



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Construction process design [S2Bud1E-ZBZ>PPB]

Course

Field of study

Civil Engineering

Year/Semester

1/2

Area of study (specialization)

Sustainable construction and management

Profile of study

general academic

Level of study

second-cycle

Course offered in

English

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

0

Number of credit points

2,00

Coordinators

dr hab. inż. Jerzy Paślawski prof. PP
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Lecturers

Prerequisites

The student has basic knowledge of construction process design. The student is able to perform a basic analysis of construction processes.

Course objective

To provide knowledge on how to design and simulate construction processes using the main simulation approaches: System Dynamics, Discrete-Event Simulation, and Agent-Based Modeling.

Course-related learning outcomes

Knowledge:

- Has detailed knowledge of procedures for construction project development in relation to quality management and is able to apply them in simulation.
- Understands the need for assessment and maintenance of the technical condition of structures using modern solutions (monitoring, simulation, IoT).
- Has in-depth knowledge of the environmental impact of construction projects and understands the need to implement principles of sustainable development.

Skills:

- Uses advanced and specialised tools and software supporting construction site management.
- Is able to select appropriate simulation methods and tools to solve technical problems.

Social competences:

- Takes responsibility for the reliability of results and their interpretation.
- Is ready to independently develop and expand knowledge in the field of modern construction processes and technologies.
- Is aware of the importance of sustainable development in construction.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Student work includes:

- preparation of a presentation on a selected topic related to construction process design
- Lecture component - preparation of a project including the three main simulation methods

Grading scale:

90-100% - very good (A)

80-89% - good plus (B)

70-79% - good (C)

60-69% - satisfactory plus (D)

50-59% - satisfactory (E)

below 50% - fail (F)

Programme content

Lectures: Overview of approaches to construction site management using modern management methods (historical background, development). Disturbances in construction processes, uncertainty and risk in construction project management. Organisation of construction enterprises. Classification of decision-making situations in construction process management. Examples of applications across different phases of the project life cycle.

Classes: Introduction to basic simulation methods (their origin and development). Overview of modern technologies used on construction sites, including Internet of Things (IoT) and Machine Learning.

Course topics

Issues related to the design and analysis of construction processes using simulation methods. Introduction to modelling of construction processes and the application of computer simulation in planning and managing construction sites. Overview of main simulation methods used in construction process analysis, including System Dynamics, Discrete-Event Simulation, and Agent-Based Modeling. Application of modern technologies supporting construction process management, including IoT and digital tools for analysis and optimisation of construction workflows. Analysis and interpretation of simulation results and their use in decision-making in construction management.

Teaching methods

Lectures: problem-based lecture, lecture with multimedia presentation, case study

Classes: practical method using various sources (videos, images, datasets, presentations), case study, project-based method including design and execution of simulation and analysis of results

Bibliography

Basic:

1. Kaplinski O., Modeling of construction processes. A managerial approach., PAN, Warszawa 1997
2. Grigoryev I., AnyLogic in Three Days: Modeling and Simulation Textbook, Fifth edition, 2018

Additional:

1. Borshchev A., Grigoryev I., The Big Book of Simulation Modeling. Multimethod Modeling with AnyLogic8, Anylogic North America, 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00