



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Artificial intelligence in construction [S2Bud1E-ZBZ>SlwB]

Course

Field of study

Civil Engineering

Year/Semester

1/1

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

0

Projects/seminars

0

Number of credit points

1,00

Coordinators

dr inż. Piotr Nowotarski

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Lecturers

Prerequisites

Basic knowledge of civil engineering and familiarity with computer tools supporting design and management processes.

Course objective

The aim of the course is to familiarize students with the possibilities of using artificial intelligence methods and tools in construction, particularly in data analysis, decision support, process optimization, and automation of selected engineering and organizational tasks.

Course-related learning outcomes

Knowledge:

- has in-depth knowledge of the algorithms of selected computer programs supporting the analysis and design of civil engineering structures as well as those useful for planning and managing construction projects, including BIM (Building Information Modeling) technology
- has in-depth knowledge of the principles of developing quality management procedures in construction projects; has knowledge of efficiency, costs, and time of implementation of construction projects under conditions of risk and uncertainty

Skills:

- uses advanced specialized tools to search for useful information, communicate and acquire software supporting the work of a designer and organizer of construction processes
- using the acquired knowledge is able to select appropriate methods and tools (analytical, numerical, simulation, experimental) to solve technical problems
- is able to obtain information from literature, databases and other properly selected sources; is able to integrate the obtained information, perform its creative interpretation and evaluation, as well as draw conclusions, formulate and justify opinions and present them

Social competences:

- is ready to independently supplement and expand knowledge in the field of modern processes and technologies in construction
- is aware of the need to improve professional and personal competences, is ready to critically assess possessed knowledge and received content

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- activity and participation in discussions during classes
- short individual assignment (analysis of AI application in a selected construction area)
- 90-100% - A (very good)
- 80-89% - B (good plus)
- 70-79% - C (good)
- 60-69% - D (satisfactory plus)
- 50-59% - E (satisfactory)
- < 50% - F (fail)

Programme content

The course covers issues related to the application of artificial intelligence in construction, including the use of AI models for data analysis, support of design processes, management of construction projects, optimization of schedules, and support of engineering decision-making.

Course topics

- Introduction to artificial intelligence
- Overview of AI tools used in construction
- AI in design and BIM
- AI in construction project management
- Data analysis and prediction in construction
- Process automation
- AI in risk management
- Limitations and challenges of AI
- Student discussions and case studies

Teaching methods

- interactive lecture
- student discussions
- case study analysis
- lectures delivered remotely using online learning methods and techniques

Bibliography

Basic:

1. Goodfellow I., Bengio Y., Courville A., Deep Learning, PWN, 2018.
2. Sawhney A., Riley M., Irizarry J., Construction 4.0, Routledge, 2020.

Additional:

Scientific publications on AI in construction (journals and conference papers)

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50