

# POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

## KARTA PRZEDMIOTU

obowiązuje studentów rozpoczynających studia w roku akademickim 2012/2013

Wydział Inżynierii Lądowej

Kierunek studiów: Budownictwo

Profil: Ogólnoakademicki

Forma studiów: stacjonarne

Kod kierunku: BUD

Stopień studiów: II

Specjalności: Konstrukcje budowlane i inżynierskie - studia w języku angielskim

### 1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	Mosty II
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Bridges II
KOD PRZEDMIOTU	WIL BUD oIIS D24 12/13
KATEGORIA PRZEDMIOTU	Przedmioty specjalnościowe
LICZBA PUNKTÓW ECTS	3.00
SEMESTRY	2

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

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

### 3 CELE PRZEDMIOTU

**Cel 1** Introduction of advanced concepts and modern trends in design of bridges, rehabilitation, repair, and retrofit of existing bridges

**Cel 2** Deepening the knowledge on actions and load combinations to EC (development of the static road traffic load models, combination of multi-component actions, development of fatigue load models, actions on footbridges, actions on railway bridges, accidental actions on bridges)

**Cel 3** Deepening the knowledge on design and erection techniques for different bridge construction types: reinforced concrete bridges; prestressed concrete bridges; steel bridges; composite bridges; arch bridges, cable stayed bridges, suspension bridges, movable bridges, footbridges

**Cel 4** Knowledge on classification and various construction techniques of underground structures: road, rail and pedestrian tunnels (cut and cover tunnels both bottom-up and top-down methods, bored tunnels, immersed tube tunnels) and knowledge on various techniques to protect deep excavations

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

1 Bridge structures

2 Concrete and prestressed structures

3 Steel structures

4 Structural mechanics

5 Strength of materials

## 5 EFEKTY KSZTAŁCENIA

**EK1 Wiedza** Knowledge of advanced concepts and modern trends in design of road and rail bridges, rehabilitation, repair, and retrofit of existing bridge structures

**EK2 Wiedza** Knowledge on design and construction of reinforced concrete bridges, prestressed concrete bridges, steel bridges, composite bridges, arch bridges, cable stayed bridges, suspension bridges, movable bridges and footbridges

**EK3 Wiedza** Knowledge of basic terminology, concepts and definitions, principles and modern design and construction techniques of underground structures: road, rail and pedestrian tunnels

**EK4 Umiejętności** Ability to design a slab deck / beam deck post-tensioned bridge to EC (set of conceptual drawings of the bridge; basis of design limit states, combinations of actions, durability, structural analysis; calculations for ultimate limit states and serviceability limit states; detailing of reinforcement and prestressing steel)

## 6 TREŚCI PROGRAMOWE

PROJEKTY		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
P1	Setting up the structural form, communication (road layout) on the bridge and location of the bridge	2
P2	Setting up the basic parameters of the bridge: set of conceptual drawings of the superstructure - cross sections and longitudinal sections	3
P3	Actions and combination of actions (non-traffic actions for persistent design situations, traffic loads on road bridges and other when applicable)	3

PROJEKTY		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
<b>P4</b>	Detailed structural calculations for main components of the bridge: ultimate limit states (bending, shear, torsion) and serviceability limit states (stress limitation, crack control, deflection control, early thermal cracking)	6
<b>P5</b>	Detailing of reinforcement and prestressing steel	1

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
<b>W1</b>	The history and aesthetic development of bridges, selected concepts and classifications of bridge and underground structures	2
<b>W2</b>	Actions and load combinations to EC (development of the static road traffic load models, combination of multi-component actions, development of fatigue load models, actions on footbridges, actions on railway bridges, accidental actions on bridges)	4
<b>W3</b>	Structural systems of concrete, steel, prestressed and composite road and rail bridges; structural analysis and modeling techniques	6
<b>W4</b>	Design and construction of reinforced concrete bridges, prestressed concrete bridges, steel bridges, composite bridges, arch bridges, cable stayed bridges, suspension bridges, movable bridges, footbridges	6
<b>W5</b>	Integral and semi-integral bridges: the concept, configuration, and behaviour of integral and semi-integral bridge structures, soil-structure interaction for integral bridges with embedded abutments	2
<b>W6</b>	Inspection, assessment, repair, strengthening and replacement of bridge structures	2
<b>W7</b>	Bridge accessories, protection and bridge management	2
<b>W8</b>	Underground structures / road, rail and pedestrian tunnels, basic classification and various construction techniques (cut and cover tunnels both bottom-up and top-down methods, bored tunnels, immersed tube tunnels)	4
<b>W9</b>	Various techniques to protect deep excavations (retaining walls - cantilevered, gravity and anchored walls)	2

## 7 NARZĘDZIA DYDAKTYCZNE

**N1** Wykłady

**N2** Prezentacje multimedialne

**N3** Dyskusja

N4 Ćwiczenia projektowe

N5 Konsultacje

N6 Praca w grupach

## 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	0
Konsultacje przedmiotowe	0
Egzaminy i zaliczenia w sesji	0
<b>Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:</b>	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	30
Opracowanie wyników	0
Przygotowanie raportu, projektu, prezentacji, dyskusji	15
<b>SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA</b>	<b>45</b>
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	3.00

## 9 SPOSOBY OCENY

### OCENA FORMUJĄCA

F1 Projekt indywidualny

### OCENA PODSUMOWUJĄCA

P1 Egzamin pisemny

P2 Egzamin ustny

P3 Średnia ważona ocen formujących

### KRYTERIA OCENY

EFEKT KSZTALCENIA 1	
NA OCENĘ 2.0	Student does not know the basic terminology, concepts, principles, and definitions in the field of bridge engineering

NA OCENĘ 3.0	Student knows the basic terminology, concepts, principles, and definitions in the field of bridge engineering (concrete and steel bridges)
NA OCENĘ 3.5	Student has the knowledge of advanced concepts and modern trends in design of road and rail bridges (concrete bridges)
NA OCENĘ 4.0	Student has the knowledge of advanced concepts and modern trends in design of road and rail bridges (concrete, steel and composite bridges)
NA OCENĘ 4.5	Student has the knowledge of advanced concepts and modern trends in design of road and rail bridges (concrete, steel and composite), rehabilitation, repair, and retrofit of existing bridge structures
NA OCENĘ 5.0	Student possesses the knowledge of advanced concepts and modern trends in design and construction of road and rail bridges (concrete, steel and composite), rehabilitation, repair, and retrofit of existing bridge structures
EFEKT KSZTALCENIA 2	
NA OCENĘ 2.0	Student does not have the knowledge on design and construction of basic types of bridge structures
NA OCENĘ 3.0	Student has the knowledge on design and construction of reinforced concrete bridges
NA OCENĘ 3.5	Student has the knowledge on design and construction of reinforced concrete bridges and prestressed concrete bridges
NA OCENĘ 4.0	Student has the knowledge on design and construction of reinforced concrete bridges, prestressed concrete bridges, steel bridges, and composite bridges
NA OCENĘ 4.5	Student has the knowledge on design and construction of reinforced concrete bridges, prestressed concrete bridges, steel bridges, composite bridges and footbridges
NA OCENĘ 5.0	Student has the knowledge on design and construction of reinforced concrete bridges, prestressed concrete bridges, steel bridges, composite bridges, arch bridges, cable stayed bridges, suspension bridges, movable bridges and footbridges
EFEKT KSZTALCENIA 3	
NA OCENĘ 2.0	Student does not have the knowledge of basic terminology, concepts and definitions, principles and modern design and construction techniques of underground structures and various techniques to protect deep excavations
NA OCENĘ 3.0	Student has the knowledge of basic terminology, concepts and definitions, principles and modern design techniques of underground structures - road tunnels
NA OCENĘ 3.5	Student has the knowledge of basic terminology, concepts and definitions, principles and modern design techniques of underground structures - road tunnels and various techniques to protect deep excavations
NA OCENĘ 4.0	Student has the knowledge of basic terminology, concepts and definitions, principles and modern design techniques of underground structures - road and pedestrian tunnels and various techniques to protect deep excavations

NA OCENĘ 4.5	Student has the knowledge of basic terminology, concepts and definitions, principles and modern design and construction techniques of underground structures - road and pedestrian tunnels and various techniques to protect deep excavations
NA OCENĘ 5.0	Student has the knowledge of basic terminology, concepts and definitions, principles and modern design and construction techniques of underground structures - road, rail and pedestrian tunnels (cut and cover tunnels both bottom-up and top-down methods, bored tunnels, immersed tube tunnels) and various techniques to protect deep excavations
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 2.0	Student is not able to design a slab deck or beam deck post-tensioned 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 slab deck post-tensioned bridge to EC, is able to produce a set of conceptual drawings of the bridge, understands the basis of design to limit states, understands actions and combinations of actions, is able to carry out basic calculations for ULS and SLS
NA OCENĘ 3.5	Student is able to design a slab deck or beam deck post-tensioned bridge to EC, is able to produce a set of conceptual drawings of the bridge, understands the basis of design to limit states, understands actions and combinations of actions, is able to carry out basic calculations for ULS and SLS
NA OCENĘ 4.0	Student is able to design a slab deck or beam deck post-tensioned bridge to EC, is able to produce a set of conceptual drawings of the bridge, understands the basis of design to limit states, understands actions and combinations of actions, is able to carry out basic calculations for ULS and SLS
NA OCENĘ 4.5	Student is able to design a slab deck and beam deck post-tensioned bridge to EC (set of conceptual drawings of the bridge; basis of design limit states, combinations of actions, durability, structural analysis; calculations for ultimate limit states and serviceability limit states; detailing of reinforcement and prestressing steel)
NA OCENĘ 5.0	Student is able to design and then further optimize the design of a slab deck and beam deck post-tensioned bridge to EC (set of conceptual drawings of the bridge; basis of design limit states, combinations of actions, durability, structural analysis; calculations for ultimate limit states and serviceability limit states; detailing of reinforcement and prestressing steel)

## 10 MACIERZ REALIZACJI PRZEDMIOTU

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓLOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK1	K_W02, K_W03, K_W04, K_W07, K_W08, K_W14, K_W15	Cel 1	w1 w2 w3 w4 w5 w6 w7	N1 N2 N3 N4 N5 N6	P1 P2 P3
EK2	K_W02, K_W03, K_W04, K_W07, K_W08, K_W14, K_W15	Cel 2	w1 w2 w3 w4 w5	N1 N2 N3 N4 N5 N6	F1 P1 P2 P3
EK3	K_W02, K_W03, K_W04, K_W07, K_W08, K_W14, K_W15	Cel 3	w1 w8 w9	N1 N2 N3 N4 N5 N6	F1 P1 P2 P3
EK4	K_U01, K_U02, K_U03, K_U05, K_U07, K_U09, K_U13, K_U16	Cel 4	p1 p2 p3 p4 p5 w2 w3 w4 w7	N1 N2 N3 N4 N5 N6	F1 P1 P2 P3

## 11 WYKAZ LITERATURY

### LITERATURA PODSTAWOWA

- [1 ] Madaj A., Wołowicki W. — *Podstawy projektowania budowli mostowych*, Warszawa, 2007, WKŁ
- [2 ] Madaj A., Wołowicki W. — *Mosty betonowe wymiarowanie i konstruowanie*, Warszawa, 2002, WKŁ
- [3 ] Furtak K., Kędracki M. — *Podstawy budowy tuneli*, Kraków, 2005, Wydawnictwo Politechniki Krakowskiej
- [4 ] Leonhardt F — *Podstawy budowy mostów betonowych*, Warszawa, 1982, WKŁ
- [5 ] Gałczyński S. — *Podstawy budownictwa podziemnego*, Wrocław, 2001, -
- [6 ] Hambly, E.C. — *Bridge Deck Behaviour*, London, 1991, E&FN Spon
- [7 ] Luca S., Pietro C. — *Design of Bridges*, Pisa, 2005, -

- [8] | **Ajdukiewicz A., Mames J.** — *Betonowe konstrukcje sprężone*, Gliwice, 2002, Wydawnictwo Politechniki Śląskiej
- [9] | **Furtak K., Wrana B.** — *Mosty zintegrowane*, Warszawa, 2005, WKŁ
- [10] | **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, -
- [11] | **C.R. Hendy and D.A. Smith** — *Designers Guide to EN 1992-2. Eurocode 2: Design of concrete structures. Part 2: Concrete bridges*, -, 2007, -
- [12] | **C.R. Hendy and C.J. Murphy** — *Designers Guide to EN 1993-2. Eurocode 3: Design of steel structures. Part 2: Steel bridges*, -, 2007, -
- [13] | **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, -
- [14] | **H. Gulvanessian, J.-A. Calgaro and M. Holicky** — *Designers Guide to EN 1990. Eurocode: Basis of Structural Design*, -, 2010, -

#### 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. Artur Czarnecki (kontakt: [aczarnecki@pk.edu.pl](mailto:aczarnecki@pk.edu.pl))

### OSOBY PROWADZĄCE PRZEDMIOT

1 dr inż. Artur Czarnecki (kontakt: [aczarnecki@pk.edu.pl](mailto:aczarnecki@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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