

# POLITECHNIKA KRAKOWSKA IM. TADEUSZA KOŚCIUSZKI

## KARTA PRZEDMIOTU

obowiązuje studentów rozpoczynających studia w roku akademickim 2023/2024

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: Structural Design)

### 1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	Trwałość konstrukcji budowlanych
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Durability of Structures
KOD PRZEDMIOTU	WIL BUD oIIS D19 23/24
KATEGORIA PRZEDMIOTU	Specjalty subjects (profile: Structural Design)
LICZBA PUNKTÓW ECTS	2.00
SEMESTRY	3

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

SEMESTR	WYKŁAD	ĆWICZENIA AUDYTORYJNE	LABORATORIA	LABORATORIA KOMPUTERO- WE	PROJEKTY	SEMINARIUM
3	15	0	0	0	0	0

### 3 CELE PRZEDMIOTU

**Cel 1** To acquaint students with the corrosion processes of building materials.

**Cel 2** To acquaint students with methods of protection against corrosion of building elements.

**Cel 3** Comprehension skills of impact of specific environmental conditions to the materials and structure durability.

**Cel 4** Preparation for independent collection and evaluation of data from scientific publications serving the description corrosion phenomena of construction materials and to participate in research on durability building construction materials.

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

1 Basic skills in chemistry, technology of building materials and designing of various structures according to curriculum of first and second cycle.

## 5 EFEKTY KSZTAŁCENIA

**EK1 Wiedza** Based on the literature data and the results of scientific research, the student explains the concepts and processes occurring during the destruction of building materials.

**EK2 Umiejętności** Using scientific tools, the Student is able to describe the processes associated with the corrosion of concrete, steel and building ceramics.

**EK3 Wiedza** The student is able to assess the degree of aggressiveness of the environment in relation to concrete and steel elements and determine the corrosion exposure classes.

**EK4 Umiejętności** The student knows the principles of protection of building structures and its material and technological conditions and environmental.

**EK5 Kompetencje społeczne** The student works in a team to obtain and develop descriptive data process, dynamics and consequences of failure of basic construction materials.

## 6 TREŚCI PROGRAMOWE

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
<b>W1</b>	Durability and sustainability of the structure. General rules for the protection of structures and its material, technological and environmental conditions.	2
<b>W2</b>	Concrete corrosion processes. Steel corrosion processes and reinforcement corrosion in reinforced concrete. Corrosion building ceramics - current scientific reports.	3
<b>W3</b>	Requirements for the durability of reinforced concrete. Classification of aggressive environments in relation to concrete and reinforced concrete.	2
<b>W4</b>	Rules for the protection of reinforced concrete structures (material and structural protection, surface protection). Requirements for surface protection of reinforced concrete structures .	3
<b>W5</b>	Classification of aggressive environments in relation to steel structures. Requirements for steel structures operating in the environment with increased aggressiveness. Protection of steel structures (metal coatings, paintings - general requirements, details solutions).	3
<b>W6</b>	Causes and effects of biological corrosion in construction - current scientific reports.	2

## 7 NARZĘDZIA DYDAKTYCZNE

N1 Lectures

N2 Discussion

N3 Multimedia and oral presentations

N4 Team 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	15
Konsultacje przedmiotowe	5
Egzaminy i zaliczenia w sesji	5
<b>Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:</b>	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	10
Opracowanie wyników	0
Przygotowanie raportu, projektu, prezentacji, dyskusji	15
<b>SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA</b>	<b>50</b>
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	2.00

## 9 SPOSOBY OCENY

### OCENA FORMUJĄCA

F1 Oral presentation

F2 Active participation in the discussion

### OCENA PODSUMOWUJĄCA

P1 Oral presentation/Test

### KRYTERIA OCENY

EFEKT KSZTAŁCENIA 1

NA OCENĘ 2.0	The student is not able to a sufficient degree neither replace nor define the concepts describing the features of the destruction of basic construction materials. He did not get 50% correct answers from the test.
NA OCENĘ 3.0	The student is able to sufficiently name the terms describing the features of the destruction of basic construction materials. It is required to obtain at least 50% of correct answers from the final test.
NA OCENĘ 3.5	The student is able to name and define the terms describing the features of the destruction of basic construction materials. It is required to obtain 60.01-70% of correct answers from the final test.
NA OCENĘ 4.0	The student is able to list and define the concepts describing the destruction features of basic construction materials, as well as in a basic way explains the processes taking place during the destruction of building materials. It is required to obtain 70.01-80% of correct answers from the final test.
NA OCENĘ 4.5	The student is able to name and define the terms describing the destruction features of basic construction materials, as well as to explain the processes taking place during the destruction of building materials, give their possible causes. It is required to obtain 80.01-90% of correct answers from the final test.
NA OCENĘ 5.0	The student is able to name and define the terms describing the destruction features of basic construction materials, as well as to explain the processes taking place during the destruction of building materials, give their possible causes. He can support his observations with data obtained from the literature. It is required to obtain 90.01-100% of correct answers from the final test.
EFEKT KSZTAŁCENIA 2	
NA OCENĘ 2.0	The student is not able to correctly identify and describe the destruction processes of any of the basic construction materials, such as: concrete, steel and building ceramics. He did not get 50% correct answers from the test.
NA OCENĘ 3.0	The student is able to sufficiently correctly identify and describe the processes of destruction of one of the basic construction materials, such as: concrete, steel and building ceramics. It is required to obtain at least 50% of correct answers from the final test.
NA OCENĘ 3.5	The student is sufficiently able to correctly identify and describe the processes of destruction of each of the basic construction materials, such as: concrete, steel and building ceramics. It is required to obtain 60.01-70% of correct answers from the final test.
NA OCENĘ 4.0	The student is able to correctly identify, describe and give the causes of the destruction processes of one of the basic construction materials, such as: concrete, steel and building ceramics. It is required to obtain 70.01-80% of correct answers from the final test.
NA OCENĘ 4.5	The student is able to correctly identify, describe and give the causes of the destruction processes of each of the basic construction materials, such as: concrete, steel and building ceramics. It is required to obtain 80.01-90% of correct answers from the final test.

NA OCENĘ 5.0	The student is able to fully characterize the destruction processes of each of the basic construction materials, such as: concrete, steel and ceramics construction. It is required to obtain 90.01-100% of correct answers from the final test.
EFEKT KSZTAŁCENIA 3	
NA OCENĘ 2.0	The student is not able to assess the degree of aggressiveness of the external and internal environment in relation to elements made of reinforced and unreinforced concrete and steel. He did not get 50% correct answers from the test.
NA OCENĘ 3.0	Based on the obtained literature and experimental data, the student is able to sufficiently correctly assess the degree of aggressiveness of the external and internal environment in relation to elements made of reinforced and unreinforced concrete or construction metals. It is required to obtain at least 50% of correct answers from the final test.
NA OCENĘ 3.5	Based on the obtained literature and experimental data, the student is able to sufficiently correctly assess the degree of aggressiveness of the external and internal environment in relation to elements made of reinforced and unreinforced concrete and construction metals. It is required to obtain 60.01-70% of correct answers from the final test.
NA OCENĘ 4.0	Based on the obtained literature and experimental data, the student is able to correctly assess the degree of aggressiveness of the external and internal environment in relation to elements made of reinforced and unreinforced concrete and construction metals. On this basis, the student is able to determine the corrosion exposure class. It is required to obtain 70.01-80% of correct answers from the final test.
NA OCENĘ 4.5	Based on the obtained literature and experimental data, the student is able to correctly assess the degree of aggressiveness of the external and internal environment in relation to elements made of reinforced and unreinforced concrete and construction metals. On this basis, the student is able to determine the corrosion exposure class. It is required to obtain 80.01-90% of correct answers from the final test.
NA OCENĘ 5.0	On the basis of the obtained literature and experimental data, the student is able to correctly assess the degree of aggressiveness of the external and internal environment in relation to elements made of reinforced and unreinforced concrete and structural metals, as well as the corrosion hazard of steel in reinforced concrete. On this basis, the student is able to determine the corrosion exposure class. It is required to obtain 90.01-100% of correct answers from the final test.
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 2.0	The student does not know the rules for the protection of building structures or its material, technological and environmental conditions. He did not get 50% correct answers from the test.
NA OCENĘ 3.0	The student knows sufficiently the principles of protection of the selected type of building structures. It is required to obtain at least 50% of correct answers from the final test.
NA OCENĘ 3.5	The student knows sufficiently the principles of protection of all types of building structures. It is required to obtain 60.01-70% of correct answers from the final test.

NA OCENĘ 4.0	The student knows the principles of protection of the selected type of building structures and its material, technological and environmental conditions. It is required to obtain 70.01-80% of correct answers from the final test.
NA OCENĘ 4.5	The student knows the principles of protection of each type of building structure and its material, technological and environmental conditions. It is required to obtain 80.01-90% of correct answers from the final test.
NA OCENĘ 5.0	The student knows the principles of protection of each type of building structure and its material, technological and environmental conditions. He is able to choose the most relative solution. It is required to obtain 90.01-100% of correct answers from the final test.
EFEKT KSZTAŁCENIA 5	
NA OCENĘ 2.0	The student does not cooperate with the group in the assigned tasks.
NA OCENĘ 3.0	The student sufficiently cooperates in the team in the development of the analysis of the impact of the environment on the durability of the facility and the method of its further provision.
NA OCENĘ 3.5	The student works in a team to develop an analysis of the impact of the environment on the durability of the facility and the method of its further provision.
NA OCENĘ 4.0	The student cooperates in the team in the development and himself determines the scope of partial analyzes of the impact of the environment on the durability of the object and the method of its further provision.
NA OCENĘ 4.5	The student cooperates in the team in the development and himself determines the scope of partial analyzes of the impact of the environment on the durability of the object and the method of its further provision. If necessary, he helps other team members.
NA OCENĘ 5.0	The student is the leader of the group in terms of its work. He is responsible for the partial and overall results of his group's work and the division of tasks for individual team members.

## 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_W01 K_W05 K_W07 K_U17 K_K02 K_K03 K_K06 K_K07 K_K08 K_K09	Cel 1 Cel 4	w1 w2	N1 N2 N3 N4	F1 F2 P1
EK2	K_W01 K_W05 K_W07 K_U17 K_K02 K_K03 K_K06 K_K07 K_K08 K_K09	Cel 1 Cel 4	w2 w6	N1 N2 N3 N4	F1 F2 P1
EK3	K_W01 K_W07 K_U17 K_K02 K_K03 K_K06 K_K07 K_K08 K_K09	Cel 2 Cel 4	w3 w4	N1 N2 N3 N4	F1 F2 P1
EK4	K_W01 K_W05 K_W07 K_U17 K_K02 K_K03 K_K06 K_K07 K_K08 K_K09	Cel 3	w4 w5 w6	N1 N2 N3 N4	F1 F2 P1
EK5	K_U17 K_U18 K_K02 K_K03 K_K06 K_K07 K_K08 K_K09	Cel 3 Cel 4	w6	N1 N2 N3 N4	F1 F2 P1

## 11 WYKAZ LITERATURY

### LITERATURA PODSTAWOWA

- [1 ] **Bohni H.** — *Corrosion in reinforced concrete structures*, , 2005, ed. By Hans Bohni
- [2 ] **Bertolini L. [et al.]** — *Corrosion of steel in concrete : prevention, diagnosis, repair*, , 2004, Wiley
- [3 ] **Page C.L. and Page M.M.** — *Durability of concrete and cement composites*, CRC Press, 2007, ed. by C.L.Page and M.M.Page
- [4 ] **Gjorv Odd E.** — *Durability design of concrete structures in severe environments*, New York, 2009, New York
- [5 ] **Neville A.M.** — *Properties of concrete*, New York, 1996, New York
- [6 ] **Munger Ch.G., Vincent L.D.** — *Corrosion protection by protective coatings*, Houston, 1999, Nat. Assoc. of Corrosion Engineers

**LITERATURA UZUPEŁNIAJĄCA**

- [1 ] edited by Poursae A. — *Corrosion of steel in concrete structures*, Amsterdam, 2016, Woodhead Publishing/Elsevier
- [2 ] edited by Khatib J.M. — *Sustainability of construction materials*, Amsterdam, 2016, Elsevier/Woodhead Publishing

**12 INFORMACJE O NAUCZYCIELACH AKADEMICKICH****OSOBA ODPOWIEDZIALNA ZA KARTĘ**

dr inż. Dominika Dębska (kontakt: ddebska@pk.edu.pl)

**OSOBY PROWADZĄCE PRZEDMIOT**

1 dr inż. Dominika Dębska (kontakt: dominika.debska@pk.edu.pl)

2 dr hab. inż., prof.PK Elżbieta Stanaszek-Tomal (kontakt: estanaszek-tomal@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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