



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Designing and managing of production processes

### Course

Field of study

Year/Semester

Civil engineering

1/2

Area of study (specialization)

Profile of study

Construction Engineering and Management

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

part-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

10

0

0

Tutorials

Projects/seminars

18

18

### Number of credit points

5

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr inż. Tomasz Wiatr

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Wydział Inżynierii Lądowej i Transportu

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### Prerequisites

**KNOWLEDGE:** Obtains basic knowledge of general construction, including building structures and knows the basic methods of organization and planning in general construction.

**SKILLS:** Is able to develop a cost estimate and a network model (technological and organizational) as a basis for a schedule and its key derivative charts.

**SOCIAL COMPETENCES:** Obtains basic competences in the field of project management in construction and demonstrates the desire to extend knowledge about construction.



## Course objective

Development of the engineer's competences as a manager in construction with particular emphasis on investment projects, including a construction manager in the context of planning and analysis of construction processes, taking into account the conditions of the project and enterprise in general construction. Improving knowledge about building design, industrialised construction technologies, including modelling and analysis in terms of Open BIM software and methods.

## Course-related learning outcomes

### Knowledge

1. Knows the rule of construction investment realisation rules with PM guidelines.
2. Knows the rules of production management and logistics processes in modern construction.
3. Knows computer methods of designing production processes in general construction.

### Skills

1. Can identify the scope of works on the basis of classic and electronic design documentation in terms of Open BIM approach and conduct quantitative and qualitative analyzes of BIM models.
2. Can develop a general and detailed network logistic and financial schedule of building realisation in terms of integrated, computer based cost estimate, BIM model and derivatives.
3. Can identify the key safety and risk factors in a given production process and deal with them preventively using design methods.

### Social competences

1. Is able to work efficiently in a construction organization with principles of professional ethics.
2. Can work in a team and communicate effectively on the way to achieving the design goal.
3. Is able to formulate conclusions on the rational improvement of construction processes.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Checking the results includes: a written exam in the lecture part in the form of a workshop, a written test in the auditorium part and an evaluation of the design elaboration, taking into account consultative activity and additionally attendance at classes.

## Programme content

With the division key: lecture (theory and method review), tutorial exercises (analytical methods and examples of calculations), project exercises (problem work with software).

Project in general construction, construction as the goal of design documentation, building information in BIM terms and computer software. Executive design and technical specifications for execution and acceptance of works. Model quantification and take-offs, transformation of construction product information (building) into production processes (construction) with the identification of production factors (resources). Cost estimation and data analysis in BIM approach with analyzes of active and passive resources as well as fixed and variable costs. Network methods in deterministic terms, PERT method and elements of risk analysis. General and detailed material and financial schedule in terms of 5D BIM, derivatives and the steady work method and division into working packages



with elements of 4D BIM. Construction logistics, delivery, consumption, inventory planning method. Health and safety plan as well as site layout planning. Advanced application of the Open BIM approach with aid of contemporary software.

### Teaching methods

1. Lecture: presentations with the use of slides, oral explanations, sketches and program shows.
2. Auditorium exercises: graphical and analytical methods, examples supporting the design part.
3. Design exercises: work in a computer laboratory, practical design problems.

### Bibliography

#### Basic

1. Ciołek R. - red., Kompleksowa mechanizacja produkcji budowlanej. Arkady, Warszawa 1985.
2. Biernacki J., Cyunel B., Metody sieciowe w budownictwie. Arkady, Warszawa 1989.
3. Biruk S., Janowski P., Sobotka A., Zarządzanie w budownictwie. Organizacje, procesy, metody. Wydawnictwo Uczelniane, Lublin 2003.
4. Jaworski K. - red., Metodologia projektowania realizacji budowy. PNW, Warszawa 2009.
5. Jerzak M., Organizacja i ekonomika wykonawstwa budowlano-montażowego. PWN, Warszawa 1990.
6. Mindur L., Metody, techniki i technologie transportu w budownictwie. Arkady, Warszawa 1992.
7. Rowiński L., Organizacja produkcji budowlanej. Arkady, Warszawa 1982.

#### Additional

1. Allplan BIM Compendium. Theory and Practice. Nemetschek 2014.
2. Halpin D., Construction management. Wiley, 2006.
3. Krawczyńska-Piechna A., Marcinkowski R., Projektowanie realizacji budowy. PWN, Warszawa 2019.
4. Lenkiewicz W. - red., Organizacja i planowanie budowy. PWN, Warszawa 1982.
5. Nunnally S. W., Construction methods and management. Prentice Hall, 2007.
6. Pliszek E. - red., Vademecum budowlane. Arkady, Warszawa 2015.
7. Praca zbior. Przygotowanie budowy wykonywanej nowoczesnymi technologiami. Poradnik. WACETOB PZITB, Warszawa 1998.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,0
Classes requiring direct contact with the teacher	48	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	72	2,5

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