

Tadeusz Kosciuszko Cracow University of Technology

Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering

Study profile: general academic

Study form: full-time

Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Nawierzchnie drogowe i technologia robót drogowych
Course name in English	Road Surfaces and Technology of Road Construction
Course code	WIL BUD oIS C30 24/25
Course category	Basic
No. of ECTS points	3.00
Semester	4

2 CLASS TYPE, NUMBER OF HOURS ACCORDING TO THE STUDY PLAN

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
4	30	0	15	0	15	0

3 COURSE OBJECTIVES

Objective 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.

Objective 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.

Objective 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.

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

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

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

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 The students credit for the course: Building Materials

5 LEARNING OUTCOMES

LO1 Knowledge 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.

LO2 Skills 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.

LO3 Knowledge Student explains requirements for road materials depending on the specificity of their performance.

LO4 Skills Student is able to apply the proper algorithm to pavement structure design.

LO5 Skills Student is able to specify the assortments of road works, to describe the technology of their execution and acceptance requirements.

LO6 Knowledge Student cooperates with the team.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	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
L2	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
L3	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

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L4	Road artificial aggregates, reclaimed asphalt and fillers: types, properties and requirements.	1
L5	Asphalt binders, paving grade bitumen, polymer modified bitumen, bitumen emulsions, cut back bitumen, bitumen production, applications, properties and requirements.	3
L6	Bituminous mixtures: types, applications, composition design, properties and requirements. Conventional mixtures and new generation mixtures.	3
L7	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
L8	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

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
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

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
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

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L3	Tests for hot mix asphalt: composition design, preparation of specimens to tests, compatibility 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, compatibility 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

7 TEACHING TOOLS

N1 Laboratory activities

N2 Discission

N3 Design activities

N4 Consultations

N5 Group work

N6 Lectures

N7 Multimedia presentations

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	60
Consultation hours	10
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	0
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	90

Total number of ECTS points	3.00
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9 Methods of grading

Partial grades

F1 Team project

F2 Test

Summary grade

P1 Written exam

P2 Weighted average of forming grades

Conditions for passing the course

L1 1.To give up the exam student should credit the design and laboratory activities

L2 2.The writing exam consists of the test and the description part