

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	Nawierzchnie drogowe i technologia robót drogowych
NAZWA PRZEDMIOTU W JĘZYKU ANGIELSKIM	Road Surfaces and Technology of Road Construction
KOD PRZEDMIOTU	WIL BUD oIS C30 23/24
KATEGORIA PRZEDMIOTU	Przedmioty kierunkowe
LICZBA PUNKTÓW ECTS	3.00
SEMESTRY	4

2 RODZAJ ZAJĘĆ, LICZBA GODZIN W PLANIE STUDIÓW

SEMESTR	WYKŁAD	ĆWICZENIA AUDYTORYJNE	LABORATORIA	LABORATORIA KOMPUTERO- WE	PROJEKTY	SEMINARIUM
4	30	0	15	0	15	0

3 CELE PRZEDMIOTU

Cel 1 Introduction to basic terms and definitions, connected with the pavement structure and its collaboration with a subgrade, technical-exploitation parameters of pavements, ultimate limit states.

Cel 2 Acquainting students with the road pavements classification criteria in relation to the traffic loading, structure type, deformability, materials; acquaintance with practical principles of pavement type selection.

Cel 3 Acquainting students with the specificity of road materials and examination methods of their functional properties (according to European Standards), as well as with principles of their certification.

Cel 4 Acquainting students with the mechanisms of pavement work structure work for flexible, rigid and semi rigid structures, and algorithms of their design.

Cel 5 Acquainting students with assortments of road works and technologies of their execution.

Cel 6 Students acquire the competences in the team-work.

4 WYMAGANIA WSTĘPNE W ZAKRESIE WIEDZY, UMIEJĘTNOŚCI I INNYCH KOMPETENCJI

1 The students credit for the course: Building Materials

5 EFEKTY KSZTAŁCENIA

EK1 Wiedza Student explains the principles of road pavement structure, the improving of pavement structure, ultimate limit states, as well as the demands made by managers and road users.

EK2 Umiejętności Student is able to select the proper pavement type in the relation to such criteria as: pavement function, traffic load, structure type, deformability, material possibilities, and so on.

EK3 Wiedza Student explains requirements for road materials depending on the specificity of their performance.

EK4 Umiejętności Student is able to apply the proper algorithm to pavement structure design.

EK5 Wiedza Student is able to specify the assortments of road works, to describe the technology of their execution and acceptance requirements.

EK6 Kompetencje społeczne Student cooperates with the team.

6 TREŚCI PROGRAMOWE

LABORATORIA		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
L1	Tests for mineral aggregates properties: determination of particle size distribution, (with the evaluation of the aggregate usefulness to the mechanical stabilization technology), shape index test, sand equivalent test, resistance to fragmentation test, resistance to freezing and thawing test, affinity between aggregate and bitumen test.	4
L2	Tests for paving bitumen: needle penetration test, softening point Ring and Ball method test, Fraass breaking point test, elastic recovery of modified bitumen test.	2
L3	Tests for hot mix asphalt: composition design, preparation of specimens to tests, compactibility in gyratory press, water sensitivity in indirect tensile strength test, elastic stiffness modulus test with indirect tensile test and the 4-pointed bended beam, resistance to rutting test, resistance to fatigue test, interlayer binding test.	5
L4	Tests for hot mix asphalt: composition design, preparation of specimens to tests, compactibility in gyratory press, water sensitivity in indirect tensile strength test, elastic stiffness modulus test with indirect tensile test and the 4-pointed bended beam, resistance to rutting test, resistance to fatigue test, interlayer binding test.	4

PROJEKTY		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
P1	Team design: designing of typical pavement structures for carriageways, bus stop lay-bys, car parks, cycle lanes, sidewalks with car-park admission. Whole work consists of the determination of traffic category, designing the subgrade improvement according to geological conditions, materials selection, calculation of layers thickness, checking the depth of the frost penetration, specifying the standard requirements for structure layers.	15

WYKŁAD		
LP	TEMATYKA ZAJĘĆ OPIS SZCZEGÓŁOWY BLOKÓW TEMATYCZNYCH	LICZBA GODZIN
W1	Introduction to basic terms and definitions, connected with the pavement structure and its co-work with a subgrade, road pavement as the engineering structure, technical- exploitation parameters of pavements, (bearing capacity, friction, evenness, rutting, instability, durability, light reflection, noise emission, impermeability of surface layers, requirements for road markings), ultimate limit states.	5
W2	Classification of pavements according to different criteria: level of the accommodation to fast traffic, traffic loads, deformability, applied materials, influence of the temperature on the pavement work, criteria of the pavement type selection.	2
W3	Stone pavement materials: raw materials for stone elements and road aggregates production, their basic physical and mechanical properties, testing and evaluation methods, chosen examples of their application, among others also to stone pavements in historical areas.	3
W4	Road artificial aggregates, reclaimed asphalt and fillers: types, properties and requirements.	1
W5	Asphalt binders, paving grade bitumen, polymer modified bitumen, bitumen emulsions, cut back bitumen, bitumen production, applications, properties and requirements.	3
W6	Bituminous mixtures: types, applications, composition design, properties and requirements. Conventional mixtures and new generation mixtures.	3
W7	Pavement structure design, soil subgrade classification, weak subgrades improving methods with using the geotextiles, the pavement structure work mechanism, execution requirements, the algorithm of pavement structure design for flexible and semirigid pavements.	5
W8	Technology of the road works: assortments of road works, earth works with the use of the materials for embankments, subgrade strengthening methods, mineral unbound aggregate bases, aggregate bases bound with the hydraulic binders, pavement recycling technology, technology of surface asphalt layers, specifications for the execution and acceptance inspection of the road works.	8

7 NARZĘDZIA DYDAKTYCZNE

N1 Laboratory activities

N2 Discission

N3 Design activities

N4 Consultations

N5 Group work

N6 Lectures

N7 Multimedia presentations

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	10
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	10
Opracowanie wyników	0
Przygotowanie raportu, projektu, prezentacji, dyskusji	10
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 Team project

F2 Test

OCENA PODSUMOWUJĄCA

P1 Written exam

P2 Weighted average of forming grades

WARUNKI ZALICZENIA PRZEDMIOTU**W1** 1.To give up the exam student should credit the design and laboratory activities**W2** 2.The writing exam consists of the test and the description part**KRYTERIA OCENY**

EFEKT KSZTAŁCENIA 1	
NA OCENĘ 2.0	Student is not able to give the basic principles of the pavement structure and improved subgrade as well as the ultimate limit states.
NA OCENĘ 3.0	Student is able to give the basic principles of the pavement structure and improved subgrade as well as the ultimate limit states for a satisfactory grade.
NA OCENĘ 3.5	x
NA OCENĘ 4.0	Student is able to give and explain principles of the pavement structure and specify the requirements for improved subgrade. Student explains the ultimate limit state of pavement structure.
NA OCENĘ 4.5	x
NA OCENĘ 5.0	Student explains principles of pavement structure relating to the work mechanism of flexible and semirigid structure and to requirements technical-exploitation parameters. Student is able to mention full requirements for the improved subgrade. Student explains the ultimate limit state of pavement structure in the aspect of fatigue properties and the permanent deformation.
EFEKT KSZTAŁCENIA 2	
NA OCENĘ 2.0	Student does not know the basic criteria of pavement selection.
NA OCENĘ 3.0	Student knows the basic criteria of pavement selection.
NA OCENĘ 3.5	x
NA OCENĘ 4.0	Student knows criteria of pavement selection and is able to match these criteria with pavement function and exploitation parameters.
NA OCENĘ 4.5	x
NA OCENĘ 5.0	Student is able to describe the full criteria of pavement selection and to show in detail their application at the pavement structure designing as well as at the pavement surface forming.
EFEKT KSZTAŁCENIA 3	
NA OCENĘ 2.0	Student does not know the basic requirements for such road materials as aggregates, asphalt binders and asphalt mixtures.
NA OCENĘ 3.0	Student knows the basic requirements for such road materials as aggregates, asphalt binders and asphalt mixtures.
NA OCENĘ 3.5	x

NA OCENĘ 4.0	Student explains the requirements for road materials in relation to their application.
NA OCENĘ 4.5	x
NA OCENĘ 5.0	Student explains the requirements for road materials and is able to connect them it with the character of their performance (traffic loading, layer localization, temperature, rainfalls).
EFEKT KSZTAŁCENIA 4	
NA OCENĘ 2.0	Student does not know the basic algorithms of the pavement structure design and explains their stages.
NA OCENĘ 3.0	Student knows the basic algorithms of the pavement structure design and explains their stages.
NA OCENĘ 3.5	x
NA OCENĘ 4.0	Student is able to analyze the input data for designing the pavement structure as well as the improved subgrade and explain the detailed track of the design procedure.
NA OCENĘ 4.5	x
NA OCENĘ 5.0	Student knows the sources for design input data, is able to proceed their analysis, interprets results in the view of design requirements, presents the alternatives of improved subgrade and designs the full pavement structure.
EFEKT KSZTAŁCENIA 5	
NA OCENĘ 2.0	Student is not able to specify the basic assortments of road works.
NA OCENĘ 3.0	Student is able to specify the basic assortments of road works.
NA OCENĘ 3.5	x
NA OCENĘ 4.0	Student is able to specify the full assortments of road works, show the most important of the execution stages together with the inspection control conditions.
NA OCENĘ 4.5	x
NA OCENĘ 5.0	Student is able to specify the full assortments of road works, characterise the most important of the execution stages as well as know detailed procedures of execution of earth work and asphalt works, together with acceptance inspection.
EFEKT KSZTAŁCENIA 6	
NA OCENĘ 2.0	Student does not realize the part of the pointed task.
NA OCENĘ 3.0	Student realizes the part of the pointed task, but does not consult his opinion with the rest of team.
NA OCENĘ 3.5	x
NA OCENĘ 4.0	Student cooperate with the team very well, is active and engaged.

NA OCENĘ 4.5	x
NA OCENĘ 5.0	Student cooperate with the team excellent, leading the work of the group.

10 MACIERZ REALIZACJI PRZEDMIOTU

EFEKT KSZTAŁCENIA	ODNIESIENIE DANEGO EFEKTU DO SZCZEGÓŁOWYCH EFEKTÓW ZDEFINIOWANYCH DLA PROGRAMU	CELE PRZEDMIOTU	TREŚCI PROGRAMOWE	NARZĘDZIA DYDAKTYCZNE	SPOSOBY OCENY
EK1		Cel 1	p1 w1	N3 N4 N5 N6 N7	F1 P1
EK2		Cel 2	p1 w2	N3 N4 N6	F1 P1
EK3		Cel 3	l1 l2 l3 l4 w3 w4 w5 w6	N1 N2 N5 N6	F2 P1
EK4		Cel 4	p1 w7	N3 N4 N6 N7	F1 P1
EK5		Cel 5	l4 w8	N1 N2 N6 N7	F2 P1
EK6		Cel 6	l1 l2 l3 l4 p1	N1 N2 N3 N5	F1 F2

11 WYKAZ LITERATURY

LITERATURA PODSTAWOWA

- [1] | **Judycki J i inni** — *Analizy i projektowanie konstrukcji nawierzchni podatnych i półsztywnych*, Warszawa, 2014, WKiŁ
- [2] | **Kalabinska M. Piłat J., Radziszewski P.** — *Technologia materiałów i nawierzchni drogowych*, Warszawa, 2003, Politechnika Warszawska
- [3] | **Zieliński P., Grzybowska W., Malicki K., Górszczyk J.** — *Materiały i nawierzchnie drogowe*, Kraków, 2014, Wydawnictwo Politechniki Krakowskiej
- [4] | **Zieliński P., Malicki K.** — *Lectures presentations*, Kraków, 2020, pdf

12 INFORMACJE O NAUCZYCIELACH AKADEMICKICH

OSOBA ODPOWIEDZIALNA ZA KARTĘ

dr inż. Piotr Zieliński (kontakt: pzielin@pk.edu.pl)

OSOBY PROWADZĄCE PRZEDMIOT

1 dr inż. Piotr Zieliński (kontakt: pzielin@pk.edu.pl)

2 dr inż. Konrad Malicki (kontakt: kmalicki@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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