



COURSE DESCRIPTION CARD - SYLLABUS

Course name

BIM technology III [S2Bud1E-ZBZ>TBIM3]

Course

Field of study

Civil Engineering

Year/Semester

2/3

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

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student has the ability to prepare BIM documentation and basic knowledge of information management in a construction project.

Course objective

Student zna zagadnienia związane z wykorzystaniem modelu BIM do analiz i nowoczesne technologie cyfrowe w budownictwie. Student potrafi przeprowadzić analizę energetyczną budynku oraz wykorzystać dane fotogrametryczne do tworzenia modelu BIM istniejącego obiektu.

Course-related learning outcomes

Knowledge:

- has knowledge of building physics (heat, energy)
- has in-depth knowledge of computer programs supporting design and management, including BIM technology
- knows measurement and inventory methods in construction

Skills:

- are able to perform an energy analysis of a building
- can select appropriate methods and tools (including digital and analytical) to solve technical problems.

Social competences:

- are ready to autonomously complete and extend knowledge in the field of modern processes and technologies of building engineering
- are aware how important is sustainable development in building engineering

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: A written multiple-choice test assessing theoretical knowledge of the topics covered.

Assessment criteria: percentage ranges of correct answers: <90-100> - very good (5.0), <80-90> - good plus (4.5), <70-80> - good (4.0), <60-70> - satisfactory plus (3.5), <50-60> - satisfactory (3.0), <0-50> - unsatisfactory (2.0). Laboratories: Assessment of tasks performed independently during each laboratory session, ongoing monitoring of student progress, and assessment of the accuracy of models, analyses, and studies. The final grade is the average of the grades for tasks completed during the course. The following factors are taken into account when assessing the tasks:

- substantive and technical accuracy of the task,
- compliance with the task requirements,
- completeness of the work,
- independence of the task,

Grading scale:

- very good (5.0) - tasks completed correctly, without errors,
- good plus (4.5) - minor errors not affecting the final result,
- good (4.0) - correct execution with minor deficiencies,
- satisfactory plus (3.5) - visible errors, but the task was completed,
- satisfactory (3.0) - task was partially completed,
- insufficient (2.0) - no execution or serious errors.

Programme content

Lectures:

Energy performance of buildings - basic indicators and requirements.

Energy models in BIM - data scope and model preparation.

Integrating BIM with analytical tools (energy simulations).

AI in BIM model analysis - automating design processes.

Introduction to photogrammetry and 3D scanning technologies.

Point clouds as a data source for BIM models (scan-to-BIM).

Additive technologies in construction - introduction to 3D printing.

Integrating BIM with modern digital technologies (AI, IoT, digital twin).

Development trends in digitalization in construction and their importance for the organization of the investment process.

Laboratory classes:

Preparing a BIM model in Autodesk Revit for energy analysis - envelope parameters, functional zones.

Exporting the model to energy analysis tools and interpreting the results.

Analyzing the impact of building parameters on energy demand.

Introduction to digital photogrammetry - principles of data acquisition. Generating point clouds based on photogrammetric data. Importing point clouds into a BIM environment and inventory modeling.

Course topics

Lectures: The use of BIM models in technical analyses and the application of modern digital technologies, including artificial intelligence and additive technologies, in the design and implementation of construction projects.

Laboratories: The labs cover the use of BIM models for energy analyses and the acquisition of spatial data using photogrammetry and its application in inventory modeling.

Teaching methods

Lectures: multimedia presentations using practical examples.

Lectures delivered remotely using online learning methods and techniques.

Laboratories: independent student work at a computer based on instructions (tutorials), opportunity for ongoing consultations with the instructor, periodic presentation of student results in the group.

Bibliography

Basic:

1. Eastman Ch., BIM Handbook: a guide to building information modeling for owners, managers, designers, engineers and contractors, Wiley & Sons
2. Levy F., BIM in small-scale sustainable design, Wiley & Sons

Additional:

1. Barnes P., BIM for project managers : digital construction management, ICE Publishing & Thomas Telford Limited

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