

# POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

## KARTA PRZEDMIOTU

obowiązuje studentów rozpoczynających studia w roku akademickim 2021/2022

Wydział Inżynierii Lądowej

Kierunek studiów: Budownictwo

Profil: Ogólnoakademicki

Forma studiów: stacjonarne

Kod kierunku: BUD

Stopień studiów: II

Specjalności: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management)

### 1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	BIM w zarządzaniu budową
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	BIM in Construction Management
KOD PRZEDMIOTU	WIL BUD oIIS D15 21/22
KATEGORIA PRZEDMIOTU	Specialty subjects (profile: Construction Technology and Management)
LICZBA PUNKTÓW ECTS	4.00
SEMESTRY	2

### 2 RODZAJ ZAJĘĆ, LICZBA GODZIN W PLANIE STUDIÓW

SEMESTR	WYKŁAD	ĆWICZENIA AUDYTORYJNE	LABORATORIA	LABORATORIA KOMPUTERO- WE	PROJEKTY	SEMINARIUM
2	15	0	0	30	0	0

### 3 CELE PRZEDMIOTU

**Cel 1** To explain the role and benefits of BIM technology for construction management.

**Cel 2** To get students acquainted with features and issues of 4D BIM and 5D BIM. To discuss the use of BIM and BIM-related technologies for construction site management. To make students aware of the impact of BIM technology on construction management. To familiarize students with BIM-related technologies.

Kod archiwizacji:

**Cel 3** To prepare students for development of BIM-based time and cost analyses of construction works with the use of dedicated BIM tools.

**Cel 4** To familiarize students with functionalities of dedicated 4D BIM and 5D BIM software.

**Cel 5** Individual and team work in the preparation of construction projects based on BIM technology. To prepare students (at a basic level) to take part in research within the field BIM-based construction management.

## 4 WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

## 5 EFEKTY KSZTAŁCENIA

**EK1 Wiedza** Student knows the role and benefits of BIM implementation in the field of construction management. Student knows the scope of information stored in BIM models essential for the processes of construction management. Student is aware of the changes that arise from the implementation of BIM technology for construction management.

**EK2 Umiejętności** Student is able to work with BIM models and find the information essential for 4D modelling and 5D modelling.

**EK3 Umiejętności** Student is able to develop BIM-based cost estimates and BIM-based schedules while working with dedicated BIM tools.

**EK4 Kompetencje społeczne** Student is responsible for the results of her/his work. Student is able to discuss the results of BIM based time and cost analyses with the others. Student is able to defend constructively his point of view on the results of BIM based time and cost analyses in relation to both her/his own or the others work. Student is open for constructive criticism.

**EK5 Kompetencje społeczne** Ability to conduct independent and team research using BIM technology and publishing in the field of management based on BIM modeling.

## 6 TREŚCI PROGRAMOWE

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
<b>W1</b>	BIM in management - introduction, definitions, divisions, idea. Maturity and development levels BIM (LOD - Level of Development).	2
<b>W2</b>	IPD - Integrated Project Delivery.	2
<b>W3</b>	Classifications of construction works - OmniClass, Unifomat, Masterformat and others. The use of classification in management.	2
<b>W4</b>	BIM-based cost-estimations and scheduling of construction works.	4
<b>W5</b>	BIM and other digital techniques at the construction site (digitization of construction, unmanned aerial vehicles, printing techniques, augmented reality, etc.)	5

LABORATORIA KOMPUTEROWE		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
<b>K1</b>	Basics of BIM models handling with the use of dedicated software (model viewers).	8
<b>K2</b>	Cost estimation based on BIM models (e.g. system BIMestiMate and BIM Vision, Norma Expert).	8
<b>K3</b>	Scheduling and simulations of construction works (e.g. BIMestiMate, Navisworks).	6
<b>K4</b>	Creating revisions, checking objects, measuring, checking collisions (e.g. Navisworks Manage, Trimble Connect for Desktop).	4
<b>K5</b>	Project management (BIM 360 cloud tools)	4

## 7 NARZĘDZIA DYDAKTYCZNE

**N1** multimedia presentation

**N2** computer laboratories

**N3** BIM software

## 8 OBCIĄŻENIE PRACĄ STUDENTA

FORMA AKTYWNOŚCI	ŚREDNIA LICZBA GODZIN NA ZREALIZOWANIE AKTYWNOŚCI
<b>Godziny kontaktowe z nauczycielem akademickim, w tym:</b>	
Godziny wynikające z planu studiów	45
Konsultacje przedmiotowe	2
Egzaminy i zaliczenia w sesji	4
<b>Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:</b>	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	20
Opracowanie wyników	25
Przygotowanie raportu, projektu, prezentacji, dyskusji	20
<b>SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA</b>	<b>116</b>
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	4.00

## 9 SPOSOBY OCENY

### OCENA FORMUJĄCA

**F1** Completion of the lecture in the form of a test

**F2** Project evaluation

### OCENA PODSUMOWUJĄCA

**P1** Average rating weight

### WARUNKI ZALICZENIA PRZEDMIOTU

**W1** passing lecture part

**W2** passing project part

**W3** Presence for min. 80% of laboratories classes

### KRYTERIA OCENY

EFEKT KSZTAŁCENIA 1	
NA OCENĘ 2.0	The student has not mastered the general knowledge about the use of BIM in management, does not know the levels of maturity and development of BIM, classification, does not know examples and is not able to characterize them. Cannot work with BIM models. Altogether he mastered less than 50% of the required knowledge.
NA OCENĘ 3.0	Student knows the role and benefits of BIM implementation in the field of construction management. Student knows the scope of information stored in BIM models. Student knows a basics of BIM based construction management. Altogether he mastered 50- 59% of relevant knowledge.
NA OCENĘ 3.5	The student has mastered the basic knowledge of the use of BIM in management, knows the levels of BIM maturity and development, classification, knows examples of the use of BIM and is able to characterize them. Can "read" BIM models. He can work with the building model. Altogether he mastered 60-69% of relevant knowledge.
NA OCENĘ 4.0	The student has mastered the basic knowledge of the use of BIM in management, knows the levels of BIM maturity and development, classification, knows examples of the use of BIM and is able to characterize them. Can "read" BIM models. Can discuss the basic problems associated with BIM models. He can describe the methods of taking the bill of quantities and cost estimate based on the BIM model. Has knowledge of simple 4D and 5D simulations. Altogether he mastered 70-79% of relevant knowledge.
NA OCENĘ 4.5	The student has mastered the basic knowledge of the use of BIM in management, knows the levels of BIM maturity and development, classification, knows examples of the use of BIM and is able to characterize them. Can "read" BIM models. Can discuss the basic problems associated with BIM models. He can describe the methods of taking the bill of quantities and cost estimate based on the BIM model. Has knowledge of complex 4D and 5D simulations. Altogether he mastered 80- 89% of relevant knowledge.

NA OCENĘ 5.0	The student has mastered the basic knowledge of the use of BIM in management, knows the levels of BIM maturity and development, classification, knows examples of the use of BIM and is able to characterize them. Is able to "read" BIM models. Can discuss the basic problems associated with BIM models. He can describe the methods of taking the bill of quantities and cost estimate based on the BIM model. Has knowledge of complex 4D and 5D simulations. He has knowledge of the use of BIM on the construction site. Altogether he mastered 90-100% of relevant knowledge.
EFEKT KSZTAŁCENIA 2	
NA OCENĘ 2.0	The student cannot discuss costing principles based on the Macro and Micro BIM models. Cannot perform costing and scheduling for 4D and 5D. It cannot verify the correctness of the BIM model preparation using any IFC browser. Altogether he mastered less than 50% of his skills.
NA OCENĘ 3.0	Student is able to discuss costing principles based on Makro and Micro BIM models. He can perform simple costing elements and 4D and 5D scheduling using any software. He can verify the correctness of the preparation of the BIM model using any IFC browser. Altogether he mastered 50-59% of his skills.
NA OCENĘ 3.5	Student is able to discuss costing principles based on Makro and Micro BIM models. He can perform simple costing elements and 4D and 5D scheduling using any software. He can verify the correctness of the preparation of the BIM model using any IFC browser. Altogether he mastered 60-69% of his skills.
NA OCENĘ 4.0	The student knows the costing principles based on the Makro and Micro BIM models well. He can perform complex costing and scheduling elements 4D and 5D using any software. He can verify the correctness of the preparation of the BIM model using several IFC browsers. He can catch errors resulting from spatial collisions and analyze them. Altogether he mastered 70-79% of his skills.
NA OCENĘ 4.5	The student knows the costing principles based on the Makro and Micro BIM models well. He can perform complex costing and scheduling elements 4D and 5D using any software. He can verify the correctness of the preparation of the BIM model using several IFC browsers. He can catch errors resulting from spatial collisions and analyze them. Student is able to perform 4D and 5D simulations. Altogether he mastered 80-89% of his skills.
NA OCENĘ 5.0	The student knows the costing principles based on the Makro and Micro BIM models well. He can perform complex costing and scheduling elements 4D and 5D using any software. He can verify the correctness of the preparation of the BIM model using several IFC browsers. He can catch errors resulting from spatial collisions and analyze them. Student is able to perform 4D and 5D simulations, perform variant analyzes. Altogether he mastered 90-100% of his skills.
EFEKT KSZTAŁCENIA 3	
NA OCENĘ 2.0	The student cannot make simple cost estimates and schedules using BIM technology. The student is unable to make a report assessing the correctness of the BIM model used. Altogether he mastered less than 50% of his skills.
NA OCENĘ 3.0	Student is able to make simple cost estimates and schedules using BIM technology. The student is able to make a report with a few errors assessing the correctness of the BIM model used. Altogether he mastered 50-59% of his skills.

NA OCENĘ 3.5	Student is able to make simple cost estimates and schedules using BIM technology. The student is able to make a report with a few errors assessing the correctness of the BIM model used. Altogether he mastered 60-69% of his skills.
NA OCENĘ 4.0	The student is able to make complex cost estimates and schedules using BIM technology. The student is able to correctly prepare a report assessing the correctness of the BIM model used. The student is able to perform simulations and time-cost analyzes. Altogether he mastered 70-79% of his skills.
NA OCENĘ 4.5	The student is able to make complex cost estimates and schedules using BIM technology. The student is able to correctly prepare a report assessing the correctness of the BIM model used. The student is able to perform simulations and time-cost analyzes. In total, he mastered 80-89% of skills.
NA OCENĘ 5.0	The student is able to make complex cost estimates and schedules using BIM technology. The student is able to correctly prepare a report assessing the correctness of the BIM model used. The student is able to perform 4D and 5D simulations as well as time-cost and variant analyzes based on the BIM model. Altogether he mastered 90-90% of his skills.
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 2.0	Student is not quite responsible for the results of her/his work. Student is not able to work independently with even a help from the lecturer.
NA OCENĘ 3.0	Student is responsible for the results of her/his work. Student is able to work independently with a little help from the lecturer.
NA OCENĘ 3.5	Student is responsible for the results of her/his work. Student is able to work independently with a little help from the lecturer. The student cooperates in a group, he is not always able to defend his opinion.
NA OCENĘ 4.0	Student is responsible for the results of her/his work. Student is able to work independently with a little help from the lecturer. The student cooperates in a group, he is not always able to defend his opinion.
NA OCENĘ 4.5	The student cooperates very well in a group, is active and involved, manifests the characteristics to manage the work of the group. Performs independently complex tasks.
NA OCENĘ 5.0	The student perfectly cooperates and manages the group work. Performs independently complex tasks.
EFEKT KSZTAŁCENIA 5	
NA OCENĘ 2.0	He cannot conduct scientific research using BIM technology and publish in the field of management based on BIM modeling.
NA OCENĘ 3.0	The student is able to conduct with the help of conducting simple scientific research using BIM technology.
NA OCENĘ 3.5	The student is able to conduct with the help of conducting simple scientific research using BIM technology.
NA OCENĘ 4.0	Student is able to conduct simple scientific research using BIM technology.

NA OCENĘ 4.5	Student is able to conduct simple scientific research using BIM technology.
NA OCENĘ 5.0	The student is able to independently conduct scientific research using BIM technology. Student is able to publish in the field of construction management based on BIM modeling.

## 10 MACIERZ REALIZACJI PRZEDMIOTU

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓŁOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK1		Cel 1 Cel 2 Cel 3 Cel 4	w1 w2 w3 w4 w5	N1	F1 P1
EK2		Cel 3 Cel 5	k1 k2 k3 k4 k5	N2 N3	F2 P1
EK3		Cel 4 Cel 5	k1 k2 k3 k4 k5	N2 N3	F2 P1
EK4		Cel 5	k1 k2 k3 k4 k5	N2 N3	F2 P1
EK5		Cel 3 Cel 4 Cel 5	w1 w2 w3 w4 w5 k1 k2 k3 k4 k5	N1 N2 N3	F1 F2 P1

## 11 WYKAZ LITERATURY

### LITERATURA PODSTAWOWA

- [1] Underwood, Jason; Isikdag, Umit — *Handbook of research on building information modeling and construction informatics : concepts and technologies*, New York, 2010, IGI Global
- [1] Sacks, Rafael; Eastman, Charles M; Lee, Ghang; Teicholz, Paul M. — *BIM handbook : a guide to building information modeling for owners, designers, engineers, contractors, and facility managers*, Hoboken, 2018, John Wiley & Sons
- [2] Steve Pittard, Peter Sell — *BIM and Quantity Surveying*, UK, 2015, Routledge

### LITERATURA UZUPEŁNIAJĄCA

- [1] Shepherd, David — *BIM management handbook*, Newcastle, UK,, 2015, Newcastle Upon Tyne

### LITERATURA DODATKOWA

- [1] Zima, Krzysztof — *Kalkulacja kosztów robót budowlanych z wykorzystaniem technologii BIM*, Kraków, 2017, Wyd. PK

[2 ] Kasznia, Dariusz; Magiera, Jacek; Wierzowiecki, Paweł. — *BIM w praktyce : standardy, wdrożenie, case study*, Warszawa, 2017, Wydawnictwo Naukowe PWN

## 12 INFORMACJE O NAUCZYCIELACH AKADEMICKICH

### OSOBA ODPOWIEDZIALNA ZA KARTĘ

dr hab. inż. prof. PK Krzysztof Zima (kontakt: [kzima@izwbit.pk.edu.pl](mailto:kzima@izwbit.pk.edu.pl))

### OSOBY PROWADZĄCE PRZEDMIOT

1 dr hab. inż. prof. PK Krzysztof Zima (kontakt: [kzima@17.pk.edu.pl](mailto:kzima@17.pk.edu.pl))

2 dr inż. Damian Wieczorek (kontakt: [dwieczorek@17.pk.edu.pl](mailto:dwieczorek@17.pk.edu.pl))

3 dr inż. Michał Juszczyk (kontakt: [mjuszczuk@17.pk.edu.pl](mailto:mjuszczuk@17.pk.edu.pl))

4 mgr inż. Ewelina Mitera-Kiełbasa (kontakt: [emitera@17.pk.edu.pl](mailto:emitera@17.pk.edu.pl))

5 dr inż. Grzegorz Śladowski (kontakt: [gsladowski@17.pk.edu.pl](mailto:gsladowski@17.pk.edu.pl))

## 13 ZATWIERDZENIE KARTY PRZEDMIOTU DO REALIZACJI

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(miejscowość, data)

(odpowiedzialny za przedmiot)

(dziekan)

**PRZYJMUJĘ DO REALIZACJI** (data i podpisy osób prowadzących przedmiot)

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