

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: I

Specjalności: Bez specjalności - studia w języku angielskim

1 INFORMACJE O PRZEDMIOCIE

NAZWA PRZEDMIOTU	Ochrona budowli przed korozją
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Protection of structures against corrosion
KOD PRZEDMIOTU	WIL BUD oIS E2163 23/24
KATEGORIA PRZEDMIOTU	Przedmioty związane z dyplomem
LICZBA PUNKTÓW ECTS	3.00
SEMESTRY	6 7

2 RODZAJ ZAJĘĆ, LICZBA GODZIN W PLANIE STUDIÓW

SEMESTR	WYKŁAD	ĆWICZENIA AUDYTORYJNE	LABORATORIA	LABORATORIA KOMPUTERO- WE	PROJEKTY	SEMINARIUM
6	15	0	0	0	0	0
7	15	0	0	0	0	0

3 CELE PRZEDMIOTU

Cel 1 To acquaint students with issues related to impact of material and environmental condition on corrosion processes of building materials.

Cel 2 To acquaint students with issues related to corrosion of non-metallic (mineral and organic) building materials.

Cel 3 To acquaint students with the principles of protection of elements made of non-metallic (mineral and organic) building materials.

Cel 4 To acquaint students with issues related to corrosion of metallic building materials.

Cel 5 To acquaint students with the principles and types of protection of metallic construction elements.

Cel 6 Preparing students to participate in conducting scientific research on durability of building materials used in real engineering structures.

4 WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

1 Basic knowledge in the field of building materials and engineering structures according curriculum of the first cycle study's program.

5 EFEKTY KSZTAŁCENIA

EK1 Kompetencje społeczne The student understands the social and ethical responsibility that is associated with performance construction engineer profession - understands the meaning of the term "profession of social trust".

EK2 Kompetencje społeczne The student collaborates in a team and is responsible for partial and overall the results of your group's work.

EK3 Umiejętności The student is able to describe the basic symptoms of corrosion of construction materials (concrete, steel, ceramics, organic materials).

EK4 Umiejętności The student is able to formulate the basic research problem in the field of determining the method material destruction in the building structure and on this basis, in the basic scope, plan performing an experiment modeling the problem and interpreting the obtained results.

EK5 Umiejętności The student is able to propose a method of protecting the structure or its elements against corrosion.

EK6 Wiedza The student knows the causes and effects of physical, chemical and biological corrosion of building materials.

EK7 Wiedza The student explains the basic concepts of corrosion of construction materials (concrete, steel, ceramics, organic materials).

EK8 Wiedza The student knows the principles of protection of reinforced concrete, steel, masonry and wooden structures.

6 TREŚCI PROGRAMOWE

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W1	Impact of the external environment on the durability of concrete and concrete building components. Classification of aggressive environments against concrete and reinforced concrete structures.	2

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W2	Processes and mechanisms of physical, chemical and thermal destruction of mineral building materials. Laboratory methods of modeling building mineral material destruction processes.	2
W3	Mechanism of reinforcement corrosion in a reinforced concrete structures. Laboratory and field methods for estimation of the protective properties of concrete. Methodology for measuring threat of reinforcement corrosion in reinforced structures.	2
W4	Corrosion processes of steel and other metals in building structures. Classification of aggressive environments towards steel structures. Laboratory and field methods of structures damage assessment.	4
W5	Processes of masonry corrosion.	2
W6	Biological corrosion of building materials - causes and effects.	2
W7	Durability vs. sustainability of building structures. General rules for protection of building structures and their material, technological and environmental factors.	3
W8	Rules for the protection of reinforced concrete structures: material and structural protection, surface protection. Requirements for surface protected reinforced concrete structures.	3
W9	Products and systems for the protection and repair of concrete structures: hydrophobic impregnation, sealing impregnation, coating protections, injection products for filling cracks, voids and gaps in concrete.	4
W10	Requirements for steel structures operating in environments with increased aggressiveness. Protection of steel structures: metal coatings, paint protections. General requirements, detail solutions.	4
W11	Protection of elements made of organic materials against biological corrosion and fire action.	2

7 NARZĘDZIA DYDAKTYCZNE

N1 Lectures

N2 Multimedia and oral presentations

N3 Team working

N4 Discussion

8 OBCIĄŻENIE PRACĄ STUDENTA

FORMA AKTYWNOŚCI	ŚREDNIA LICZBA GODZIN NA ZREALIZOWANIE AKTYWNOŚCI
Godziny kontaktowe z nauczycielem akademickim, w tym:	
Godziny wynikające z planu studiów	30
Konsultacje przedmiotowe	10
Egzaminy i zaliczenia w sesji	5
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	10
SUMARYCZNA LICZBA GODZIN DLA PRZEDMIOTU WYNIKAJĄCA Z CAŁEGO NAKŁADU PRACY STUDENTA	85
SUMARYCZNA LICZBA PUNKTÓW ECTS DLA PRZEDMIOTU	3.00

9 SPOSOBY OCENY

OCENA FORMUJĄCA

F1 Classwork/Test

F2 Oral presentation

OCENA PODSUMOWUJĄCA

P1 Average weight of formative assessment

WARUNKI ZALICZENIA PRZEDMIOTU

W1 Presence at classes

W2 Teamwork

W3 Active discussion at classes

KRYTERIA OCENY

EFEKT KSZTAŁCENIA 1	
NA OCENĘ 2.0	The student does not understand what social and ethical responsibility is related to with the performance of the profession of a construction engineer.

NA OCENĘ 3.0	The student sufficiently understands the social and ethical responsibility that is associated with the profession of civil engineer.
NA OCENĘ 3.5	The student understands the social and ethical responsibility that comes with it with the performance of the profession of a construction engineer.
NA OCENĘ 4.0	The student understands the social and ethical responsibility that comes with it with the performance of the profession of a construction engineer. He can predict the consequences indiscriminate activities related to the profession of an engineer construction.
NA OCENĘ 4.5	The student understands the social and ethical responsibility that comes with it with the performance of the profession of a construction engineer. He can predict and describe the effects of unintended activities in the field of performing the profession of an engineer construction.
NA OCENĘ 5.0	The student understands the social and ethical responsibility that comes with it with the performance of the profession of a construction engineer. He can predict and describe the effects of unintended activities in the field of performing the profession of an engineer construction site and indicate possible remedial measures.
EFEKT KSZTAŁCENIA 2	
NA OCENĘ 2.0	The student does not cooperate with the group in the tasks assigned to him.
NA OCENĘ 3.0	The student is able to work sufficiently in a group for achievement intended purpose.
NA OCENĘ 3.5	The student is able to work in a group to achieve the intended purpose.
NA OCENĘ 4.0	The student is able to work in a group to achieve the intended goal and determines the scope of partial tasks.
NA OCENĘ 4.5	The student is able to work in a group to achieve the intended target, he himself determines the scope of partial tasks. Serves when necessary helping other team members.
NA OCENĘ 5.0	The student is the leader of the group in terms of its work. It is responsible for the partial and overall results of the group's work and the division of tasks for each of them team members.
EFEKT KSZTAŁCENIA 3	
NA OCENĘ 2.0	The student is not able to indicate the symptoms of a corrosion hazard building construction materials. He did not reach 50% correct from the test answers.
NA OCENĘ 3.0	The student is able to sufficiently indicate the basic symptoms on the risk of corrosion of building construction materials. Required is getting at least 50% correct answers from the test.
NA OCENĘ 3.5	The student is able to identify and describe the symptoms of the risk of corrosion of building 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 identify and describe the symptoms of the risk of corrosion of building construction 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 identify and describe the symptoms of the risk of corrosion of building construction materials. It is required to obtain 80.01-90% of correct answers from the final test.
NA OCENĘ 5.0	The student is able to identify and describe the symptoms of the risk of corrosion of building construction materials. It is required to obtain 90.01-100% of correct answers from the final test.
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 2.0	The student is not able to formulate a research problem serving the determination degree of material destruction in the structure. During the lectures, he does not participate in discussions on the actual subject. He did not get from the test 50% correct answers.
NA OCENĘ 3.0	The student is able to sufficiently formulate the research problem of the servant determining the degree of material destruction in the structure. Active participation in discussions during lectures and obtaining at least 50% correct answers from the test are required.
NA OCENĘ 3.5	The student is able to formulate a research problem to determine the degree material destruction in the structure. Active participation in the discussion is required on lecture. It is required to obtain 60.01-70% correct answers from the final test.
NA OCENĘ 4.0	The student is able to formulate a research problem to determine the degree material destruction in the structure. Active participation in the discussion is required on lecture. It is required to obtain 70.01-80% correct answers from the final test.
NA OCENĘ 4.5	The student is able to formulate a research problem to determine the degree material destruction in the structure. Active participation in the discussion is required on lecture. It is required to obtain 80.01-90% correct answers from the final test.
NA OCENĘ 5.0	The student is able to formulate a research problem to determine the degree material destruction in the structure. Active participation in the discussion is required on lecture. It is required to obtain 90.01-100% correct answers from the final test.
EFEKT KSZTAŁCENIA 5	
NA OCENĘ 2.0	The student cannot propose any method of securing the material in the structure against potential corrosion damage. During the lectures, he does not participate in discussions on the actual subject. He did not get from the test 50% correct answers.
NA OCENĘ 3.0	The student is able to propose an appropriate corrosion protecting method for various types of material in the structure. Active participation in discussions during lectures and obtaining at least 50% correct answers from the test are required.

NA OCENĘ 3.5	The student is able to correctly propose a method of sufficient protection of the material in the structure against corrosion. Active participation in the discussion is required on lecture. It is required to obtain 60.01-70% correct answers from the final test.
NA OCENĘ 4.0	The student is able to correctly propose a method of sufficient protection of the material in the structure against corrosion. Active participation in the discussion is required on lecture. It is required to obtain 70.01-80% correct answers from the final test.
NA OCENĘ 4.5	The student is able to correctly propose a method of sufficient protection of the material in the structure against corrosion. Active participation in the discussion is required on lecture. It is required to obtain 80.01-90% correct answers from the final test.
NA OCENĘ 5.0	The student is able to correctly propose a method of sufficient protection of the material in the structure against corrosion. Active participation in the discussion is required on lecture. It is required to obtain 90.01-100% correct answers from the final test.
EFEKT KSZTALCENIA 6	
NA OCENĘ 2.0	The student does not name and describe the causes and effects of physical, chemical and biological corrosion of building materials. During the lectures, he does not participate in discussions on the actual subject. He did not get from the test 50% correct answers.
NA OCENĘ 3.0	The student is able to name and describe the causes and effects of physical, chemical and biological corrosion of building materials. Active participation in discussions during lectures and obtaining at least 50% correct answers from the test are required.
NA OCENĘ 3.5	The student is able to name and correctly describe the causes and effects of physical, chemical and biological corrosion of building materials. Active participation in the discussion is required on lecture. It is required to obtain 60.01-70% correct answers from the final test.
NA OCENĘ 4.0	The student is able to name and correctly describe the causes and effects of physical, chemical and biological corrosion of building materials. Active participation in the discussion is required on lecture. It is required to obtain 70.01-80% correct answers from the final test.
NA OCENĘ 4.5	The student is able to name and correctly describe the causes and effects of physical, chemical and biological corrosion of building materials. Active participation in the discussion is required on lecture. It is required to obtain 80.01-90% correct answers from the final test.
NA OCENĘ 5.0	The student is able to name and correctly describe the causes and effects of physical, chemical and biological corrosion of building materials. Active participation in the discussion is required on lecture. It is required to obtain 90.01-100% correct answers from the final test.
EFEKT KSZTALCENIA 7	

NA OCENĘ 2.0	The student is not able to explain the concept of the description of corrosion of materials construction (concrete, steel, ceramics, organic materials). During the lectures, he does not participate in discussions on the actual subject. He did not get from the test 50% correct answers.
NA OCENĘ 3.0	The student explains sufficiently the basic concepts of the corrosion of construction materials (concrete, steel, ceramics, organic materials). Active participation in discussions during lectures and obtaining at least 50% correct answers from the test are required.
NA OCENĘ 3.5	The student explains the basic concepts of the corrosion of construction materials (concrete, steel, ceramics, organic materials). Active participation in the discussion is required on lecture. It is required to obtain 60.01-70% correct answers from the final test.
NA OCENĘ 4.0	The student explains the basic concepts of the corrosion of construction materials (concrete, steel, ceramics, organic materials). Active participation in the discussion is required on lecture. It is required to obtain 70.01-80% correct answers from the final test.
NA OCENĘ 4.5	The student explains the basic concepts of the corrosion of construction materials (concrete, steel, ceramics, organic materials). Active participation in the discussion is required on lecture. It is required to obtain 80.01-90% correct answers from the final test.
NA OCENĘ 5.0	The student explains the basic concepts of the corrosion of construction materials (concrete, steel, ceramics, organic materials). Active participation in the discussion is required on lecture. It is required to obtain 90.01-100% correct answers from the final test.
EFEKT KSZTAŁCENIA 8	
NA OCENĘ 2.0	The student does not know the principles of protection against corrosion of reinforced concrete, steel, masonry and wooden structures. During the lectures, he does not participate in discussions on the actual subject. He did not get from the test 50% correct answers.
NA OCENĘ 3.0	The student knows sufficiently the principles of protection against corrosion of reinforced concrete, steel, masonry and wooden structures. Active participation in discussions during lectures and obtaining at least 50% correct answers from the test are required.
NA OCENĘ 3.5	The student knows the principles of protection against corrosion of reinforced concrete, steel, masonry and wooden structures. Active participation in the discussion is required on lecture. It is required to obtain 60.01-70% correct answers from the final test.
NA OCENĘ 4.0	The student knows the principles of protection against corrosion of reinforced concrete, steel, masonry and wooden structures. Active participation in the discussion is required on lecture. It is required to obtain 70.01-80% correct answers from the final test.
NA OCENĘ 4.5	The student knows the principles of protection against corrosion of reinforced concrete, steel, masonry and wooden structures. Active participation in the discussion is required on lecture. It is required to obtain 80.01-90% correct answers from the final test.

NA OCENĘ 5.0	The student knows the principles of protection against corrosion of reinforced concrete, steel, masonry and wooden structures. Active participation in the discussion is required on lecture. It is required to obtain 90.01-100% correct answers from the final test.
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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_U19 K_K06 K_K10	Cel 1 Cel 3 Cel 5	w1 w2 w3 w4 w5 w6 w7 w8 w9 w10 w11	N1 N2 N3 N4	F1 F2 P1
EK2	K_U17 K_K01 K_K03 K_K06 K_K10	Cel 1 Cel 3 Cel 5	w1 w2 w3 w4 w5 w6 w8 w9 w10 w11	N1 N2 N3 N4	F2 P1
EK3	K_W01 K_W06 K_W12 K_U20 K_K03 K_K07 K_K09	Cel 1 Cel 2 Cel 6	w1 w2	N1 N2 N3 N4	F1 F2 P1
EK4	K_W01 K_W12 K_W14 K_U13 K_K01 K_K03 K_K06 K_K09	Cel 2 Cel 4 Cel 6	w2 w3 w4	N1 N2 N3 N4	F1 F2 P1
EK5	K_W01 K_W12 K_W14 K_U13 K_K01 K_K03 K_K06 K_K09	Cel 1 Cel 3 Cel 5	w4 w5 w6 w7 w8 w9 w10 w11	N1 N2 N3 N4	F1 F2 P1
EK6	K_W01 K_W12 K_W14 K_U01 K_U02 K_U20 K_K01 K_K06	Cel 1 Cel 2 Cel 4 Cel 6	w1 w2 w3 w4 w5 w6	N1 N2 N3 N4	F1 F2 P1
EK7	K_W01 K_W12 K_W14 K_U02 K_U17 K_U20 K_K01 K_K02 K_K03 K_K06 K_K07 K_K08 K_K09	Cel 1 Cel 2 Cel 4 Cel 6	w1 w2 w3 w4 w5 w6	N1 N2 N3 N4	F1 F2 P1

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓŁOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK8	K_W01 K_W12 K_W14 K_U02 K_U17 K_U20 K_K02 K_K06 K_K07 K_K08 K_K09	Cel 1 Cel 3 Cel 5	w7 w8 w9 w10 w11	N1 N2 N3 N4	F1 F2 P1

11 WYKAZ LITERATURY

LITERATURA PODSTAWOWA

- [1] | **Bohni H.** — *Corrosion in reinforced concrete structures*, ed. By Hans Bohni, 2005, ed. By Hans Bohni
- [2] | **Bertolini L. [et al.]** — *Corrosion of steel in concrete : prevention, diagnosis, repair*, Wiley, 2004, Wiley
- [3] | **Page C.L., 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, 4th edition
- [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

LITERATURA DODATKOWA

- [1] | **Broniewski T., Fiertak M.** — *Fizykochemiczne podstawy procesów korozyjnych w budownictwie*, Kraków, 1995, Wydawnictwo PK
- [2] | **Czarnecki L., Emmons P.H.** — *Naprawa i ochrona konstrukcji betonowych*, Kraków, 2002, Polski Cement
- [3] | **Drobiec Ł., Jasinski R., Piekarczyk A.** — *Diagnostyka konstrukcji żelbetowych. T. 1*, Warszawa, 2010, PWN
- [4] | **Zybura A., Jaśniok M., Jaśniok T.** — *Diagnostyka konstrukcji żelbetowych. T. 2*, Warszawa, 2011, PWN
- [5] | **Ściślewski Z.** — *Ochrona konstrukcji Ochrona konstrukcji żelbetowych*, Warszawa, 1999, Arkady

- [6] Fiertak M., Dębska D., Stryzewska T. — *Chemia dla inżyniera budownictwa*, Kraków, 2011, Wydawnictwo PK
- [7] Zybura A. — *Degradacja żelbetu w warunkach korozyjnych*, Gliwice, 1990, Wydawnictwo Politechniki Śląskiej

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

(miejscowość, data)

(odpowiedzialny za przedmiot)

(dziekan)

PRZYJMUJĘ DO REALIZACJI (data i podpisy osób prowadzących przedmiot)

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