

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: I

Specjalności: Bez specjalności – studia w języku angielskim

1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	Konstrukcje betonowe
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Concrete Structures
KOD PRZEDMIOTU	WIL BUD oIS C41 21/22
KATEGORIA PRZEDMIOTU	Przedmioty kierunkowe
LICZBA PUNKTÓW ECTS	7.00
SEMESTRY	5 6

2 RODZAJ ZAJĘĆ, LICZBA GODZIN W PLANIE STUDIÓW

SEMESTR	WYKŁAD	ĆWICZENIA AUDYTORYJNE	LABORATORIA	LABORATORIA KOMPUTERO- WE	PROJEKTY	SEMINARIUM
5	30	0	0	0	30	0
6	15	0	15	0	15	0

3 CELE PRZEDMIOTU

Cel 1 Cognition of mechanical characteristics for concrete and reinforcing steel, understanding the conditions of their co-operation in reinforced concrete structures and basic requirements formulated for such structures

- Cel 2** Recognition of codes principles and methods for safety, durability and serviceability assurance in the design process
- Cel 3** Learning the basis of reinforced concrete structures design according to Limit States Method within the range of: bending, shear, compression, tension, punching shear, together with appropriate codes regulations. Recognition of principles for Ultimate Limit States verification
- Cel 4** Recognition of Serviceability Limit States and simplified methods of crack width and deflection verification
- Cel 5** Cognition of phenomena connected with slenderness and second order effects and their consideration in reinforced concrete compressed members design
- Cel 6** Getting familiar with the methodology of simple laboratory tests and the course of actions taken while testing on the example of reinforced and prestressed concrete beams
- Cel 7** Mastering the basis of reinforced concrete elements detailing and working out the structural drawings
- Cel 8** Shaping the professional responsibility of structural engineer

4 WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

- 1** Passing preceding subjects. For semester V: Theoretical mechanics, Technical drawings, Engineering graphics, Building materials, Concrete technology, Strength of materials, Mechanics of structures. b. Passing preceding subjects. For semester VI: Theoretical mechanics, Technical drawings, Engineering graphics, Building materials, Concrete technology, Strength of materials, Mechanics of structures, Concrete structures (semester V).
- 2** Passing preceding subjects. For semester VI: Theoretical mechanics, Technical drawings, Engineering graphics, Building materials, Concrete technology, Strength of materials, Mechanics of structures, Concrete structures (semester V).

5 EFEKTY KSZTAŁCENIA

- EK1 Wiedza** Knowledge: Student knows mechanical characteristics and material models used for reinforced concrete structures, basic rules of materials co-operation and questions of bond between concrete and reinforcing steel
- EK2 Umiejętności** Skills: Student can apply basic rules and methods of safety, serviceability and durability assurance within the design process for reinforced concrete structures according to appropriate valid codes
- EK3 Umiejętności** Skills: Student can select initial dimensions of rc elements, set the appropriate actions and combinations of actions, carry out static calculations, verify load-bearing capacity for simple structural elements and produce structural drawings
- EK4 Umiejętności** Skills: Student is able to check Serviceability Limit States for reinforced concrete elements using simplified methods
- EK5 Wiedza** Knowledge: Student knows the questions of slenderness and second order effects influence onto behaviour of compressed rc elements
- EK6 Wiedza** Knowledge: Student knows codes detailing rules for the following reinforced concrete elements: slabs, beams, columns, foundation footings, stairs, frames
- EK7 Wiedza** Knowledge: Student knows the phases of work and the course of tests conducted for reinforced concrete and prestressed concrete beams, as well as the basic equipment used and measuring techniques applied while conducting laboratory tests
- EK8 Kompetencje społeczne** Social competencies: Student is aware of responsibility for structure design correctness and of necessity to improve professional competencies

6 TREŚCI PROGRAMOWE

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W1	Definition and qualification of concrete structures. Basic characteristics for concrete and reinforced concrete structures. Mechanical properties for concrete and reinforcing steel. Requirements for materials. Co-operation between concrete and steel - bond and anchorage.	4
W2	Basic requirements for concrete structures. Limit states method. Criteria for safe and durable concrete structure. Characteristic and design values, safety coefficients.	2
W3	Ultimate limit states (ULS) for bending - phases of work for bent element. Simplified method of verification for ULS according to design assumptions, rectangular and T-beam cross-sections, single- and double-reinforced cross-sections. Designing and checking the capacity of elements under bending. detailing conditions for bent elements	8
W4	ULS for shear. Scheme for shear zone failure, reliable cross-sections for checking the shear capacity. Design conditions for shear. Ultimate values of shear force. Designing and checking capacity for shear. Shear reinforcement between slab and beam. Detailing rules for shear reinforcement (stirrups, bent-up bars)	6
W5	Serviceability limit states (SLS). deflections of rc elements, limit admissible values of deflection, verification of SLS for deflection by simplified method. Cracks in RC structures - crack occurrence, checking crack width with simplified method.	4
W6	Examples of typical structural elements (one-way slabs, beams) - geometry and reinforcement course	6
W7	ULS for compression - eccentrically loaded elements. Buckling, effective length, second order effects, eccentricities, critical load. Methods of design for compressed elements with taking into account the second order effects. Designing and checking capacity for cases of big and small eccentricities. Detailing conditions for columns	5
W8	Eccentrically tensiled elements. ULS for tension - equilibrium equations for cross-section.	2
W9	ULS for punching shear - checking the capacity for un-reinforced elements	2
W10	Reinforced concrete monolithical stairs - static behaviour and detailing	2
W11	Examples of typical structural elements (two-way slabs, columns, foundation footings, rc frames) - geometry and reinforcement course	4

PROJEKTY		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN

PROJEKTY		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
P1	Design of slab-beam floor. Static calculations and dimensioning. Design of one-way slab under bending. Design of beam for bending and shear. Checking SLS by simplified methods. Producing structural drawings for slab and beam with taking into account the beam load-bearing envelope.	30
P2	Design of monolithical frame for multi-storey building (continuation of theme from semester V). Static calculations for frame. Designing of columns. Designing of foundation footings loaded eccentrically. Structural drawing for columns and footings.	15

LABORATORIA		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
L1	Laboratory tests for reinforced and prestressed concrete beams	15

7 NARZĘDZIA DYDAKTYCZNE

N1 Wykłady

N2 Ćwiczenia projektowe

N3 Ćwiczenia laboratoryjne

N4 Prezentacje multimedialne

N5 Konsultacje