

# POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

## KARTA PRZEDMIOTU

obowiązuje studentów rozpoczynających studia w roku akademickim 2022/2023

Wydział Inżynierii Lądowej

Kierunek studiów: Budownictwo

Profil: Ogólnoakademicki

Forma studiów: stacjonarne

Kod kierunku: BUD

Stopień studiów: I

Specjalności: Bez specjalności - studia w języku angielskim

### 1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	Konstrukcje zespolone mostowe i inne
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Composite structures for bridges
KOD PRZEDMIOTU	WIL BUD oIS E3272 22/23
KATEGORIA PRZEDMIOTU	Przedmioty związane z dyplomem
LICZBA PUNKTÓW ECTS	6.00
SEMESTRY	7

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

SEMESTR	WYKŁAD	ĆWICZENIA AUDYTORYJNE	LABORATORIA	LABORATORIA KOMPUTERO- WE	PROJEKTY	SEMINARIUM
7	15	0	0	0	30	0

### 3 CELE PRZEDMIOTU

**Cel 1** Introduction of the basic concepts in the field of composite structures with focus on bridge structures.

**Cel 2** Understanding and classification of modern structures and methods of construction of bridge composite structures.

**Cel 3** Introduction students with modern trends in building of composite bridges and skeletal/frame buildings.

**Cel 4** Possessing of basic knowledge on structural analysis used during the design and analysis of composite bridge elements, characteristics and load carrying capacity calculations.

**Cel 5** Developing the ability to team solving construction and calculation problems.

**Cel 6** Preparing the student for scientific work and scientific research by acquiring the ability to solve engineering tasks, modeling and analysis of the work of the structure.

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

1 Concrete structures

2 Steel structures

3 Structural mechanics

4 Strength of materials

## 5 EFEKTY KSZTAŁCENIA

**EK1 Wiedza** Knowledge of basic concepts and modern trends in design and construction (material selection) of road and rail composite steel/concrete bridges.

**EK2 Wiedza** Knowledge on design and construction of composite steel-concrete bridges.

**EK3 Umiejętności** Ability to select a proper design and construction technique for a given situation (span length selection, material selection, communication layout on the bridge)

**EK4 Umiejętności** Ability to design a steel-concrete composite bridge to EC (set of conceptual drawings of the bridge, combinations of actions, structural analysis, calculations for ultimate limit states and serviceability limit states)

**EK5 Kompetencje społeczne** Ability to effectively work in teams, lead a team or be a part of a design team. The student gains social competences - the student cooperates in a team. The student is basically prepared for scientific work and scientific research.

## 6 TREŚCI PROGRAMOWE

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W1	Introduction to the subject: construction solutions, nomenclature. Short presentation of textbooks. Historical introduction.	1
W2	Composite solutions in concrete-to-concrete and concrete-to-steel structures, connector types - part 1 bridge structures.	1
W3	Materials (concrete, reinforcing steel, structural steel, connecting devices), durability (Corrosion protection at the steelconcrete interface in bridges)	1
W4	Composite bridges: typical construction methods, execution phases, solutions of cross sections.	1

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
<b>W5</b>	Analysis of selected bridge and general construction solutions.	1
<b>W6</b>	Use of composite structures in general construction: beams, structures ceiling slabs, pillars.	1
<b>W7</b>	Determination of the basic characteristics of a composite girder sections.	1
<b>W8</b>	Effects of shrinkage, creep and temperature in composite structures.	1
<b>W9</b>	Solutions for important structural details in composite bridges and civil/general structures.	1
<b>W10</b>	Discussion of the principles, rules and formulae contained in EC4 - buildings part 1	1
<b>W11</b>	Discussion of principles, rules and formulae contained in EC4 - bridges part 2	1
<b>W12</b>	Composite structures based on the use of corrugated sheets.	1
<b>W13</b>	Composite structures: concrete-to-concrete type: structural solutions, calculation principles, erection techniques, connectors, examples.	1
<b>W14</b>	Composite structures: wood-concrete: structural solutions, calculation principles, erection techniques, fasteners, examples.	1
<b>W15</b>	Modern trends in the use of various composite materials in nowadays structures.	1

PROJEKTY		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
<b>P1</b>	Setting up the structural form, communication layout on the bridge, location of the bridge and selecting the main accessories of the bridge	2
<b>P2</b>	Setting up the basic parameters of the bridge: set of conceptual drawings of the superstructure - cross sections, longitudinal sections and top view drawings	6
<b>P3</b>	Actions and combination of actions (non-traffic actions for persistent design situations, traffic loads on road bridges and other when applicable). Calculations carried out for the deck and main girders	4
<b>P4</b>	Detailed structural calculations for RC deck (ULS and SLS to be considered)	2
<b>P5</b>	Detailed structural calculations for main steel-concrete composite girder (ULS and SLS to be considered)	10
<b>P6</b>	Execution of selected detailed drawings and preparation of final report.	6

## 7 NARZĘDZIA DYDAKTYCZNE

N1 Lectures

N2 Multimedia presentations

N3 Discussion

N4 Design exercises

N5 Consultation

N6 Group work

## 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	9
Egzaminy i zaliczenia w sesji	0
passing the project	1
<b>Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:</b>	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	40
Opracowanie wyników	40
Przygotowanie raportu, projektu, prezentacji, dyskusji	45
<b>SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA</b>	<b>180</b>
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	6.00

## 9 SPOSOBY OCENY

The grading methodology uses an assessment of the student's oral response to a specific question and an assessment of free speech on the subject.

### OCENA FORMUJĄCA

F1 Individual assessment from a team project

F2 Activity during classes

### OCENA PODSUMOWUJĄCA

P3 Weighted average of formulating grades

**WARUNKI ZALICZENIA PRZEDMIOTU****W1** Positive assessment of the project**W2** Positive assessment of lecture activity**OCENA AKTYWNOŚCI BEZ UDZIAŁU NAUCZYCIELA****B1** passing the presentation**KRYTERIA OCENY**

EFEKT KSZTAŁCENIA 1	
NA OCENĘ 2.0	Student does not know the basic terminology, concepts, principles, and definitions in the field of composite bridge engineering
NA OCENĘ 3.0	Student knows the basic terminology and definitions in the field of composite bridge engineering (student can describe basic structural forms, materials and can define the communication system on the bridge)
NA OCENĘ 3.5	Student knows the basic terminology and definitions in the field of composite bridge engineering (student can describe basic structural forms, materials and can define the communication system on the bridge)
NA OCENĘ 4.0	Student knows well the basic terminology and definitions in the field of composite bridge engineering (student can describe basic structural forms, materials and can define the communication system on the bridge)
NA OCENĘ 4.5	Student knows very well the terminology and definitions in the field of composite bridge engineering (student can describe basic structural forms, materials and can define the communication system on the bridge)
NA OCENĘ 5.0	Student knows excellentl the terminology and definitions in the field of composite bridge engineering (student can describe basic structural forms, materials and can define the communication system on the bridge)
EFEKT KSZTAŁCENIA 2	
NA OCENĘ 2.0	Student does not have the knowledge on design and construction of steel-concrete composite bridge structures
NA OCENĘ 3.0	Student has the basic knowledge on design and construction of steel-concrete composite bridge structures
NA OCENĘ 3.5	Student has understanding and the knowledge on design and construction of steel-concrete composite bridge structures
NA OCENĘ 4.0	Student has good understanding and the knowledge on design and construction of steel-concrete composite bridge structures
NA OCENĘ 4.5	Student has very good understanding and the knowledge on design and construction of steel-concrete composite bridge structures
NA OCENĘ 5.0	Student has excellent understanding and the knowledge on design and construction of steel-concrete composite bridge structures

EFEKT KSZTAŁCENIA 3	
NA OCENĘ 2.0	Student is not able to select a proper design and construction technique for a given situation (span length selection, material selection, communication layout on the bridge)
NA OCENĘ 3.0	Student is able to select a proper design and construction technique - bridge type - for a given situation (span length selection, material selection, communication layout on the bridge)
NA OCENĘ 3.5	Student is able to select a proper design and construction technique - bridge type - for a given situation (span length selection, material selection, communication layout on the bridge) and also is able to optimize the selected bridge type
NA OCENĘ 4.0	Student is able good to select a proper design and construction technique - bridge type - for a given situation (span length selection, material selection, communication layout on the bridge) and also is able to optimize the selected bridge type
NA OCENĘ 4.5	Student is able very good to select a proper design and construction technique - bridge type - for a given situation (span length selection, material selection, communication layout on the bridge) and also is able to optimize the selected bridge type
NA OCENĘ 5.0	Student is able excellent to select a proper design and construction technique - bridge type - for a given situation (span length selection, material selection, communication layout on the bridge) and also is able to optimize the selected bridge type
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 2.0	Student is not able to design a steel-concrete composite bridge to EC, does not have an understanding of limit states, actions and combinations of actions
NA OCENĘ 3.0	Student is able to design a simple steel-concrete composite bridge to EC, has a basic understanding of limit states, actions and combinations of actions
NA OCENĘ 3.5	Student is able to design a steel-concrete composite bridge to EC, produce a set of conceptual drawings, understands the basis of design to limit states, understands actions and combinations of actions, and is able to carry out basic calculations for ULS and SLS
NA OCENĘ 4.0	Student is able good to design a steel-concrete composite bridge to EC, produce a set of conceptual drawings, understands the basis of design to limit states, understands actions and combinations of actions, and is able to carry out basic calculations for ULS and SLS
NA OCENĘ 4.5	Student is able very good to design a steel-concrete composite bridge to EC, produce a set of conceptual drawings, understands the basis of design to limit states, understands actions and combinations of actions, and is able to carry out basic calculations for ULS and SLS
NA OCENĘ 5.0	Student is able excellent to design a steel-concrete composite bridge to EC, produce a set of conceptual drawings, understands the basis of design to limit states, understands actions and combinations of actions, and is able to carry out basic calculations for ULS and SLS

EFEKT KSZTAŁCENIA 5	
NA OCENĘ 2.0	Student is not able to work in a team, does not communicate well with others, cannot express his/her thoughts in an understandable manner
NA OCENĘ 3.0	Student is not able to work in a team, does not communicate well with others, can express his/her thoughts in an understandable manner
NA OCENĘ 3.5	Student is able to work in a team, is able to communicate with others, is able to somehow express his/her thoughts in an understandable manner
NA OCENĘ 4.0	Student is able to work well in a team, is able to communicate well with others, is able to express his/her thoughts in an understandable manner. Student feels well as a leader or as a team member.
NA OCENĘ 4.5	Student is able good to work well in a team, is able to communicate well with others, is able to express his/her thoughts in an understandable manner. Student feels well as a leader or as a team member.
NA OCENĘ 5.0	Student is able excellent to work well in a team, is able to communicate well with others, is able to express his/her thoughts in an understandable manner. Student feels well as a leader or as a team member.

## 10 MACIERZ REALIZACJI PRZEDMIOTU

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓŁOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK1	K_W06 K_W07 K_U01 K_U02 K_U03 K_U08	Cel 1 Cel 2 Cel 3 Cel 4	w1 w2 w3 w4 w5 w6 w7 w8 w9 w10 w11	N1 N2 N3 N4 N5 N6	F1 F2 P3
EK2	K_U01 K_U02 K_U03 K_U08	Cel 1 Cel 2 Cel 3 Cel 4	w1 w2 w3 w4 w5 w6 w7 w8 w9 w10 w11 w12 w13 w14 w15	N1 N2 N3 N4 N5 N6	F1 F2 P3
EK3	K_U01 K_U02 K_U03 K_U08	Cel 1 Cel 2 Cel 3 Cel 4 Cel 5 Cel 6	w1 w2 w3 w4 w5 w6 w7 w8 w9 w10 w11 w12 w13 w14 w15 p1 p2 p3 p4 p5 p6	N1 N2 N3 N4 N5 N6	F1 F2 P3

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓLOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK4	K_U01 K_U02 K_U03 K_U08	Cel 1 Cel 2 Cel 3 Cel 4 Cel 5	w1 w2 w3 w4 w5 w6 w7 w8 w9 w10 w11 w12 w13 w14 w15 p1 p2 p3 p4 p5 p6	N1 N2 N3 N4 N5 N6	F1 F2 P3
EK5	K_K08 K_K09	Cel 1 Cel 2 Cel 3 Cel 4 Cel 5 Cel 6	w1 w2 w3 w4 w5 w6 w7 w8 w9 w10 w11 w12 w13 w14 w15 p1 p2 p3 p4 p5 p6	N1 N2 N3 N4 N5 N6	F1 F2 P3

## 11 WYKAZ LITERATURY

### LITERATURA PODSTAWOWA

- [1] | **Hambly, E.C.** — *Bridge Deck Behaviour*, London, 1991, E&FN Spon
- [2] | **C.R. Hendy and R.P. Johnson** — *Designers Guide to EN 1994-2. Eurocode 4: Design of composite steel and concrete structures. Part 2 General rules for bridges*, -, 2006, -
- [3] | **C.R. Hendy and D.A. Smith** — *Designers Guide to EN 1992-2. Eurocode 2: Design of concrete structures. Part 2: Concrete bridges*, -, 2007, -
- [4] | **C.R. Hendy and C.J. Murphy** — *Designers Guide to EN 1993-2. Eurocode 3: Design of steel structures. Part 2: Steel bridges*, -, 2007, -
- [5] | **J.-A. Calgaro, M. Tschumi and H. Gulvanessian** — *Designers Guide to Eurocode 1: Actions on Bridges. EN 1991-2, EN 1991-1-1, -1-3 to -1-7 and EN 1990 Annex A2*, -, 2010, -
- [6] | **H. Gulvanessian, J.-A. Calgaro and M. Holicky** — *Designers Guide to EN 1990. Eurocode: Basis of Structural Design*, -, 2010, -
- [7] | **Collings, D.** — *Steel-Concrete Composite Bridges*, London, 2005, Thomas Telford
- [8] | **Furtak, K.** — *Mosty zespolone*, Kraków, 1999, Państwowe Wydawnictwo Naukowe
- [9] | **Madaj A., Wołowicki W.** — *Podstawy projektowania budowli mostowych*, Warszawa, 2007, WKŁ

### LITERATURA UZUPEŁNIAJĄCA

- [1] | **M.J. Ryall, G.A.R. Parke & J.E. Harding** — *Manual of Bridge Engineering*, London, 2003, Thomas Telford Ltd

### LITERATURA DODATKOWA

- [1] | Czasopisma polskie i zagraniczne związane z mostownictwem i ich odpowiedniki internetowe: Inżynieria i Budownictwo, Mosty, Obiekty inżynierskie, Drogi, Drogownictwo, Geoinżynieria - drogi mosty tunele, Inżynier Budownictwa, Nowoczesne Budownictwo Inżynieryjne, Structural Engineering International



## 12 INFORMACJE O NAUCZYCIELACH AKADEMICKICH

### OSOBA ODPOWIEDZIALNA ZA KARTĘ

dr inż. Wojciech Średniawa (kontakt: [wsrednia@pk.edu.pl](mailto:wsrednia@pk.edu.pl))

### OSOBY PROWADZĄCE PRZEDMIOT

1 dr inż. Wojciech Średniawa (kontakt: [wsrednia@pk.edu.pl](mailto:wsrednia@pk.edu.pl))

2 dr inż. Marek Pańtak (kontakt: [mpantak@pk.edu.pl](mailto:mpantak@pk.edu.pl))

3 dr inż. Mariusz Hebda (kontakt: [mariusz.hebda@epk.edu.pl](mailto:mariusz.hebda@epk.edu.pl))

4 mgr inż. Kazimierz Piwowarczyk (kontakt: [kpiwowarczyk@pk.edu.pl](mailto:kpiwowarczyk@pk.edu.pl))

5 prof. dr hab. inż. Kazimierz Furtak (kontakt: [kfurtak@pk.edu.pl](mailto:kfurtak@pk.edu.pl))

6 dr inż. Krzysztof Ostrowski (kontakt: [krzysztof.ostrowski@pk.edu.pl.com](mailto:krzysztof.ostrowski@pk.edu.pl.com))

## 13 ZATWIERDZENIE KARTY PRZEDMIOTU DO REALIZACJI

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(miejsowość, data)

(odpowiedzialny za przedmiot)

(dziekan)

PRZYJMUJĘ DO REALIZACJI (data i podpisy osób prowadzących przedmiot)

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