4. Microsoft Project 2013 Krok po kroku, C.Chatfield i T. Johnson, (tłum. W. Sikorski), APN Promise, Warszawa, 2013

### Breakdown of average student's workload

	Hours	ECTS
Total workload	102	4,00
Classes requiring direct contact with the teacher	38	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	64	2,50