

POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

KARTA PRZEDMIOTU

obowiązuje studentów rozpoczynających studia w roku akademickim 2017/2018

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 D25 17/18
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)

EK5 Kompetencje społeczne Ability to effectively work in teams, lead a team or be a part of a design team

6 TREŚCI PROGRAMOWE

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W1	The history and aesthetic development of bridges, selected concepts and classifications of bridge and underground structures	2
W2	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

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W3	Structural systems of concrete, steel, prestressed and composite road and rail bridges; structural analysis and modeling techniques	6
W4	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
W5	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
W6	Inspection, assessment, repair, strengthening and replacement of bridge structures	2
W7	Bridge accessories, protection and bridge management	2
W8	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
W9	Various techniques to protect deep excavations (retaining walls - cantilevered, gravity and anchored walls)	2

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
P4	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
P5	Detailing of reinforcement and prestressing steel	1

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
Godziny kontaktowe z nauczycielem akademickim, w tym:	
Godziny wynikające z planu studiów	45
Konsultacje przedmiotowe	0
Egzaminy i zaliczenia w sesji	0
Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	30
Opracowanie wyników	0
Przygotowanie raportu, projektu, prezentacji, dyskusji	15
SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA	90
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	3.00

9 SPOSOBY OCENY

OCENA FORMUJĄCA

F1 Projekt zespołowy

OCENA PODSUMOWUJĄCA

P1 Egzamin pisemny

P2 Egzamin ustny

P3 Średnia ważona ocen formujących

KRYTERIA OCENY

EFEKT KSZTAŁCENIA 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 KSZTAŁCENIA 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 KSZTAŁCENIA 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)
EFEKT KSZTAŁCENIA 5	
NA OCENĘ 3.0	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 3.5	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	xxx
NA OCENĘ 5.0	xxx

10 MACIERZ REALIZACJI PRZEDMIOTU

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓLOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK1		Cel 1	w1 w2 w3 w4 w5 w6 w7	N1 N2 N3 N4 N5 N6	P1 P2 P3
EK2		Cel 2	w1 w2 w3 w4 w5	N1 N2 N3 N4 N5 N6	F1 P1 P2 P3
EK3		Cel 3	w1 w8 w9	N1 N2 N3 N4 N5 N6	F1 P1 P2 P3
EK4		Cel 4	w2 w3 w4 w7 p1 p2 p3 p4 p5	N1 N2 N3 N4 N5 N6	F1 P1 P2 P3
EK5		Cel 1 Cel 2 Cel 3 Cel 4	p1 p2 p3 p4 p5	N1 N2 N3 N4 N6	F1

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 sprezone*, 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)

OSOBY PROWADZĄCE PRZEDMIOT

1 dr inż. Artur Czarnecki (kontakt: aczarnecki@pk.edu.pl)

13 ZATWIERDZENIE KARTY PRZEDMIOTU DO REALIZACJI

(miejsowość, data)

(odpowiedzialny za przedmiot)

(dziekan)

PRZYJMUJĘ DO REALIZACJI (data i podpisy osób prowadzących przedmiot)

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