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	Architektura i urbanistyka
Course name in English	Architecture and Urban Design
Course code	WIL BUD oIS C20 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	2

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
2	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Understanding of architect role in design process as future main partner for civil engineer

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Technical drawing

2 computer graphics

3 Building materials

4 Fundamentals of civil eng

5 LEARNING OUTCOMES

LO1 Knowledge teamwork

LO2 Skills Knowledge of architectural language and importance of aesthetics in building design

LO3 Knowledge ability to make thoughtful decisions in the fields of civil. eng. to improve building standard

LO4 Skills Enlarging of students professional knowledge as future civil eng.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	connection between form, function and structure; humanization of technical studies; art, paint, interior design	2
L2	Relation between architecture and place (location), time (arch. style) and local influences	5
L3	Main architectural trends in recent years based on author's slides	8

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Conceptual design of individually chosen architectural object. Project scope is adjusted to delivery format (model, drawings) enough to explain designed concept (form, function, structure)	15

7 TEACHING TOOLS

N1 Lectures

N2 Design exercise

N3 presentations

N4 discussion

N5 consultations

N6 Team work

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	0
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Individual Design

Summary grade

P1 Average mark

Conditions for passing the course

L1 project delivered on time, according to agreed scope

L2 accumulation of knowledge from lectures

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Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Konstrukcje mostowe
Course name in English	Bridge Constructions
Course code	WIL BUD oIS D55 24/25
Course category	Przedmioty profilowe
No. of ECTS points	5.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	30	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Basic knowledge of design of bridge structures, materials used in bridge construction, communication layout on the bridge and architectural design of bridge structures.

Objective 2 Basic knowledge of design and construction of concrete bridges, steel bridges, composite bridges and laminated timber bridges and also basic knowledge on bridge equipment. Knowledge preparing students to solve engineering tasks as well as to participate in scientic research in the field of bridge design and construction.

Objective 3 Basic knowledge of actions and load combinations to EC (development of the static road traffic load models, combination of multi-component actions, development of fatigue load models, actions on footbridges, actions on railway bridges, accidental actions on bridges)

Objective 4 Basic knowledge of the structural analysis used for static and dynamic calculations during bridge design. Knowledge preparing students to solve engineering tasks as well as to participate in scientific research in the field of bridge design and construction.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Concrete structures

2 Steel structures

3 Structural mechanics

4 Soil mechanics

5 Strength of materials

5 LEARNING OUTCOMES

LO1 Knowledge of basic concepts and modern trends in design and construction (material selection) of road and rail bridges.

LO2 Knowledge on design and construction of reinforced concrete bridges and basic information on design and construction of prestressed concrete bridges, steel bridges, composite bridges, arch bridges, cable stayed bridges, suspension bridges and movable bridges.

LO3 Knowledge Ability to select a proper design and construction technique for a given situation (span length selection, material selection, communication layout on the bridge).

LO4 Skills Ability to design a slab deck / beam deck reinforced concrete bridge to EC (set of conceptual drawings of the bridge, combinations of actions, structural analysis, calculations for ultimate limit states and serviceability limit states, detailing of reinforcement).

LO5 Knowledge Ability to work in a design team either as a leader or a regular member.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Conceptual design of a single span reinforced concrete road bridge. Setting up the structural form, communication layout on the bridge, location of the bridge and selecting the main accessories of the bridge.	4
P2	Setting up the basic parameters of the bridge: set of conceptual drawings of the superstructure - cross sections, longitudinal sections and top view drawings.	6
P3	Actions and combination of actions (non-traffic actions for persistent design situations, traffic loads on road bridges and others when applicable). Calculations carried out for the bridge main girders.	6

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P4	Detailed structural calculations for the main components of the bridge - RC main beams (main girders).	4
P5	Analysis of one of the main beams for ultimate limit states (bending, shear) and serviceability limit states (stress limitation, crack control, deflection control).	6
P6	Execution of selected detailed drawings and detailing of reinforcement steel	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Organizational topics for Bridge Structures classes. Types and classification of the bridge structures, basic terminology and elements of the bridge structures. The historical development of the bridge structures.	4
L2	Design of communication layout on the bridge. Bridge accessories, bridge bearings, protection and bridge management. Basics of hydraulic and hydrologic calculations.	4
L3	Actions and load combinations to EC (actions on road bridges, actions on railway bridges, the combination of multi-component actions, actions on footbridges, accidental actions on bridges).	6
L4	Design and construction of concrete bridges (reinforced concrete and prestressed concrete bridges).	4
L5	Design and construction of steel bridges and composite bridges.	4
L7	Bridges construction method.	4
L9	Long span bridges - cable stayed, suspension and arch bridge structures.	4

7 TEACHING TOOLS

N1 Lecture

N2 Discussion

N3 Multimedia presentation

N4 Consultations

N5 Work in groups

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	2
Exams and tests during session	2
Passing the project	1
Hours of autonomous student work	
Preparing for classes, studying literature	35
Developing results	20
Preparing of reports, projects presentations, discussion	30
Total number of hours devoted to the subject	**150**
Total number of ECTS points	5.00

9 Methods of grading

Partial grades

F1 Team project

F2 Oral answer

F3 Writing exam

Summary grade

P1 Average of forming grades

Conditions for passing the course

L1 The positive result of the exam, correctly made project, the oral answer to questions about design issues.

Assessment of activity without teacher participation

B1 Team project

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	Instalacje budowlane w obiektach kubaturowych
Course name in English	Building Installations in Cubature Objects
Course code	WIL BUD oIS D53 24/25
Course category	Przedmioty profilowe
No. of ECTS points	3.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	30	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Presenting to students basic knowledge of indoor installations in cubature buildings

Objective 2 Presenting to students alternative energy sources

Objective 3 Presenting to students the rules of making the documentation of indoor installations in cubature buildings

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 General construction

2 Sensitive and latent heat balance in buildings

5 LEARNING OUTCOMES

LO1 Knowledge Student describes and explains the principles and characteristics of indoor installations in cubature buildings

LO2 Skills Student describes and explains the rules of designing indoor installations in cubature buildings

LO3 Knowledge Student can explain and make the documentation of indoor installations in cubature buildings

LO4 Knowledge Student can coordinate the different installations inside the building

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Water plumbing system design in a cubature building analysis of the existing plumbing system, plumbing dimensioning	5
P2	Water distribution system design for small agglomeration	5
P3	Ventilation and air-conditioning systems. Reading and correcting the documentation	5

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Source of water in the household, water service lines, water plumbing in single family, multistory and cubature buildings: pipe materials, valves, meters, plumbing fixtures and appliances, pressure zones, hydrophore units, hot water plumbing systems	4
L2	Wastewater disposal solutions in the household, sewer line, gravity drain system in single family and multistory buildings: pipe materials, plumbing fixture and appliance connections, drain equipment's, drain system venting	4
L3	Water supply systems: water intakes, water demand, water distribution systems, piping materials, pipeline construction, reliability and maintenance, pumping stations, water tanks, water treatment plants.	4
L4	Sewerage systems: sanitary sewers and storm water drainage systems, pipeline construction, repair and maintenance, sewage pumping stations, storm water detention tanks, vacuum and pressure systems, wastewater treatment plants.	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	The structures of LV and MV power supply systems (IT, TN-C, TN-S), example of buildings (public and residential) wiring diagrams and description of basic symbols. Connecting of electrical equipment into electric installation. Determination of wires colours Layout of electrical installation inside the walls and construction divisions. Layout of electrical installation over the surface of the walls	2
L6	The calculation of circuit loads and currents for LV circuits. Apparent power, active and reactive powers calculation of the currents for various types of loads Installed and required power for residential buildings. Basic protection system and the selection of proper protection devices (selection of fuses, safety switches, thermal protection devices) and the requirements they have to satisfy. Documents: Required by standards records from the tests and measurements Basic of the design and installation of lighting and voltage surge protection equipment and grounding circuitry	2
L7	Air properties, standards, natural ventilation characteristics, advantages and disadvantages	4
L8	Mechanical ventilation, hybrid ventilation, Air conditioning systems, methods of energy saving in ventilation and air conditioning systems	4
L9	Renewable energy sources, alternative systems (solar, heat pumps)	2

7 TEACHING TOOLS

N1 Lecture

N2 Design exercise

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	45
Consultation hours	0
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	13
Developing results	0
Preparing of reports, projects presentations, discussion	30
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 positive grade of returned project

Summary grade

P1 Test

Conditions for passing the course

L1 positive grade from the test and returned project

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Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Metody obliczeniowe
Course name in English	Computational Methods
Course code	WIL BUD oIS B14 24/25
Course category	Przedmioty podstawowe
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	15	0	0	30	0	0

3 COURSE OBJECTIVES

Objective 1 Student should get acquainted with mathematical modelling, in particular local and global formulation of problems of mathematical physics

Objective 2 Student should learn about methods of finding approximate solutions, in particular Finite Element Method (FEM), and get prepared to participation in scientific research

Objective 3 Student should learn FEM for bar structures

Objective 4 Student should learn FEM two-dimensional problems of stationary heat transfer and continuum mechanics

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge from courses of mathematics, information technology, applied mathematics and numerical methods, in particular the following subjects: functions of many variables, differential and integral calculus, differential equations, matrix and tensor calculus, basics of programming in a mathematical package, solution of set of linear equations, approximation, interpolation, numerical integration, foundations of finite difference method

5 LEARNING OUTCOMES

LO1 Skills Ability to derive global formulation of a problem from local one

LO2 Skills Ability to find approximate solution of a simple ordinary differential equation using FEM

LO3 Knowledge of FEM algorithm for bar structures

LO4 Skills Ability to find FE solution for two-dimensional bar structure (truss, beam, frame)

LO5 Knowledge of formulation and FEM algorithm for two-dimensional problem of stationary heat flow

LO6 Knowledge Ability to solve two-dimensional problem of stationary heat flow using FEM

LO7 Knowledge of formulation and FEM algorithm for plane stress problem

LO8 Knowledge Ability to solve plane stress problem using FEM

LO9 Knowledge Ability to assess critically obtained results of numerical analysis

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	FEM package for civil engineers - introduction, solution of a beam, truss and frame - exercise	6
K2	Solution of ODE using FEM - exercise	2
K3	Solution of bar structures using FEM (assignments 1, 2)	8
K4	Simulation of heat flow using general purpose FE code and mathematical package (assignment 3)	6
K5	Computation of stresses in a panel using FEM package for civil engineers (assignment 4)	4
K6	Delivery of assignments	2
K7	FEM for buckling or dynamics - exercise	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Computer simulations in mechanics and engineering, mathematical modelling	1
L2	Local and global formulation of BVPs, approximation, Galerkin method	1
L3	Finite element method (FEM)	1
L4	FEM for bar structures	4
L5	FEM formulation for 2D problems - stationary heat flow	2
L6	Overview of 1D/2D/3D elements	1
L7	FEM for 2D problem of statics of a panel (plane stress)	2
L8	Estimation of approximation error	1
L9	Isoperimetric finite elements	1
L10	Simulations of frame buckling or vibrations using FEM	1

7 TEACHING TOOLS

N1 Lecture

N2 Discussion

N3 Multimedia presentation

N4 Laboratory exercise

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	45
Consultation hours	0
Exams and tests during session	0
colloquia	4
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	10
Preparing of reports, projects presentations, discussion	15
Total number of hours devoted to the subject	**89**
Total number of ECTS points	3.00

9 Methods of grading

Partial gradesF1

Individual project **F2**

Practical exercise

Summary grade

P1 Average grade from 2 tests

P2 Weighted average of the midterm tests grades

Conditions for passing the course

L1 The presence at laboratory exercises is compulsory (student can be absent maximum 3 times). If an assignment report is delivered with a delay, the grade will be lowered

L2 Assignments 1 and 2 have to be delivered before test 1, assignment 3 before the end of classes. Assignment 4 should be delivered by the summer break

L3 Test 1 takes place at additional classes scheduled in contact with students. There is one more opportunity to take each tests (resit). In justified cases, one more resit can be held in examination session

L4 The grade recorded in student's study record is computed as weighted average of lab grade and average grade from tests

Assessment of activity without teacher participation

B1 Individual project

B2 Test

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Study profile: general academic

Study form: full-time

Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Organizacja, kier. budową i BHP
Course name in English	Construction Supervision, Occupational Safety and Health
Course code	WIL BUD oIS C43 24/25
Course category	Basic
No. of ECTS points	4.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	30	15	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Acquainting students with the basic principles and methods of organizing the construction process and planning construction projects

Objective 2 Acquainting students with the rights and duties of participants in the construction process in accordance with construction law

Objective 3 To get students acquainted with the principles of occupational health and safety during construction works, basic threats occurring during the execution of works, rules of conduct in the event of accident and methods of estimating the level of occupational risk

Objective 4 Preparing students to work in a team to solve problems related to the organization of effective and safe work at the construction site

Objective 5 Preparation students for scientific work, critical assessment of obtained results and presentation of a given problem regarding planning and organization of a construction project in accordance with health and safety rules

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Fundamental knowledge of building technologies and preparing bill of quantities

5 LEARNING OUTCOMES

LO1 Knowledge Student has knowledge of: principles and methods of planning and organization of construction works, rights and obligations of participants in the construction process, hazards that may occur during the performance of construction works, the principles of health and safety in construction works, methods of occupational risk assessment in construction

LO2 Skills The student is able to organize construction works using network models and construction schedules

LO3 Knowledge The student is able to identify the basic hazards that may occur during the execution of construction works, analyze the possibilities of their prevention and estimate the level of risk in a basic range The student is able to design the development of the construction site according to the safety rules

LO4 Knowledge Student is aware of the responsibility for the reliability of the results of their work and their interpretation and can work in a group

6 COURSE CONTENT

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Creating and analyzing networks using the CPM method. Analysis of the critical path. Calculation of simple CPM examples	4
C2	Construction schedules	2
C3	Working sections, works organization methods on the building site	2
C4	Organization of the construction site. Temporary roads on the construction site. Case studies	2
C5	Identification of hazards that may occur during construction works and occupational risk assessment. Documents related to OSH at the construction site.	5

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Description and assumptions of the project. Presenting the scope of the project.	2
P2	Analysis of construction documentation. Division into working plots	2
P3	Analysis of the technological order of construction works execution	2
P4	Bill of quantities	4
P5	Calculation of the number of work teams and the time of completion of construction works	4
P6	Modeling of the activity network for investments. CPM method and critical path analysis	6
P7	Construction schedules	6
P8	Construction site development plan according to the safety rules	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Organization and characteristic of the construction process. Law regulations	2
L2	Methods of organizing construction works. Estimating task execution time.	2
L3	Planning methods and organization of a construction project. Construction Critical Path Method (CPM) and network model analysis	4
L4	Construction schedules - types and rules of performance	2
L5	Health and safety rules at the construction site	8
L6	Construction site development: construction site development elements, theirs location and order of implementation	4
L7	Health and safety plan. occupational risk assessment	2
L8	Rights and duties of participants in the construction process. Construction documentation	6

7 TEACHING TOOLS

N1 Design exercises

N2 Discussion

N3 Multimedia presentations

N4 Lectures

N5 Panel tasks

N6 Films

N7 Consultations

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	75
Consultation hours	4
Exams and tests during session	6
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	5
Preparing of reports, projects presentations, discussion	20
Total number of hours devoted to the subject	**120**
Total number of ECTS points	4.00

9 Methods of grading

Partial grades

F1 positive grade from the project (design exercise)

F2 positive grade from the test

F3 positive grade from the exam

Summary grade

P2 Weighted average of forming grades 60%exam+20%design exercise+20% auditorium exercises

Conditions for passing the course

L1 Positive grades from the design exercise, test and the exam. the student may take the exam after passing all the classes included in the course

Assessment of activity without teacher participation

B1 design exercise, test and exam

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Course Card

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Study profile: general academic

Study form: full-time

Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Problemy bezpieczeństwa pożarowego w inżynierii lądowej
Course name in English	Fire Safety Measures in Civil Engineering
Course code	WIL BUD oIS C44 24/25
Course category	Basic
No. of ECTS points	1.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	15	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Presentation of building law requirements related to the problem how to secure the acceptable safety level in various building types in case of internal fire ignition and its development.

Objective 2 Presentation of succeeding phases of fire development in building compartment, their characterisation and description of basic parameters used for mathematical fire modelling.

Objective 3 Presentation of possible ways of structural member fire protection. A detailed survey of active and passive fire protection measures currently used in practice, according to the building type as well as the way of its exploitation.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 No preliminary requirements

5 LEARNING OUTCOMES

LO1 Knowledge Understanding of the nature of fire phenomenon potentially occurred in building compartment, particularly of basic rules determining its intensity and development.

LO2 Knowledge of the possible ways of structural member fire protection in case of fire ignition and its development in building compartment.

LO3 Knowledge of the building law requirements related to the necessary active and passive fire protection measures.

LO4 Skills Competence in the selection of active and passive fire protection measures according to the type of the structural element as well as to the level of potential risk.

LO5 Skills Competence in the reliable evaluation of the usefulness, effectivity and efficiency with respect to the chosen measure of fire protection, in context of the ability to select an alternative measure, more economic or better justified for application.

LO6 Knowledge Competence in the assessment of fire throw type as well as of the risk level in context of the analysis of all potentially possible fire scenarios.

LO7 Knowledge Promotion of sustainable building technologies, with the application of modern and economically justified solutions, especially those related to the problems of safety of people as well as of the cost of the assurance of the accurate safety level, with particular respect to the analysis of the potential fire throw.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Nature of fire phenomenon. Fire in fire compartment. Basic parameters describing its intensity and development.	2
L2	Modelling of fire development. Numerical models. Analytical models.	1
L3	Building law requirements related to the acceptable level of fire protection.	1
L4	Passive fire protection measures applied for various building elements. Ways of the selection of optimal insulation material as well asits necessary parameters.	1
L5	Active fire protection measures possible to use in buildings.	1
L6	Fire resistance limit state - specification and interpretation of limit condition, practical ways of its verification.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L7	Technique of the temperature evaluation of structural member exposed to fire, thermally insulated as well as unprotected against the fire exposure.	1
L8	Properties of constructional steel subjected to fire.	1
L9	Structural wood exposed to fire. Behavior of timber elements under fire conditions.	1
L10	Reinforced concrete members exposed to fire. Properties of concrete under fire temperature. Spalling.	3
L11	Fire tests of building materials. Basic classifications of building materials with respect to their reaction for fire exposure.	1
L12	Test	1

7 TEACHING TOOLS

N1 Lectures

N2 Discussion

N3 Multimedia presentation

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	15
Consultation hours	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	0
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**30**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Test

Summary grade

P1 Test

Assessment of activity without teacher participation

B1 Test

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Study form: full-time

Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Budownictwo ogólne
Course name in English	Fundamentals of Civil Engineering
Course code	WIL BUD oIS C22 24/25
Course category	Basic
No. of ECTS points	7.00
Semester	2 and 3

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
2	30	0	0	0	15	0
3	30	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Introduction to basic concepts of civil engineering, classification of buildings civil engineering structures and actions for the structural design

Objective 2 Introduction of the Polish Building Law and the standards applicable to the design and execution

Objective 3 Introduction of the principles and application rules used for various systems of structural design

Objective 4 Introduction to various systems of finishings applied in structural design

Objective 5 Knowledge of the rules and regulations for preparation of a technical documentation for designed structure

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Descriptive geometry

2 Building materials

5 LEARNING OUTCOMES

LO1 Knowledge Student is able to describe basic structural design systems and to assess the characteristic combi- nations of loads and actions for the structural design

LO2 Skills Student is familiar with the basis of the Polish Building Laws and able to apply the principles and rules that are contemporarily in force

LO3 Knowledge Student has knowledge on the systems of the structural elements of a building (foundations, walls, floors, stairs, flat roofs, roofs) as well as their elements (lintels, chimneys, etc.)

LO4 Skills Student knows the elements of finishings

LO5 Skills Student is able to professionally prepare the architectural and technical documentation of a building and is able to read a technical documentation

LO6 Knowledge Student is able to cooperate in a teamwork on a design project and is able to apply the current standards and laws

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	General guidance for the structural design, basic notions and definitions, classification of the civil engineering works and buildings, basis of the Building Law and the other legal acts (Specification of technical conditions which should be fulfilled for buildings design and orientation - Decree by the Minister of Infrastructure), investment process, regulations for fire protection	4
L2	Structural systems - terminology, structural elements of buildings and civil engineering works	2
L3	Actions for the structural design of buildings and civil engineering works	2
L4	Regulations for specification of technical conditions which should be fulfilled for buildings design and orientation, identification and characteristics of soils, foundation types and their selection, excavation and trench timbering; hydro-protection of the foundations	6

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	Masonry walls - criterions for the wall type selection, single layer walls (brick, hollow blocks, cement tiles), multilayer walls	4
L6	Principles for designing of chimneys, ceramic chimney blocks, traditional systems of chimneys	2
L7	Lintel - types and principles of construction	2
L8	Timber walls - types and principles of construction	2
L9	Prefabricated systems of walls and large-size walls	2
L10	Timber floors - principles of construction for typical floors: "open floor", "open floor with a sound boarding", "simple floor" (strop szkolny)	3
L11	Rib-and-slab floors - types and principles of construction	5
L12	Monolithic floors (slab floors and joists floors), prefabricated floors	2
L13	The elements of vertical communication - stairs, ramps and lifts. The types and the principles for the design of the r.c. stairs, timber nad steel stairs	4
L14	Roofs - the types of roofs, timber construction of roofs, typical elements and sizes of the roof constructions	6
L15	Flat roofs and terraces in traditional buildings	4
L16	Large span roof structures - timber , steel and concrete structures.	2
L17	Finishing elements in building - : windows, doors, coatings, flooring, roof tiles and steel sheets	6
L18	Multistory buildings - industrial systems of construction	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Individual design project: planning the layout od the modular spacing of the wall axes. Dimensioning	4
P2	Individual design project: ArchiCAD - architectural design of a two-story building. 3D model and the plans of particular levels: Ground floor plan, First floor plan, Roof Plan.	12
P3	Individual design project: ArchiCAD -Staircase design. Cross sections. Model, Views and Layout specifications. Dimensioning.	4

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P4	Individual design project: ArchiCAD - particular floor design; details: support on a ring beam; distributing ribs, additional ribs application under the partition walls, detailing of structural elements	12
P5	Individual design project: detailing of structural elements	2
P6	Individual design project: Energy performance of a building calculation - ArchiCAD	6
P7	Individual design project: Bills of materials and elements (windows and doors). Technical description of a design project	4
P8	Technical description of a design project	1

7 TEACHING TOOLS

N1 Lectures

N2 Presentations

N3 Projects

N4 Consultations

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	105
Consultation hours	25
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	0
Preparing of reports, projects presentations, discussion	30
Total number of hours devoted to the subject	**195**
Total number of ECTS points	7.00

9 Methods of grading

Partial grades

F1 Individual

design

F2 test

Summary grade

P1 exam

Conditions for passing the course

L1 Only those students who get the "pass" grade from the Design project and all the partial Tests are allowed to take the final exam

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	Geodezja
Course name in English	Geodesy
Course code	WIL BUD oIS C19 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	2

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
2	15	0	30	0	0	0

3 COURSE OBJECTIVES

Objective 1 familiarize with the angular, linear and levelling surveys used in civil engineering

Objective 2 familiarize with mapping and reading surveying drawings

Objective 3 acquire the skills of performing angular, linear and levelling surveys

Objective 4 acquire the skills of mapping and map reading

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 basic knowledge of mathematics

5 LEARNING OUTCOMES

LO1 Knowledge knows the rules for mapping and reading surveying drawings

LO2 Skills knows basic methods of angular and linear surveys

LO3 Knowledge knows basic methods of levelling surveys

LO4 Skills can perform basic angular and linear surveys and create geodetic documentation for them

LO5 Skills can perform basic levelling surveys and create geodetic documentation for them

LO6 Knowledge can use geodetic maps in work

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Initial concepts, tasks and division of surveying, types of measurements, surveying instructions	1
L2	Geoids, height reference system, reference surfaces, cartographic projections, coordinate systems	1
L3	Map definition, map division, scale and map content, digital map, principal map, map deformation, K-1 instruction	1
L4	Methods of distance measuring: direct, indirect, optical, digital, GPS, distance measurement accuracy	1
L5	Straight line setting out, line setting out by the obstacle, setting out using right angle prism	1
L6	Structure of theodolite, types of theodolites (optical, digital), reading systems, instrumental errors and their removal, instrument verification before surveying	1
L7	Angle measurement in horizontal plane using different methods and angle calculation, angle measurement in vertical plane and angle calculation, error calculation, Gaussian distribution, law of the propagation of errors	1
L8	Bearings and azimuth, angle calculation, points coordinates calculation, surfaces area	1
L9	Traverses, traverse calculation, intersections (linear and angular), space resection	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L10	Structure on levelling instrument, types of instruments, rod readings, instrumental errors, types of levelling	1
L11	Levelling traverse, traverse calculation, bench marks, levelling accuracy, profile levelling	1
L12	Surface levelling methods, contour lines interpolation, level setting out	1
L13	Topographic surveys, traverse net, tachymeter surveying, polar and orthogonal surveying, frontages as controlling method	1
L14	Surveying at construction site, vertical deviations of the columns and factory chimneys, deformations in horizontal planes, control surveying	1
L15	GIS definition, map features, metadata, GIS analysis	1

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Surveying principals - Units of measure, azimuths and distance calculation, using K-1 instruction	2
L2	Linear surveying - Straight line setting out, projection of the point on the straight line, distance measurement, calculation of mean distance error	2
L3	Orthogonal survey of details - Details surveying with the right angle prism and the type	2
L4	Structure of engineering level - Structure of engineering level, levelling an instrument, main condition testing	2
L5	Levelling traverse - Elevation determination in loop traverse	2
L6	Profile measurement - Linear and elevation survey of a profile, plotting of profile in 1:50/100 scale	2
L7	Grid levelling - Area levelling using grid method, plotting of contour map in 1:250 scale	2
L8	Structure of theodolite - Structure of optical theodolite, setting up and levelling the instrument, horizontal and vertical angle measurements	2
L9	Horizontal angle measurement - Horizontal angle measurement in 3 series, calculation of mean angular error	2
L10	Loop traverse measurement - Loop traverse measurement, computation of coordinates	2

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L11	Topographic surveys - Polar surveying of details, coordinates computation in local coordinate system, topographical data mapping in 1:250 scale	2
L12	Trigonometric levelling - Levelling an inaccessible point by vertical angle and distance surveying	2
L13	Mapping part 1 - Determining of linear and superficial map deformation, designing of a diagonal scale	2
L14	Mapping part 2 - Coordinates computation, area computation, linear and angular calculations, station description plotting	2
L15	Accuracy analysis of trigonometric levelling - mean function error calculation	2

7 TEACHING TOOLS

N1 Lecture

N2 Multimedia presentations

N3 laboratory

N4 work in group

N5 individual work

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	45
Consultation hours	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	0
Developing results	15
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**60**

Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Report from the laboratory exercise

F2 task

F3 Test

Summary grade

P1 weighted average

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	Hydraulika i hydrologia
Course name in English	Hydraulics and Hydrology
Course code	WIL BUD oIS C21 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	2

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
2	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 The aim of the course is to provide basic knowledge in the field of hydraulics, including: Hydrostatics - pressure distribution in the field of mass forces, practical methods of calculating static loads exerted by a liquid,

Objective 2 Hydrodynamics - calculation of flow parameters in pressure pipelines (calculation of energy losses), elements of pipeline network, calculations for the siphon and pumps' characteristics

Objective 3 Introduction to basic hydrological concepts and formulas including hydrological cycle, basic precipitation formulas, normative flows

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic knowledge of physics and mathematics at the academic level

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the mathematical description of the hydrostatic pressure distribution, under- stands its consequence for static load calculations

LO2 Skills The student knows the general flow laws for incompressible liquids, remembers and understands the Bernoulli equation and ditch. continuity

LO3 Knowledge The student knows how to apply practically known flow laws supplemented with additional semi-empirical formulas regarding energy losses, contracting effects, etc.

LO4 Skills The student learned the calculation methods used to describe uniform flow in open channels

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Hydrostatics; pressure, pressure distribution, pressure measurement, hydrostatic forces on plane surfaces, forces on curved surfaces.	6
P2	Pipe flow; friction losses, Moody diagram, pressure and energy distribution lines, application of continuity and Bernoullis equations for pipe flow parameters determination.	6
P3	Open channels flow; application of Manning formula for flow parameter calculation.	2
P4	Visiting hydraulic laboratory; demonstration of Reynolds experiment, siphon, orifice and weir flow.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Principles of hydrostatics; pressure, hydrostatic forces, stability of floating bodies, forces on plane and curved surfaces	4
L2	Basic principles of hydrodynamics; kinematical descriptions of fluid motion, flow governing equations. Pipe flow principles, flow continuity and Bernoullis equations, Darcy-Weisbach equation	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L3	Uniform flow in open channels; Chazy-Manning formula.	2
L4	Hydraulics of water engineering structures; weirs and orifices rating curves.	2
L5	Porous material filtration; Darcy law, well and ditch charging.	1
L6	Introduction to hydrology; water cycle, hydrometric measurements, characteristic discharges.	2

7 TEACHING TOOLS

N1 Lectures

N2 Design exercises

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	7
Exams and tests during session	3
Hours of autonomous student work	
Preparing for classes, studying literature	7
Developing results	7
Preparing of reports, projects presentations, discussion	6
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Colloquium grade

Partial grades

F1 Colloquium grade

Summary grade

P1 Colloquium grade

Conditions for passing the course

L1 Colloquium graduation

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	Technologia informacyjna
Course name in English	Information Technology
Course code	WIL BUD oIS A4 24/25
Course category	Przedmioty ogólne
No. of ECTS points	2.00
Semester	2

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
2	15	0	0	15	0	0

3 COURSE OBJECTIVES

Objective 1 Development of skills in formulation and analysis of algorithms

Objective 2 Introduction to use of computers for computational tasks

Objective 3 Development of understanding the reasons and consequences of finite precision arithmetics of computer chips.

Objective 4 Enhancement of general information technology knowledge, presentation of selected application of computers in engineering simulations.

Objective 5 Upgrading the skills related to software engineering and programming that are essential in modern, simulation based scientific research.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 General knowledge and skills in high school mathematics.

5 LEARNING OUTCOMES

LO1 Skills Formulation of algorithms based on sequences of algebraic calculations.

LO2 Skills Ability to use selected applications: Octave/Matlab, gnuplot

LO3 Knowledge Basic programming skills including usage of : functions, conditional statements, "for" loops, "while" loops. .

LO4 Skills Ability to visualise scalar and vector functions of one or two variables.

LO5 Knowledge Students are aware of the significance of the concepts of Open Source and Open Science for scientific and technological development of humankind.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	How computer works: basic principles and components.	1
L2	Introduction to Octave as numerical computations environment. The concepts of Open Source and Open Science	2
L3	Algorithmic approaches to problem solving. Basic algorithms. Computational complexity. Convergence of iterative algorithms.	4
L4	Elements of computer graphics. Data visualisation. Visualisation of functions.	3
L5	Computer simulations in science and engineering.	3
L6	Computers' internal data representation. Positional systems. Binary system. Integer numbers. Floating point numbers.	2

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Basics of operating system.	2

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K2	Running programs in batch and interactive mode.	2
K3	Conditional statement. Simple and complex logical statements.	2
K4	Enumeration loops, "for" statement.	2
K5	Conditional loops, "while" statement.	2
K6	Sequences and limits. Matrices as data arrangement. Accessing matrix elements.	2
K7	Recursive functions.	3

7 TEACHING TOOLS

N1 Lectures

N2 Computer lab exercises

N3 Individual tutoring

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	5
Preparing of reports, projects presentations, discussion	0
individual exercises	10
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Practical exercises

Summary grade

P1 Average of marks

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	Podstawy konstrukcji mostowych
Course name in English	Introduction to Bridge Constructions
Course code	WIL BUD oIS D55 24/25
Course category	Przedmioty profilowe
No. of ECTS points	5.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	30	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Basic knowledge of design of bridge structures, materials used in bridge construction, communication layout on the bridge and architectural design of bridge structures.

Objective 2 Basic knowledge of design and construction of concrete bridges, steel bridges, composite bridges and laminated timber bridges and also basic knowledge on bridge equipment. Knowledge preparing students to solve engineering tasks as well as to participate in scientic research in the field of bridge design and construction.

Objective 3 Basic knowledge of actions and load combinations to EC (development of the static road traffic load models, combination of multi-component actions, development of fatigue load models, actions on footbridges, actions on railway bridges, accidental actions on bridges)

Objective 4 Basic knowledge of the structural analysis used for static and dynamic calculations during bridge design. Knowledge preparing students to solve engineering tasks as well as to participate in scientic research in the field of bridge design and construction.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Concrete structures

2 Steel structures

3 Structural mechanics

4 Soil mechanics

5 Strength of materials

5 LEARNING OUTCOMES

LO1 Knowledge of basic concepts and modern trends in design and construction (material selection) of road and rail bridges.

LO2 Knowledge on design and construction of reinforced concrete bridges and basic information on design and construction of prestressed concrete bridges, steel bridges, composite bridges, arch bridges, cable stayed bridges, suspension bridges and movable bridges.

LO3 Knowledge Ability to select a proper design and construction technique for a given situation (span length selection, material selection, communication layout on the bridge).

LO4 Skills Ability to design a slab deck / beam deck reinforced concrete bridge to EC (set of conceptual drawings of the bridge, combinations of actions, structural analysis, calculations for ultimate limit states and serviceability limit states, detailing of reinforcement).

LO5 Knowledge Ability to work in a design team either as a leader or a regular member.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Conceptual design of a single span reinforced concrete road bridge. Setting up the structural form, communication layout on the bridge, location of the bridge and selecting the main accessories of the bridge.	4
P2	Setting up the basic parameters of the bridge: set of conceptual drawings of the superstructure - cross sections, longitudinal sections and top view drawings.	6
P3	Actions and combination of actions (non-traffic actions for persistent design situations, traffic loads on road bridges and others when applicable). Calculations carried out for the bridge main girders.	6

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P4	Detailed structural calculations for the main components of the bridge - RC main beams.	4
P5	Analysis of one of the main beams for ultimate limit states (bending, shear) and serviceability limit states (stress limitation, crack control, deflection control).	6
P6	Execution of selected detailed drawings and detailing of reinforcement steel	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Organizational topics for Bridge Structures classes. Types and classication of the bridge structures, basic terminology and elements of the bridge structures. The historical development of the bridge structures.	4
L2	Design of communication layout on the bridge. Bridge accessories, bridge bearings, protection and bridge management. Basics of hydraulic and hydrologic calculations.	4
L3	Actions and load combinations to EC (actions on road bridges, actions on railway bridges, the combination of multi-component actions, actions on footbridges, accidental actions on bridges).	6
L4	Design and construction of concrete bridges (reinforced concrete and prestressed concrete bridges).	4
L5	Design and construction of steel bridges and composite bridges.	4
L7	Bridges construction methods.	4
L9	Long span bridges - cable stayed, suspension and arch bridge structures.	4

7 TEACHING TOOLS

N1 Lecture

N2 Discussion

N3 Multimedia presentation

N4 Consultations

N5 Work in groups

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	2
Exams and tests during session	2
Passing the project	1
Hours of autonomous student work	
Preparing for classes, studying literature	35
Developing results	20
Preparing of reports, projects presentations, discussion	30
Total number of hours devoted to the subject	**150**
Total number of ECTS points	5.00

9 Methods of grading

Partial grades

F1 Team project

F2 Oral answer

F3 Writing exam

Summary grade

P1 Average of forming grades

Conditions for passing the course

L1 The positive result of the exam, correctly made project, the oral answer to questions about design issues.

Assessment of activity without teacher participation

B1 Team project

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	Podstawy projektowania konstrukcji
Course name in English	Introduction to Contruction Designing
Course code	WIL BUD oIS C27 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	4

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

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

3 COURSE OBJECTIVES

Objective 1 The aim of course is to impart knowledge necessary for understanding and application of the recommendations of standard EN 1990 and the group of Standards EN 1991 in terms of loads and load effects on structures.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge of mathematics, material strength and building mechanics in accordance with the learning outcomes of the semester 1 to 3, 1st cycle studies majoring in Civil Engineering.

5 LEARNING OUTCOMES

LO1 Knowledge Student knows and understands the Standard EN 1990 and the group of Standards EN 1991, and also has basic knowledge of the design of structures and their elements.

LO2 Skills Student can classify construction works.

LO3 Knowledge Student can assign rules of load combination to a type of structure.

LO4 Knowledge Student is ready to work independently and in a team on a given problem, formulate and describe the results of his work in a communicative manner, incur liability for integrity of the results of his work and their interpretation.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Basis of structural design according to EN 1990.	2
L2	Differentiation of structural reliability.	2
L3	Partial Factor Design. Characteristic and design values of basic variables.	2
L4	Load Eurocodes EN 1991	6
L5	Load combinations according to EN 1990	3

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Metal structures - specification and combination of loads.	4
P2	Concrete structures - specification and combination of loads.	4
P3	Timber structures - specification and combination of loads.	3
P4	Masonry structures - specification and combination of loads.	2
P5	Specification and combination of loads in assessment of structural stability.	2

7 TEACHING TOOLS

N1 Lectures

N2 Projects

N3 Discussion

N4 Consultations

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	2
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	7
Developing results	4
Preparing of reports, projects presentations, discussion	15
examinations	2
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Project

F2 Oral examination

F3 Test

Summary grade

P1 Weighted average of F1, F2 and F3

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	Podstawy konstrukcji sprężonych i prefabrykowanych
Course name in English	Introduction to Prestressed and Precast Constructions
Course code	WIL BUD oIS D56 24/25
Course category	Przedmioty profilowe
No. of ECTS points	2.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Provide basic knowledge on the concept of prestressing, advantages and requirements

Objective 2 Provide a fundamental knowledge on the design procedures of PC members

Objective 3 Provide basic knowledge on the precast structures

Objective 4 Provide fundamental information on the production of precast members

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Must be previously completed: Structural mechanics

2 Must be previously completed: Resistance of materials

3 Must be previously completed: Technical drawing and computer graphics

4 Must be previously completed: Building materials

5 Must be previously completed: Concrete technology

6 Must be previously completed: Concrete structures

5 LEARNING OUTCOMES

LO1 Knowledge of the principal features of the prestressed and precast elements and structures

LO2 Knowledge of materials, equipment, conditions of works execution and detailing

LO3 Knowledge Ability of simplified verification of the limit states

LO4 Skills Ability of the formulation of connection models for precast members

LO5 Knowledge Awareness of the responsibility of the designer and constructor of prestressed and precast concrete structures

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Concept of prestressing, advantages and disadvantages, pre-tensioning and post-tensioning, requirements, examples of PC structures	2
L2	Materials and technology of prestressing, anchorages	2
L3	Losses of the prestressing force, simplified design stress equations for edges	2
L4	Stress verification in materials, ultimate limit states, serviceability limit states,	2
L5	Design of anchorage and end zones, grouting	2
L6	Concept of precast members structures, examples, concept of typization,	2
L7	Design of precast members load situations for slabs, beams, columns, foundations	2
L8	Design of connections	1

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of a precast element of a simply supported beam or slab	15

7 TEACHING TOOLS

N1 Lectures

N2 Discussion

N3 Multimedia presentations

N4 Practical design

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	5
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	5
Developing results	0
Preparing of reports, projects presentations, discussion	15
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Test

F3 Colloquium

Summary grade

P1 Weighted average of the midterm tests grades

Conditions for passing the course

L1 All midterm parts of the project must be approved in time, all midterm tests must be passed before the termination of the lectures period in order to qualify for the final exam

L2 The written exam consists of two parts: theoretical test and design problems to solve

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	Podstawy dróg szynowych
Course name in English	Introduction to Rail Roads
Course code	WIL BUD oIS D52 24/25
Course category	Przedmioty profilowe
No. of ECTS points	2.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Description of basic documents referring to rail transport (Polish and European). Rail transport vs other means of transport.

Objective 2 Introduction to types of rail transport systems (conventional and non-conventional). Types of track super-structures: ballasted and ballastless. Giving characteristics of engineering objects.

Objective 3 Brief characteristics of railway network in Europe (lengths, speeds, loads, etc.) including high speed railways

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic knowledge of rail transport in Europe.

2 Rudiments of structural mechanics and strength of materials

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the tracks structures and materials used for construction

LO2 Skills Student knows an outline of the design process, construction and maintenance operations

LO3 Knowledge Student knows the principles of various engineering objects in rail transport and the most common track systems in railways and tramways including turnouts

LO4 Skills Student is able to calculate stresses and displacements in a railway track and design a simple railway line section

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Basic definitions. Conventional vs non-conventional rail systems. Ballasted vs ballastess track systems. Documents referring to rail transport (Polish and European)	4
L2	Components of rail infrastructure (tracks, turnouts, bridges and culverts, subgrade). Brief characteristics of level crossings, power supply systems, etc	5
L3	Types of track structures. Ballasted track and its characteristics. Rails and their characteristics. Rail joints and expansion devices. Thermit welding, electric arc welding - emergence of CWR track. Rehabilitation process - description. Principle of subgrade strengthening. Track and subgrade renewal	6

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of a railway line section (arcs, transirion curves, etc.) including the track structure	15

7 TEACHING TOOLS

N1 Presentations

N2 In-class calculation exercises

N3 Individual design projects

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	8
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	2
Preparing of reports, projects presentations, discussion	4
Total number of hours devoted to the subject	**56**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Design project no. 1

F2 Design project no. 2

F3 Lecture-based test

Summary grade

P1 Average of the three marks

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	Sieci oraz instalacje w obiektach budowlanych
Course name in English	Municipal Systems and Installations in Building Objects
Course code	WIL BUD oIS D53 24/25
Course category	Przedmioty profilowe
No. of ECTS points	3.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	30	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Presenting to students basic knowledge of indoor and outdoor installations

Objective 2 Presenting to students alternative energy sources

Objective 3 Presenting to students the rules of making the documentation of indoor and outdoor installations in buildings

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 General construction

5 LEARNING OUTCOMES

LO1 Knowledge Student describes and explains the principles and characteristics of indoor and outdoor installations

LO2 Skills Student describes and explains the rules of designing indoor and outdoor installations in buildings

LO3 Knowledge Student can explain and make the documentation of indoor and outdoor installations

LO4 Knowledge Student can coordinate the different installations inside and outside the building

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Water plumbing system design in a single family housing: analysis of the existing plumbing system, plumbing dimensioning	5
P2	Water distribution system design for small agglomeration	5
P3	Ventilation and air-conditioning systems. Reading and correcting the documentation	5

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Source of water in the household, water service lines, water plumbing in single family and multistory buildings: pipe materials, valves, meters, plumbing fixtures and appliances, pressure zones, hydrophore units, hot water plumbing systems	4
L2	Wastewater disposal solutions in the household, sewer line, gravity drain system in single family and multistory buildings: pipe materials, plumbing fixture and appliance connections, drain equipment's, drain system venting	4
L3	Water supply systems: water intakes, water demand, water distribution systems, piping materials, pipeline construction, reliability and maintenance, pumping stations, water tanks, water treatment plants.	4
L4	Sewerage systems: sanitary sewers and storm water drainage systems, pipeline construction, repair and maintenance, sewage pumping stations, storm water detention tanks, vacuum and pressure systems, wastewater treatment plants.	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	The structures of LV and MV power supply systems (IT, TN-C, TN-S), example of buildings (public and residential) wiring diagrams and description of basic symbols. Connecting of electrical equipment into electric installation. Determination of wires colours Layout of electrical installation inside the walls and construction divisions. Layout of electrical installation over the surface of the walls	2
L6	The calculation of circuit loads and currents for LV circuits. Apparent power, active and reactive powers calculation of the currents for various types of loads Installed and required power for residential buildings. Basic protection system and the selection of proper protection devices (selection of fuses, safety switches, thermal protection devices) and the requirements they have to satisfy. Documents: Required by standards records from the tests and measurements Basic of the design and installation of lighting and voltage surge protection equipment and grounding circuitry	2
L7	Air properties, standards, natural ventilation characteristics, advantages and disadvantages	4
L8	Mechanical ventilation, hybrid ventilation, Air conditioning systems, methods of energy saving in ventilation and air conditioning systems	4
L9	Renewable energy sources, alternative systems (solar, heat pumps)	2

7 TEACHING TOOLS

N1 Lectures

N2 Design exercise

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	45
Consultation hours	0
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	13
Developing results	0
Preparing of reports, projects presentations, discussion	30
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 positive grade of returned project

Summary grade

P1 Test

Conditions for passing the course

L1 positive grade from the test and returned project

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	Fizyka budowli
Course name in English	Physics of Building Structures
Course code	WIL BUD oIS C29 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	4

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

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

3 COURSE OBJECTIVES

Objective 1 Introduction of the basic concepts regarding heat transfer, moisture, building spaces lighting and building acoustics.

Objective 2 Introduction of the students to physical phenomena connected with heat transfer description, ways of calculation of wall thermal characteristic, designing rules and basic measurement methods.

Objective 3 Introduction of the students to the forms of moisture appearance and transfer in building materials and walls, to the rules of wall calculation, design and measurement in this field.

Objective 4 Introduction of the basic issues regarding natural and artificial lighting of the building spaces.

Objective 5 Introduction to sound insulation and acoustical comfort.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Credits for Building Materials

5 LEARNING OUTCOMES

LO1 Knowledge Student understands and is able to use correctly the concepts and quantities connected with heat transfer, building shell insulation and acoustics.

LO2 Skills Student is able to calculate thermal resistance and heat transfer coefficient of the complex walls, calculate heat losses, draw wall temperature distribution diagram and conduct thermal diagnostics.

LO3 Knowledge Student is able to make the conclusions regarding the results of his work. He is able to articulate his achievements in multi-media presentations.

LO4 Skills Student knows the basic issues associated with heat and moisture transfer.

6 COURSE CONTENT

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Temperature definition, scales, measurement methods and tools, bimetallic and resistance thermometer. Thermocouple: single and differential circuit	4
L2	Remote measurement of temperature. Pyrometer, infra-red camera. Interpretation of thermal images	2
L3	Calculation of the wall thermal resistance and transmittance according to EN ISO 6946.	1
L4	Calculation of the complex wall thermal resistance and transmittance according to EN ISO 6946.	1
L5	Temperature distribution in the wall section. Corrected thermal transmittance. Computational exercise topic.	2
L6	Saturated and non-saturated air. Principles and instruments for relative humidity measurement.	3
L7	The principles of the moisture content calculation according to EN ISO 13788.	4
L8	Water vapour distribution in building shell	2
L9	Moisture content assessment of a building wall according to the building code regulations.	2

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L10	Thermal resistance measurement - method and instrument. Measurement in real conditions.	2
L11	Basic lighting parameters. Luminance and lighting intensity (illumination) in educational spaces.	2
L12	Noise level measurements. Airborne sound insulation measurements	2
L13	Structure borne sound insulation measurements. Reverberation time measurements.	2
L14	Final test and exercise receipt.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction. Basic information about the Polish climate. Basic forms of the natural heat transfer. Surface heat transfer.	1
L2	Convective heat transfer, radiation. greenhouse effect. LE coating. Complex heat transfer at the wall surface. Surface thermal resistance.	1
L3	Thermal conductivity of building materials. Measured, declared and design values. Influence of the external conditions on thermal resistance of the building materials.	1
L4	Fourier's and Newton's equations. Total thermal resistance and thermal transmittance of the wall.	1
L5	Wall temperature distribution. Designing rules of the multilayer walls. Internal surface temperature.	1
L6	Multi-dimensional heat transfer. Linear and spot thermal transmittance. Account for extra losses through thermal bridges.	1
L7	Basic information about non-stationary heat transfer. Thermal stability of the walls and spaces. Energy saving by temporary internal temperature reduction.	1
L8	Economic aspects of thermal resistance pf the heated buildings. Optimum insulation thickness.	1
L9	Water sorption in building materials. Sorption isotherm. Capillary condensation. A difference between capillary condensation and the dew point.	1
L10	Vapour diffusion in the air and in the building materials. Air relative humidity. Water vapour resistance factor, water vapour diffusion-equivalent air layer thickness. Real and saturated vapour pressure.	1
L11	Interstitial condensation conditions within the wall. Calculated maximum amount of moisture, moisture accumulation.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L12	The rules of selection, design and evaluation of the walls because of moisture.	1
L13	Wetting effect. Concave meniscus. Conditions of capillary action. Significance of capillary action for moisture condition of the building wall.	1
L14	Basic concepts and units in building acoustics; Human hearing mechanism and risk hearing loss; Reflection and absorption of sound; Transmission of sound in buildings; Building acoustics standards	1
L15	Laboratory and terrain sound insulation measurements. Air-borne sound insulation; Impact sound insulation; Transmission of sound in open space.	1

7 TEACHING TOOLS

N1 Lectures

N2 Laboratory

N3 Discussion

N4 Multimedia presentations

N5 Presented examples

N6 Consultations

N7 Design exercise

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	45
Consultation hours	2
Exams and tests during session	4
Hours of autonomous student work	
Preparing for classes, studying literature	0
Developing results	0
Preparing of reports, projects presentations, discussion	4
preparation for test	3
Total number of hours devoted to the subject	**58**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Laboratory test

F2 Lecture test

Summary grade

P1 Weighted mean grade

Conditions for passing the course

L1 After passing lab test it is possible to take part in a lecture test

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	Infrastruktura kolejowa
Course name in English	Railway Infrastructure
Course code	WIL BUD oIS D52 24/25
Course category	Przedmioty profilowe
No. of ECTS points	2.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Basic information about railway infrastructure and the management system (investments, maintenance, inspection)

Objective 2 Rail track systems, components of the railway track, turnouts, engineering objects.

Objective 3 Stations - basic components ant track layouts, platforms, infrastructure including solutions for people with reduced mobility

Objective 4 Railway loads classification, geometrical design of a rail road. Basic information about the subgrade.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 General construction knowledge about structures.

5 LEARNING OUTCOMES

LO1 Knowledge Student knows tracks systems including engineering objects and turnouts, level-crossings, etc.

LO2 Skills Student knows solutions for station infrastructure including those for people with reduced mobility

LO3 Knowledge Student knows regulations for design of track layout and infrastructural elements

LO4 Skills Student is capable of designing a section of a railway line including a simple infrastructural object such as a level-crossing.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of a railway line section including the design a platform or a level crossing	15

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Basic documents referring to rail transport (Polish and European). Rail transport and other means of transport. Types of rail transport systems (conventional and non-conventional). Brief characteristics of railway network in Europe (lengths, speeds, loads, etc.) 6.High speed railways	3
L2	Types of track structures. Ballasted track and its characteristics. Ballastless track systems.	2
L3	Station track layouts and turnouts, crossings and other track combinations.	2
L4	Detailed description of a turnout and its function in the station	2
L5	Railway line design principles including station design	3
L6	Platform infrastructure design including solutions for persons of reduced mobility	3

7 TEACHING TOOLS

N1 Presentations

N2 In-class design exercises

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	12
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	6
Developing results	4
Preparing of reports, projects presentations, discussion	2
Total number of hours devoted to the subject	**56**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Lecture-based test

F2 Individual design project

Summary grade

P1 Average of the two marks

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

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

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	Mechanika gruntów
Course name in English	Soil Mechanics
Course code	WIL BUD oIS C28 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	30	0	0	0

3 COURSE OBJECTIVES

Objective 1 Introduction into the soil mechanics, the classification of soils. Macroscopic analysis.

Objective 2 Determination of physical parameters of soils: density, water content, porosity. Granulometric analysis.

Objective 3 Cohesive soil analysis, Atterberg limits, the degree of plasticity.

Objective 4 Non-cohesive soils problems, soil compaction, optimal water content.

Objective 5 Standard constitutive models of soil, mechanical properties, shear strength, soil compressibility. New constitutive models.

Objective 6 The water in the soil, filtration, filtration rate.

Objective 7 Soil as a multiphase medium: skeleton, fluid, gas. Hypotheses of strength and mechanisms of soil destruction. Introduction into the soil mechanics research problems.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 First semester of Strength of Materials

2 Completing the course of Theoretical Mechanics

5 LEARNING OUTCOMES

LO1 Knowledge Student gives the name of building soil with varying composition of the fractions, defines the physical characteristics of the soil and knows the granulometric analysis techniques.

LO2 Skills Student is able to give the name of building soil on the basis of macroscopic diagnosis, is able to define the physical characteristics of the soil, perform sieve analysis and aerometric analysis in the laboratory conditions.

LO3 Knowledge Student knows the Atterberg limits for cohesive soils, plasticity index and the density index for non-cohesion soils.

LO4 Skills Student is able to define in laboratories the Atterberg limits, and the optimal density of the soil in Proctor tests.

LO5 Skills Student knows fundamental constitutive models of soils.

LO6 Knowledge Student in the laboratory is able to find the cohesion and the internal friction angle in the direct shear test or in the triaxial compression test and compression modulus using oedometer.

LO7 Skills Student knows the hypothesis of soil strength.

LO8 Knowledge Student, using the knowledge of the strength of materials, can explain the mechanisms of destruction of soil, as the three-phase materials.

LO9 Knowledge Student is able to work individually and in a team, as well as report the results of work both for practical and scientific purposes.

6 COURSE CONTENT

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Classification of soils due to Polish and international standards. Basic concepts, symbols and description. Classes of soil samples and sampling methods.	4
L2	Granulometric analysis of the cohesive and non-cohesive soils.	4

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L3	Determination of physical parameters of the soils. Determination of organic content.	4
L4	Atterberg limits.	4
L5	Soil compaction. Optimum moisture content and density index. Proctor method. Determination of hydraulic conductivity, Identification of passive capillary rise.	4
L6	Mechanical characteristics of the soil. Basic concepts. Compressibility and consolidation of soils, oedometer compressibility modules.	4
L7	The shear strength of a soil. Direct and residual shear tests. Determination of the internal friction angle and cohesion.	4
L8	Final approval of the reports. Final test.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction into the soil mechanics. Soil classification of due to Polish and international standards. Documentary collection and geotechnical categories of subgrade.	4
L2	The physical characteristics of soil: water content, density, porosity, other parameters. Granulometric analysis according to different standards,	4
L3	Atterberg limits for cohesive soils, the definition of plasticity index. Degree of compaction of cohesionless soil, hydraulic conductivity and passive capillary rise problems.	4
L4	Mechanical characteristics of the soil: the primary and secondary compressibility oedometer modules, the sand equivalent index.	4
L5	The shear strength in the direct shear test and triaxial compression test.	4
L6	The water and water pressure in the soil, aeration and saturation zone. Determine: suffusion, colmatage, consolidation, irrigation and dehydrations.	4
L7	Models of soil: a) as a linear-elastic half space, Boussinesq problem, b)multi-phase models, the main hypotheses in the theory of plasticity. Strain and stress soil models. Soil stability.	6

7 TEACHING TOOLS

N1 Lectures

N2 Laboratories

N3 Group work

N4 Counseling

N5 Discussion

N6 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	3
Exams and tests during session	3
Hours of autonomous student work	
Preparing for classes, studying literature	8
Developing results	6
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Individual laboratory reports

F2 Team work

F3 Final test

Summary grade

P1 Final exam

P2 Weighted average of the marks

Conditions for passing the course

L1 The exam may join students who passed individually the laboratory test

L2 The written examination may consists of theoretical test

L3 Evaluation of the effect of education is the average of P1 and P2

L4 Condition for completing the subject is to obtain a positive mark for each of P1 and P2

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	Mechanika budowli
Course name in English	Structural Mechanics
Course code	WIL BUD oIS C33 24/25
Course category	Basic
No. of ECTS points	10.00
Semester	4 and 5

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
4	15	15	0	0	30	0
5	15	15	15	0	15	0

3 COURSE OBJECTIVES

Objective 1 Knowledge of the rules concerning determination of influence lines in statically determinate bar structures. Knowledge of the fundamental theorems of mechanics and their applications. Knowledge of the rules of kinematic analysis of structures.

Objective 2 Knowledge of the rules and procedures concerning the Force Method applied for flat rod statically indeterminate structures.

Objective 3 Knowledge of the rules and procedures concerning solving flat rod statically indeterminate structures using the Displacement Method.

Objective 4 Knowledge of the rules and procedures concerning solving of the buckling problem in the case of flat rod structures.

Objective 5 Knowledge of the rules and procedures concerning determination of dynamic characteristics in the case of flat rod structures with limited number of dynamic degrees of freedom, preparing student for scientific work

Objective 6 Knowledge of the approach to the problem of dynamic actions on rod structures using dynamic coefficient.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Credited first semester of the subject: Strength of Materials

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the rules of determination of influence lines in the case of statically determinate bar structures. Student knows fundamental theorems of mechanics. Student knows the rules of kinematic analysis of flat bar structures.

LO2 Skills Student is able to determine influence lines in the case of statically determinate bar structures and is able to use them to determine the most disadvantageous positioning of variable loads. Student is able to use theorems for determination of displacements and influence lines in the case of bar structures. Student is able to differentiate correctly if a bar structure is statically determinate or indeterminate or if it is a mechanism.

LO3 Knowledge Student knows the rules and procedures of solving flat rod statically indeterminate structures using the Force Method.

LO4 Skills Student is able to solve flat rod statically indeterminate structures using the Force Method, he is able to verify the results of calculations, he is able to present the physical interpretation of the system of equations of the Force Method and of the values represented in these equations. Student is able to use the Force Method to determine influence lines in statically indeterminate bar structures.

LO5 Skills Student knows the rules and the procedures of solving flat rod statically indeterminate structures using the Displacement Method.

LO6 Knowledge Student is able to solve flat rod statically indeterminate structures using the Displacement Method, he is able to verify the results of calculations, he is able to present the physical interpretation of the system of equations of the Displacement Method and of the values represented in these equations.

LO7 Skills Student knows the rules concerning the application of the Displacement Method to the problem of buckling of flat rod structures.

LO8 Knowledge Student is able to determine values of basic critical buckling loads and buckling modes of flat rod structures.

LO9 Skills Student knows the rules and the procedures of determining dynamic characteristics of flat rod structures with limited number of dynamic degrees of freedom. Student knows the concept of dynamic coefficient and understands the influence of damping on the value of this coefficient under the action of harmonic load. Student is prepared for scientific work.

LO10 Knowledge Student is able to determine free vibration frequencies and corresponding with them free vibration forms, he is also able to verify the obtained results using approximate formulas for calculating first natural frequency of a structure and also using the rule of orthogonality of free vibration forms. Student is

able to apply dynamic coefficient to determine equivalent static action in the case of harmonic load. Student is able to define the influence of damping on the value of the dynamic coefficient and is able to interpret the dynamic coefficients used in polish design codes.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to structural mechanics (assumptions, tasks and tools of structural mechanics). Basic theorems of structural mechanics (theorems of reciprocal work, reciprocal displacements, reciprocal reactions). Calculating displacements.	4
L2	Kinematic analysis of flat rod structures. Unstable, statically determinate and statically indeterminate systems.	2
L3	Using the Force Method for solving flat rod statically indeterminate systems. Set of equations of the Force Method. Simplifications. The rules of verification of the final results. Application of the Force Method for determination of the influence lines in statically indeterminate bar structures.	8
L4	Application of the Displacement Method for solving flat rod statically indeterminate systems. Set of equations of the Displacement Method. Simplifications. The rules of verification of the final results. Application of the Displacement Method for determination of the influence lines in statically indeterminate bar structures.	7
L5	Stability of flat rod structures, determination of basic critical buckling loads and buckling modes, second order influences.	3
L6	Dynamics of rod systems, basic assumptions, dynamic characteristics of structures with limited number of dynamic degrees of freedom.	3
L7	Vibration damping, describing parameters, gaining information about the values of this parameters.	1
L8	Application of the dynamic coefficient as a simplified method of taking into account a dynamic action.	2

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Experimental determination of displacements in a beam. Comparison with calculation results.	2
L2	Experimental determination of reactions in a statically indeterminate beam. Comparison with calculation results.	3
L3	Wind tunnel and its application in the investigations of wind action on structures.	3

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L4	Apparatus for dynamic measurements and its applications.	2
L5	Experimental determination of free vibration frequencies and corresponding with them free vibration forms in a case of a rod system. Comparison with calculation results.	3
L6	Influence of communication vibrations on structures: measurements and analysis of the measurements results.	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Determination of influence lines of appointed static values in statically determinate rod structures. Determination the most unfavorable position of a variable load and the value of the appointed static value. Calculating displacements in chosen points of a statically determinate rod structure.	10
P2	Solving a continuous beam and a statically indeterminate frame using the Force Method. Giving the result of check of the solution.	12
P3	Determination of influence lines in statically indeterminate continuous beam. Verification of the results using kinematic method.	6
P4	Solving a continuous beam and a statically indeterminate frame using the Displacement Method. Giving the result of check of the solution.	8
P5	Determination of basic critical buckling load and buckling mode for a rod structure.	5
P6	Calculating free vibration frequencies and corresponding with them free vibration forms of flat rod structure with limited number of dynamic degrees of freedom. Verification - using approximate formulas the value of the first natural frequency. Checking the rule of orthogonality of free vibration forms.	4

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Influence lines of static values in statically determinate rod structures.	2
C2	Calculating displacements in statically determinate rod structures, graphic integration.	2
C3	Solving flat rod statically indeterminate systems using the Force Method, simplifications, verification of results.	8

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C4	Application of the Force Method for determination of the influence lines in statically indeterminate flat rod structures. Verification of the results using kinematic method.	2
C5	Solving flat rod statically indeterminate systems using the Displacement Method, simplifications, verification of results.	7
C6	Application of the Displacement Method for solving the problem of stability of flat rod structures, determination of basic critical buckling loads and buckling modes.	4
C7	Determining dynamic characteristics of flat rod structures with limited number of dynamic degrees of freedom. Calculating free vibration frequencies and corresponding with them free vibration forms. Application of approximate formulas for calculating first natural frequency. The rule of orthogonality of free vibration forms.	4
C8	Application of dynamic coefficient to determine equivalent static action.	1

7 TEACHING TOOLS

N1 Lectures

N2 Classes

N3 Projects

N4 Laboratory classes

N5 Colloquium

N6 Consultations

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	120
Consultation hours	5
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	70
Developing results	30
Preparing of reports, projects presentations, discussion	70
Total number of hours devoted to the subject	**300**
Total number of ECTS points	10.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Report on laboratory classes

F3 Colloquium

Summary grade

P1 Written exam

P2 Weighted average of forming grades

Conditions for passing the course

L1 Completing all learning outcomes

L2 The final grade is an average weighting of the P1 and P2 grades, but none of the component grades can be negative.

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	Rysunek techniczny
Course name in English	Technical Drawing
Course code	WIL BUD oIS C18 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	2

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
2	0	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Ability to effectively communicate engineering concepts and problem solutions for civil engineering design.

Objective 2 Ability to make (create) as well as to read technical drawings of designed constructions according to related drawing standards and conventions of engineering graphics. In particular, a special attention will be paid both to architectural and building drawings and to construction drawings (technical drawings for reinforced concrete

structures and for structural metal works) presented at various degrees of accuracy. Schematic drawings, assembly drawings, working drawings and detailed drawings will be specified.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Descriptive Geometry Course

2 Ability to represent a 3D object in European and U.S. Standard (orthographic views).

5 LEARNING OUTCOMES

LO1 Knowledge The graduate will have knowledge of the National and the European Standards required to prepare both construction and structural design projects.

LO2 Skills The graduate will have the ability to prepare design projects according to various degrees of accuracy. In particular, a special attention will be paid both to architectural and building drawings and to branch drawings (constructional and sanitary drawings, technical drawings for structural metal works and for reinforced constructions).

LO3 Knowledge The graduate will have the ability to use the AutoCAD system to create a design project.

LO4 Knowledge The graduate will be able to communicate design ideas with his/her co-workers and to work in a team.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Introduction to technical drawing standardization. Classification of drawings: schematic, working, assembly and detailed drawings and relevant scales. Standard sheet sizes (PN ISO 5457). Spaces for drawing and for text, and title blocks on drawing sheets (PN-ISO 9431). Title blocks (PN-ISO 7200). Completing the documentary of drawings (PN-86/N-01603). Scales on technical drawings (PN-EN ISO 5455). Lettering (PN-EN ISO 3098). Standard drawing lines (PN-EN 128). Introduction into AutoCAD tools and menu environment. Formatting of a sheet size, drawing limits, units, title block, line and text style. Assignment 1. Drawing sheet with a large and a small title block (Scale 1:1).	4
P2	Assignment 2. (Scale 1:1): Rolled Profiles. I-beam, C-beam, Angle beam and T-beam (PN-EN ISO 5261). Drawing standards and conventions application. Dimensioning principles (PN ISO 129).	4
P3	Assignment 3. Architectural design project. Ground-floor plan of a detached family house as an exemplary drawing for an architectural design project (Scale 1:100). Simplified and symbolic designations on architectural and building drawings (PN-B 01025). Dimensioning and indications on architectural drawings (PN-ISO 129).	8
P4	Assignment 4. Reinforced Concrete Constructional Drawing. Simplified representation of reinforcing bars (PN-EN ISO 3766), scheduling of reinforcing bars. Bill of materials used in a reinforced construction (Scale 1:20).	6

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P5	Assignment 5: Metalwork Constructions - Mechanical fastening (rivets and bolts) Schematic (Scale 1:50; 1:100) and detailed (Scale 1:10) drawings for a steel construction. Simplified representation of bars and profile sections, Symbolic representation of rivets and bolts. Dynamic blocks application.	4
P6	Assignment 6: Metalwork Constructions: welded and soldered joints. Welding designations (PN-EN ISO 5461, PN-EN 22553). Steel truss drawing.	4

7 TEACHING TOOLS

N1 Design exercise / projects

N2 Multimedia presentation / presentations

N3 Consultation / consultations

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	5
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	0
Developing results	0
Preparing of reports, projects presentations, discussion	20
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Individual project / project

F2 Oral answers

Summary grade

P1 Colloquium / tests

P2 Weighted average of the midterm tests grades / average marks

Conditions for passing the course

L1 delivery of project

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	Technologia konstrukcji sprężonych i prefabrykowanych
Course name in English	Technology of Prestressed and Precast Constructions
Course code	WIL BUD oIS D56 24/25
Course category	Przedmioty profilowe
No. of ECTS points	2.00
Semester	6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Provide basic knowledge on the concept of prestressing, advantages and requirements

Objective 2 Provide a fundamental knowledge on the design and production procedures of PC members

Objective 3 Provide basic knowledge on the technology of precast structures

Objective 4 Provide fundamental information on the production of precast members

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Must be previously completed: Structural mechanics

2 Must be previously completed: Resistance of materials

3 Must be previously completed: Technical drawing and computer graphics

4 Must be previously completed: Building materials

5 Must be previously completed: Concrete technology

6 Must be previously completed: Concrete structures

5 LEARNING OUTCOMES

LO1 Knowledge of the principal features of the prestressed and precast elements and structures

LO2 Knowledge of materials, equipment, conditions of works execution and detailing

LO3 Knowledge Ability of simplified verification of the limit states

LO4 Skills Ability of the formulation of connection models for precast members

LO5 Knowledge Awareness of the responsibility of the designer and constructor of prestressed and precast concrete structures

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Concept of prestressing, advantages and disadvantages, pre-tensioning and post-tensioning, requirements, examples of PC structures	2
L2	Materials and technology of prestressing, anchorages	2
L3	Losses of the prestressing force, their relation to technology, simplified design stress equations for edges	2
L4	Stress verification in materials, ultimate limit states, serviceability limit states,	2
L5	Design and construction of anchorage and end zones, technology of grouting	2
L6	Concept of precast members structures, examples, concept of typization,	2
L7	Design and technology of production of precast members load situations for slabs, beams, columns, foundations	2
L8	Design and technology of connections execution	1

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of a precast element of a simply supported beam or slab with special focus on technology of production	15

7 TEACHING TOOLS

N1 Lectures

N2 Discussion

N3 Multimedia presentations

N4 Practical design

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	5
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	5
Developing results	0
Preparing of reports, projects presentations, discussion	15
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Test

F3 Colloquium

Summary grade

P1 Weighted average of the midterm tests grades

Conditions for passing the course

L1 All midterm parts of the project must be approved in time, all midterm tests must be passed before the termination of the lectures period in order to qualify for the final exam

L2 The written exam consists of two parts: theoretical test and design problems to solve

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	Technologia, mechanizacja i automatyzacja robót budowlanych
Course name in English	Technology, mechanisation and automatisation of construction works
Course code	WIL BUD oIS C26 24/25
Course category	Basic
No. of ECTS points	5.00
Semester	3 and 4

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
3	30	0	0	0	15	0
4	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 To provide information related to technology of construction works. To get students acquainted with various types of technologies, mechanization and automation of construction works. To prepare students to solve problems within the field of construction technology.

Objective 2 To familiarize students with various types of construction machines. To prepare students for analyses of efficiency of labor, machines and the use of construction materials. To familiarize students with various kinds of automation of construction works. To prepare students (at a basic level) to take part in research within the field of technology, mechanization and automatization of construction works.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge on classification and types of building materials. Knowledge on classification and types of construction objects and their elements. Completion of courses according to the sequence of learning at Faculty of Civil Engineering CUT.

5 LEARNING OUTCOMES

LO1 Knowledge Basic knowledge within the field of technology, mechanization and automation of construction works.

LO2 Skills Basic knowledge on the use of resources (labor, machines, materials) in technology, mechanization and automation of construction works.

LO3 Knowledge Ability to solve basic problems within the field of technology, mechanization and automation of construction works.

LO4 Knowledge Ability to work in team. Ability to work individually. Critical approach to own work and results of analyzes. Ability to discuss results of own or others work.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Earthworks technology - individual/team assignment.	8
P2	Reinforced concrete technology - individual/team assignment.	7
P3	Technological transport on a construction site and technology of assembly works - individual/team assignment.	8
P4	Presentation of a chosen aspect of automation of construction works - - individual/team assignment.	7

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Course description. Presentation of requirements to complete the course. Introduction to construction technology, mechanization and automation of construction works.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L2	Definitions and concepts of technology of construction works. Definitions and concepts of mechanization of construction works. Definitions and concepts of automation of construction works.	2
L3	Earthworks technology. Earthworks machines. Technologies of soil stabilization and strenghtening.	6
L4	Deep excavation supports. Deep foundation technologies.	4
L6	Reinforced concrete technology - technology of reinforcement works.	2
L7	Reinforced concrete technology - formworks and scaffoldings.	4
L8	Reinforced concrete technology - technology for concrete transportation, placement and curing.	2
L9	Technological transport on a construction site. Mechanization of transport on a construction site.	4
L11	Technology of masonry works. Technology of insulation works. Technology of finishing works.	4
L12	Automation of earthworks.	4
L13	Technology of assembly works.	4
L14	Mechanization and automation of reinforced concrete construction works.	4
L15	Chosen aspects of automation and robotics in construction works.	3

7 TEACHING TOOLS

N1 Lectures, multimedia presentations

N2 Design exercises: individual tasks and team tasks

N3 E-learning

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	75
Consultation hours	0
Exams and tests during session	6
Hours of autonomous student work	
Preparing for classes, studying literature	28
Developing results	20
Preparing of reports, projects presentations, discussion	22
Total number of hours devoted to the subject	**151**
Total number of ECTS points	5.00

9 Methods of grading

Partial grades

F1 Design exercises: individual tasks, team tasks

Summary grade

P1 Exam after winter semester. Exam after summer semester.

Conditions for passing the course

L1 Completion of all design exercises within the deadlines.

L3 Positive exam grade.

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	Mechanika teoretyczna
Course name in English	Theoretical Mechanics
Course code	WIL BUD oIS B12 24/25
Course category	Przedmioty podstawowe
No. of ECTS points	9.00
Semester	2 and 3

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
2	30	30	0	0	0	0
3	30	30	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Introduce the basic concepts describing forces existing in engineering. Acquaint of the students with the idea of reduction of systems of forces.

Objective 2 Familiarize the students with the problems of kinematics of a particle and a rigid body to the extent enabling the formulation and analysis of motion of the simple mechanical systems.

Objective 3 Familiarize the students with the concepts of statistics. The acquisition of the skills of identification and forma- tion of the statically determinate structures, and determining reactions at supports for statically determinate structures.

Objective 4 Acquaint the students with the quantities characterizing the mass distribution of the rigid bodies and systems of material points.

Objective 5 Familiarize the students with dynamics of a particle under smooth and non-smooth constraints, and dynamics of the system of particles and rigid bodies.

Objective 6 Acquaint the student with the selected problems of the analytical mechanics to the extent enabling the formulation of the differential equations of motion of the simple material system, and analysing their stability of equilibrium.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 The first semester of the mathematics course must be completed.

5 LEARNING OUTCOMES

LO1 Knowledge A student understands and explains the basic concepts of the theory of the equivalence of the systems of forces.

LO2 Skills For an arbitrary force system (planar and spatial) a student can determine the equivalent couple-force system at a given point , and the simplest equivalent force system.

LO3 Knowledge A student defines the basic kinematic quantities occuring in the motion of a particle and a rigid body and describes relations between them.

LO4 Skills A student can analyse statical determinacy and stability of the structures, and determine the reactions at supports and the forces in truss members for statically determinate structures.

LO5 Skills A student is able to analyse the tensor of inertia of the system of particels and rigid bodies.

LO6 Knowledge A student describes the basic quantities of dynamics of a particle and a rigid system, and describes the friction phenomenon in civil engineering.

LO7 Skills A student can analyse free, dumped and forced vibrations of the simple construction elements modelled as systems with the single degree of freedom.

LO8 Knowledge A student is capable of forming the differential equations of motion of material systems by means of the methods of analytical mechanics.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Reduction of the spatial force system.	4
P2	Reduction of the planar and parallel force system.	4

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P3	Kinematics of a particle, acceleration decomposition. Circural motion.	2
P4	Kinematics of a rigid body: distribution of velocities in planar motion, centers of instantenous rotation.	2
P5	Reactions at supports for simple beams and frames.	2
P6	Reactions at supports and forces in truss members for compound structures, by means of the equations of equilibrium and the principle of virtual work.	5
P7	Dynamics of a particle. Determination of motion of a particle by means of the different dynamic methods.	3
P8	The tensor of inertia for solids and planar figures. Statical moments, moments and products of inertia for the cross-section composite areas. Principal and principal centroidal moments and axes of inertia.	5
P9	Determination of motion and the stable equilibrium position of the systems by means of analytical mechanics.	3

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to mechanics: fundamental concepts, division, mechanics and engineering	1
L2	Forces and force systems: moment of a force about a point, moment of the force about a line, a system of forces, moment transport theorem and corollaries, a couple- definition and properties, equivalent systems of forces, elementary transformations of the force system, reduction of the force system to a force-couple system at a chosen point, the simplest equivalent force system (zero force system, resultant force, couple, wrench), the central axis of the system, special force systems : planar force system, concurrent force system, parallel force system, distributed load - reduction.	9
L3	The discription of motion in terms of position vector, and in terms of path coordinates, velocity and acceleration vectors, tangential and centripetal acceleration, circular motion- angular velocity and acceleration compound motion of a particle, inertial and non-inertial reference frames, composition of velocity and acceleration in compound motion.	4
L4	Kinematics of a rigid body, distribution of velocities in a rigid body, methods of description of motion, special cases of motion : translation, rotation about a fixed point, rotation about a fixed axis, planar motion, center of instantenous rotation in planar motion.	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	Equilibrium of forces and objects in equilibrium constraints - definition and classification, examples of constrained motion, virtual displacement, the principle of virtual work, derivation of the equations of equilibrium.	6
L6	Statics: supports, reactions at supports, idealized structures static determinacy and stability of the structure, determining reactions at supports and forces in the truss members for statically determinate structure by means of equations of equilibrium and the principle of virtual work.	4
L7	Dynamics of a particle: free motion, motion under smooth and non-smooth frictional constraints. Concept of friction in mechanics. Lagrange's equations of the first kind,. Free, dumped and forced vibrations of the systems with one degree of freedom, resonance, magnification factor. Dynamic equations in terms of path coordinates.	12
L8	Dynamics of rigid bodies and system of particles. Center of mass, center of gravity, centroid, statical moments. Linear and angular momentum. Euler's balance and conservation laws. Angular momentum in the rotational motion of the rigid body. Moments and products of inertia. Parallel axes theorem (Steiner's theorem). Basics of the tensor calculus, eigenvectors and eigenvalues of the symmetric moment of inertia tensor. Principal and principal centroidal moments and axes of inertia. Equations of motion of a rigid body.	14
L9	Selected problems of analytical mechanics. Work and energy, potential system of forces. Principle of work and energy. Decomposition of kinetic energy of the rigid body (Koenig's theorem). D'Alambert's principle, globalized coordinates, globalized forces. Lagrange's equations of the second kind. Analysis of the stability of equilibrium of the system.	6

7 TEACHING TOOLS

N1 Lecture

N2 Discussion

N3 Multimedia presentation

N4 Design exercise

N5 Consultation

N6 Whiteboard exercises

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	90
Consultation hours	6
Exams and tests during session	8
Hours of autonomous student work	
Preparing for classes, studying literature	75
Developing results	0
Preparing of reports, projects presentations, discussion	90
Total number of hours devoted to the subject	**269**
Total number of ECTS points	9.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Test

F3 Colloquium

Summary grade

P1 Written exam

P2 Weighted average of the midterm tests grades

P3 Test

Conditions for passing the course

L1 All projects must be approved, and all midterm tests must be passed in order to qualify for the final exam

L2 The written exam consists of two parts: theory test and numerical tasks