Politechnika Krakowska im. Tadeusza Kościuszki

Karta przedmiotu

obowiązuje studentów rozpoczynających studia w roku akademickim 2016/2017

Wydział Inżynierii Lądowej

Kierunek studiów: Budownictwo

Profil: Ogólnoakademicki

Forma sudiów: stacjonarne

Kod kierunku: BUD

Stopień studiów: I

Specjalności: Bez specjalności - studia w języku angielskim

1 Informacje o przedmiocie

Nazwa przedmiotu	Materiały budowlane
Nazwa przedmiotu w języku angielskim	Building Materials
Kod przedmiotu	WIL BUD oIS C20 16/17
Kategoria przedmiotu	Przedmioty kierunkowe
Liczba punktów ECTS	7.00
Semestry	1 2

2 Rodzaj zajęć, liczba godzin w planie studiów

Semestr	Wykład	Ćwiczenia audytoryjne	Laboratoria	Laboratoria komputerowe	Projekty	Seminarium
1	15	15	0	0	0	0
2	0	0	30	0	0	0

3 Cele przedmiotu

Cel 1 Providing students with information related to the general classification of building materials and products.

Cel 2 Getting students acquainted with the internal structure of various groups of materials and the ways they react to the factors acting on them during their lifetime.

Cel 3 Getting students acquainted with the general rules of production, properties and the application of particular building materials and products.

Cel 4 Getting students acquainted with the basic properties of building materials and products as well as the methods of laboratory assessment of them.

Cel 5 Preparing students for teamwork.

4 Wymagania wstępne w zakresie wiedzy, umiejętności i innych kompetencji

1 Basic knowledge of chemistry and physics within the scope of the high school programme.

5 Efekty kształcenia

EK1 Wiedza The student knows the basic groups of building materials and products as well as their assortments.

EK2 Wiedza The student knows the internal structure of particular groups of building materials.

EK3 Wiedza The student knows the basic processes of production of various materials and products as well as their relationship with the properties of particular materials.

EK4 Wiedza The student knows and is capable of explaining the influence and the mechanisms of the action of various environmental factors on the changes in the properties of materials and products during their lifetime.

EK5 Wiedza The student knows the properties of particular groups of building materials and products as well as the directions for their applications.

EK6 Wiedza The student knows the methods of determination of the properties of materials and products and can choose the necessary equipment.

EK7 Umiejętności The student can choose a building product appropriately to the conditions in which the product is used.

EK8 Umiejętności The student can conduct laboratory tests of the chosen properties of building materials and products.

EK9 Kompetencje społeczne The student can work independently and in a team on a given task.

6 Treści programowe

Laboratoria		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
L1	Presentation of the health and safety requirements for laboratory classes.	1
L2	Determination of the selected physical properties of building materials, such as: density by pycnometer and Le Chatelier flask, apparent density by direct method and by hydrostatic weighing, density index and porosity, water absorption along with the course of absorption, moisture content along with the course of drying (with the use of a moisture analyser), the height of capillary action in porous materials.	5

Laboratoria		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
L3	Methodology and determination of the selected properties of building stones, such as: compressive and flexural strength, abrasion resistance by Boehme and wide wheel abrasion tests.	2
L4	Conducting the initial type test for clay masonry units, determining the following properties: dimensions and dimensional tolerances, geometry shape and features, gross dry density and net dry density, compressive strength.	7
L5	Presentation of the methods of determination of the thermal conductivity coefficient. Conducting laboratory tests for the two kinds of foamed polystyrene (EPS and XPS), determining and comparing their following properties: apparent density, compressive strength at 10% deformation and flexural strength.	2
L6	Methodology and determination of the selected properties of asphalt (a raw material for bituminous damp proofing products), such as: softening point, breaking point, penetration (hardness), ductility. Determination of maximum tensile force and elongation for various types of asphalt sheets.	3
L7	Methodology and determination of the selected mechanical properties of various types of timber, such as: compressive strength, tensile strength parallel and perpendicular to grain, static bending strength with modulus of elasticity in bending, shear strength, hardness by the Janka method. Presentation of the influence of timber moisture content on its mechanical properties (determination of the moisture content of specimens with the use of a hygrometer).	6
L8	Determination of compressive and flexural strength of gypsum as well as softening factors in compression and tension using beams from gypsum paste. Determination of the selected properties of gypsum cardboards (e.g. failure load in bending in transverse and longitudinal direction). Determination of surface hardness and water absorption capacity for gypsum blocks.	4

Ćwiczenia audytoryjne		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
C1	Classification of the properties of building materials and products and presentation of the methods of determination of the most important ones.	4
C2	Presentation of the assortment and the range of applications of stone materials and products.	1
C3	Presentation of the assortment and the range of applications of burnt clay products.	3
C4	Presentation of the assortment and the range of applications of thermal and acoustic insulation materials.	2
C5	Presentation of the assortment and the range of applications of bitumen damp insulation materials.	2

Ćwiczenia audytoryjne		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
C6	Presentation of the assortment of selected timber and wood waste products.	2
C7	Presentation of the assortment and the range of applications of building glass products.	1

Wykład		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
W1	Introduction, the scope of the subject, the basic definitions, material versus a building product. Basic information on standardisation and attestation.	1
W2	Basic information concerning the durability of materials and products: environmental factors, the mechanisms and the results of their actions.	2
W3	The general classification of building materials and products. The classification of the properties of building materials and the presentation of the basic physical properties.	1
W4	Stone materials and their application in civil engineering. Building ceramics: the basic processes of production, properties, the groups of burnt clay products.	2
W5	Thermal and acoustic insulation materials: required internal structure, porosity, the influence of material moisture content. Bitumens and the products for damp insulation.	2
W6	Timber (internal structure, anisotropy, species, properties, durability) and wood waste products. Presentation of sawmill products (structural timber).	2
W7	Glass in civil engineering: composition and types of glass, production of flat glass, other glass products.	2
W8	Mineral binders: air-hardening (lime, gypsum, anhydrite, magnesia) and hydraulic (hydraulic lime and cements).	3

7 Narzędzia dydaktyczne

N1 Wykłady

N2 Prezentacje multimedialne

N3 Ćwiczenia laboratoryjne

N4 Praca w grupach

N5 Konsultacje

8 Obciążenie pracą studenta

Forma aktywności	Średnia liczba godzin na zrealizowanie aktywności
Godziny kontaktowe z nauczycielem akademickim, w tym:	
Godziny wynikające z planu studiów	60
Konsultacje przedmiotowe	9
Egzaminy i zaliczenia w sesji	9
Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	40
Opracowanie wyników	25
Przygotowanie raportu, projektu, prezentacji, dyskusji	23
Sumaryczna liczba godzin dla przedmiotu wynikająca z całego nakładu pracy studenta	**166**
Sumaryczna liczba punktów ECTS dla przedmiotu	7.00

9 Sposoby oceny

Ocena formująca

F1 Kolokwium

F2 Sprawozdanie z ćwiczenia laboratoryjnego

Ocena podsumowująca

P1 Zaliczenie pisemne

P2 Średnia ważona ocen formujących

Warunki zaliczenia przedmiotu

W1 Semester 2: weighted mean, obtained from the combined grades (weight: F2 - 0,3; P1 - 0,7)

Kryteria oceny

Efekt kształcenia 1	
Na ocenę 2.0	The student fails to provide the basic groups of building materials and products.
Na ocenę 3.0	The student knows the basic groups of building materials and products, without the detailed knowledge of assortments.

Na ocenę 3.5	The student knows the basic groups of building materials and products, and is capable to specify the assortment of some groups.
Na ocenę 4.0	The student knows the basic groups of building materials and products, and is capable to specify the assortment of all groups.
Na ocenę 4.5	The student knows the basic groups of building materials and products, is capable to specify the assortment of all groups and can indicate, only for some groups, the conditions in which they can be used.
Na ocenę 5.0	The student knows the basic groups of building materials and products, and is capable to specify the assortment of all groups with the indication of the conditions in which they can be used.
Efekt kształcenia 2	
Na ocenę 2.0	The student does not know the internal structure of building materials.
Na ocenę 3.0	The student is able to specify the most important parameters characterizing the internal structure of some building materials.
Na ocenę 3.5	The student can describe the internal structure of some building materials and its relationship with the properties of the materials.
Na ocenę 4.0	The student can describe the internal structure of particular groups of building materials.
Na ocenę 4.5	The student can describe the internal structure of particular groups of building materials and its relationship with the properties of these materials.
Na ocenę 5.0	The student knows the internal structure of particular groups of building materials and the theoretical bases of the influence of the structure of materials on their properties.
Efekt kształcenia 3	
Na ocenę 2.0	The student fails to provide the basic processes of production of various materials and products.
Na ocenę 3.0	The student knows the basic processes of production of various materials and products as well as their relationship with the properties of particular materials.
Na ocenę 3.5	The student knows and can generally describe the basic processes of production of materials and products as well as their relationship with the properties of particular materials.
Na ocenę 4.0	The student knows the basic processes of production of materials and products, and can describe them in detail in the case of certain materials, providing their relationship with the properties of particular materials.
Na ocenę 4.5	The student knows the basic processes of production of all presented materials and products, and can describe them in detail and relate them to the properties of particular materials.

Na ocenę 5.0	The student describes in detail the basic processes of production of all presented materials and products, and can point out how the parameters of processes affect the properties of particular materials.
Efekt kształcenia 4	
Na ocenę 2.0	The student does not know the influence and mechanisms of the action of various environmental factors on the changes in the properties of materials and products during their lifetime.
Na ocenę 3.0	The student can specify only the principal effects and mechanisms of the action of various environmental factors on the changes in the properties of materials and products during their lifetime.
Na ocenę 3.5	The student can specify only the majority of the mechanisms of the action of various environmental factors on the changes in the properties of materials and products during their lifetime.
Na ocenę 4.0	The student can specify and explain the majority of the mechanisms of the action of various environmental factors on the changes in the properties of materials and products during their lifetime.
Na ocenę 4.5	The student can specify and describe in detail all the mechanisms and effects of the action of various environmental factors on the changes in the properties of materials and products during their lifetime.
Na ocenę 5.0	The student can specify all the mechanisms and effects of the action of various environmental factors on the changes in the properties of materials and products during their lifetime, and can use this knowledge during the discussion on the deterioration of service properties of a material in time.
Efekt kształcenia 5	
Na ocenę 2.0	The student does not know the properties of particular groups of building materials and products.
Na ocenę 3.0	The student can specify the basic properties of particular groups of building materials and products, and knows the general range of their application.
Na ocenę 3.5	The student knows most of the properties of particular groups of building materials and products and the general range of their application.
Na ocenę 4.0	The student knows the whole range of the properties of particular groups of building materials and products, can give the definitions of most of them, and can determine the wide scope of their application.
Na ocenę 4.5	The student knows the whole range of the properties of particular groups of building materials and products, can give their definitions and the limitations in their application and the reasons for that.
Na ocenę 5.0	The student knows the whole range of the properties of particular groups of building materials and products, can give their definitions and the general course of their test, and can present the limitations in their application and the reasons for that.
Efekt kształcenia 6	

Na ocenę 2.0	The student does not know the methods of determination of the properties of materials and products.
Na ocenę 3.0	The student knows the methods of determination of some properties of materials and products.
Na ocenę 3.5	The student knows most of the methods of determination of the properties of materials and products, and can choose for them the necessary equipment.
Na ocenę 4.0	The student knows most of the methods of determination of the properties of materials and products, can present their theoretical bases, and can select the necessary equipment.
Na ocenę 4.5	The student knows all the methods of determination of the properties of materials and products, can present their theoretical bases, and can select the necessary equipment.
Na ocenę 5.0	The student knows all the methods of determination of the properties of materials and products, can present their theoretical bases and the range of their application, and can select the necessary equipment.
Efekt kształcenia 7	
Na ocenę 2.0	The student is not able to make a choice.
Na ocenę 3.0	The student is able to make the right choice, having the problem with the correct explanation.
Na ocenę 3.5	The student is able to make the right choice and can give the basic explanation.
Na ocenę 4.0	The student is able to make the right choice and can give the explanation.
Na ocenę 4.5	The student is able to make the choice appropriately to the conditions in which building materials (products) are used.
Na ocenę 5.0	The student is able to make the choice of wide range of building materials (products) appropriately to the conditions in which they are used, and is able to provide the correct explanation of the choice, linking the properties of building materials (products) with the characteristic of exploitation conditions.
Efekt kształcenia 8	
Na ocenę 2.0	The student is not able to conduct laboratory experiments.
Na ocenę 3.0	The student can conduct the laboratory tests of some properties of building materials and products, having the problem with the explanation of the sequence of the measurements.
Na ocenę 3.5	The student can conduct the laboratory tests of some properties of building materials and products, and can explain the sequence of the measurements.
Na ocenę 4.0	The student can conduct the laboratory tests of the chosen properties of building materials and products, and can explain the sequence of the research.

Na ocenę 4.5	The student can conduct the laboratory tests of the chosen properties of building materials and products, can explain the sequence of the research, and is able to prepare a report.
Na ocenę 5.0	The student can conduct the laboratory tests of the chosen properties of building materials and products, can explain the sequence of the research, and is able to prepare a report with the analysis of the results and the reference to the standard requirements.
Efekt kształcenia 9	
Na ocenę 2.0	the student does not engage in teamwork.
Na ocenę 3.0	The student does a fragment of a given task within a group, neither consults nor verifies her/his opinion with the group.
Na ocenę 3.5	The student cooperates within a group, not always can explain the obtained results.
Na ocenę 4.0	The student well cooperates within a group, is active and involved in obtaining the result, which is properly interpreted by her/him.
Na ocenę 4.5	The student very well cooperates within a group, being very active in leading the work of the group making the measurements and calculations.
Na ocenę 5.0	The student fully cooperates and leads the work within a group, and can indicate the sources of possible mistakes and the methods of their repair.

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_W14	Cel 1	c2 c3 c4 c5 c6 c7 w1 w3	N1 N2 N5	F1 P1
EK2	K_W14 K_U20 K_K01 K_K02 K_K05 K_K09	Cel 2	l2 c1 w3	N1 N2 N3 N4 N5	F1 P1 P2
EK3	K_W12 K_W14 K_U20	Cel 3	w3 w4 w5 w6 w7	N1 N2 N5	P1
EK4	K_W14 K_U20	Cel 2	w1 w2	N1 N2 N5	P1

Efekt kształcenia	Odniesienie danego efektu do szczegółowych efektów zdefiniowanych dla programu	Cele przedmiotu	Treści programowe	Narzędzia dydaktyczne	Sposoby oceny
EK5	K_U20	Cel 4	c1 c2 c3 c4 c5 c6 c7 w3 w4 w5 w6 w7 w8	N1 N2 N5	F1 F2 P1 P2
EK6	K_U13 K_U20 K_K01 K_K02 K_K05 K_K09	Cel 4	l2 l3 l4 l5 l6 l7 l8 c1 w3	N1 N2 N3 N4 N5	F1 F2 P1 P2
EK7	K_W14 K_U20	Cel 1	c2 c3 c4 c5 c6 c7 w1 w2 w3 w4 w5 w6 w7 w8	N1 N2 N5	F1 P1
EK8	K_U13 K_K01 K_K02 K_K05 K_K09	Cel 4	l2 l3 l4 l5 l6 l7 l8 c1	N2 N3 N4 N5	F1 F2 P2
EK9	K_K01 K_K02 K_K05 K_K09	Cel 5	l2 l3 l4 l5 l6 l7 l8	N2 N3 N4 N5	F1 F2 P2

11 Wykaz literatury

Literatura podstawowa

[1] Chen W.F., Richard Liew J.Y. (Editors-in-Chief) — *The civil engineering handbook*, Boca Raton, USA (Florida), 2003, CRC Press

[2] Domone P., Illston J. — *Construction materials: their nature and behaviour*, London, New York, 2010, Spon Press

[3] Duggal S.K. — *Building materials*, Rotterdam, 1998, A.A. Balkema

[4] Lyons A. — *Materials for architects and builders*, Oxford, 2007, Butterworth-Heinemann, Elsevier

12 Informacje o nauczycielach akademickich

Osoba odpowiedzialna za kartę

dr inż. Teresa Zych (kontakt: tzych@pk.edu.pl)

Osoby prowadzące przedmiot

1 dr inż. Teresa Zych (kontakt: tzych@pk.edu.pl)

2 mgr inż. Emilia Luchter-Marchewka (kontakt: eluchter-marchewka@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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