



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Project management

### Course

Field of study

Year/Semester

Computing

1/2

Area of study (specialization)

Profile of study

Internet of Things

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

full-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

15

Tutorials

Projects/seminars

15

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

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### Prerequisites

Knowledge: Student attending the course should have basic knowledge on graph theory, mathematical programming problems, scheduling theory as well as should know basic definitions from the field of economics.

Skills: Student should be capable of using a chosen software package, as well as is able to realize and document an IT project.

Social competences: Student should have such attitudes as: honesty, responsibility, persistence, cognitive curiosity, creativity, personal culture, respect for other people.



### Course objective

1. Transfer of detailed knowledge on project management and scheduling, including: time and time/cost analyses of activity networks, resource allocation in a project, and financial optimization of a project.
2. Developing students' capabilities of using a chosen software package for project management.

### Course-related learning outcomes

#### Knowledge

1. has extensive and in-depth knowledge on chosen aspects of project management, including: time and time/cost analyses of activity networks, resource allocation in a project, and financial optimization of a project (K2st\_W3)
2. knows advanced methods used for time, time/cost, and financial optimization of a project (K2st\_W6)
3. knows basic economical definitions related to project management, such as: discount rate, cash flows, investment return, net present value (K2st\_W8)

#### Skills

1. is able to evaluate usefulness and applicability of a chosen software package for project management (K2st\_U6)
2. is able to evaluate functionality and perceive limitations of a chosen software package for project management while realizing his/her own project (K2st\_U9)
3. is able to prepare a project according to a given specification using a chosen software package for project management (K2st\_U11)

#### Social competences

1. understands the meaning of using the up-to-date knowledge from the area of project management in solving research and practical problems (K2st\_K2)

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during lectures is verified by a 90-mins test. The threshold for a positive grade is reaching 50% of points. Successive grades follow from applying a linear scale to the interval [50%; 100%] of points gained.

Skills acquired during projects are verified by evaluation of the prepared project and its documentation.

### Programme content

The programme content for lectures includes:

Introduction to project management and scheduling. Activity networks. Activity-on-Arc (AoA) and Activity-on-Node (AoN) representations. Properties of an AoA graph. Dummy activities and dummy nodes. Constructing an AoA network. The algorithm for topological numbering of nodes and examining acyclicity of a graph. Defining the earliest and the latest possible occurrence time of a node. Critical



nodes. Activity floats: free, safety, independent, and total. A critical activity. Critical path in a graph. The properties of the critical path. Time analysis of an activity network – the Critical Path Method (CPM). Finding the minimum execution time of a project by the CPM method – examples. The time/cost trade-off model. The average cost rate. Time/cost analysis of an activity network – the Critical Path Method/Minimum Cost Expediting (CPM/MCX) method. Finding the minimum cost of the activity network compression by the CPM/MCX method – examples. Project scheduling under limited resources. Renewable resources – definition and examples. Resource-Constrained Project Scheduling Problem (RCPSPP). Activity list (AL). Serial Schedule Generation Scheme (SGS). Priority rules. Finding a time-optimal schedule in an RCPSPP – examples. Types of activity characteristics, resource characteristics, and scheduling measures. Activity modes. Multi-Mode Resource-Constrained Project Scheduling Problem (MRCPSPP). Nonrenewable resources - definition and examples. Finding a time-optimal schedule in an MRCPSPP – examples. Cash flows. Resource-Constrained Project Scheduling Problem with Discounted Cash Flows (RCPSPPDCF). Net Present Value (NPV). Payment models or types of contracts between the client and the contractor.

The programme content for projects contains preparing and documenting a project in the Microsoft Project Professional environment.

### Teaching methods

1. Lecture: multimedia presentation with additional examples shown on a board
2. Projects: step-by-step project preparation, discussion, consultation

### Bibliography

#### Basic

1. Zarządzanie projektami dla początkujących. Jak zmienić wyzwanie w proste zadanie, M. Żmigrodzki, Wydanie II, Onepress, 2018.
2. Badania operacyjne, M. Siudak, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 1994.
3. Project Scheduling: A Research Handbook, E.L. Demeulemeester, W.S. Herroelen, Kluwer, 2002.
4. MS Project 2013 i MS Project Server 2013. Efektywne zarządzanie projektem i portfelem projektów, S. Wilczewski, Helion, 2014.

#### Additional

1. Badania operacyjne w przykładach i zadaniach, Jędrzejczak Z., Skrzypek J., Kukuła K., Walkost A., PWN, Wyd. IV zmienione, Warszawa, 2002.
2. Project scheduling with finite or infinite number of activity processing modes – a survey, Węglarz J., Józefowska J., Mika M., Waligóra G., European Journal of Operational Research, 208(3), 2011, 177-205.
3. MS Project 2000. Biblia, E. Marmel, Helion, Gliwice, 2001.



4. ECDL. Zarządzanie projektami. Moduł S5. Syllabus v. 1.0 (ebook), A. Żarowska-Mazur, D. Mazur, PWN, 2019.

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for projects, preparation for test, project and documentation preparation) <sup>1</sup>	20	0,5

<sup>1</sup> delete or add other activities as appropriate