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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Specialty: no specialty

1 COURSE INFORMATION

Course name	Betonowe konstrukcje specjalne
Course name in English	Special concrete structures
Course code	WIL BUD oIS E1 24/25
Course category	Subjects related to Diploma Projects
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	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Learning about factors determining the value of imposed strains, i.e. thermal strains and shrinkage strains, during concrete hardening processes. Deepening knowledge about the factors determining the rate of development of mechanical properties of concrete in order to prepare the student to be able to conduct scientific research in the above-mentioned area.

Objective 2 Learning about models for calculating crack widths in concrete structures subjected to early-age imposed strains as a result of limiting the freedom of strains.

Objective 3 Learning about principles of design and construction of cylindrical and rectangular monolithic reinforced concrete tanks, taking into account the period of early-age concrete hardening.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge The student has knowledge of factors (affecting imposed strains in concrete massive and semi-massive structures) that cause cracking of reinforced concrete structures, and has knowledge of the rate of development of mechanical properties of hardening concrete.

LO2 Skills The student has knowledge of the relationship between the designed surface of reinforcement and the required water-tightness class of the structure.

LO3 Knowledge The student has knowledge of the means that can be used to eliminate the occurrence of cracks in the early stages of concrete hardening processes.

LO4 Skills The student is able to assess the influence of factors determining the value of imposed strains occurring during concrete hardening processes.

LO5 Skills The student is able to design a reinforced concrete monolithic tank taking into account the effects of restraint.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Designing a shell for a reinforced concrete monolithic cylindrical or rectangular tank, taking into account the period of concrete hardening.	30

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Thermal imposed strains. Determining their values and effects of their impacts. Cement heat of hydration, description of the phenomenon and functions describing these strains. Thermal and physical properties of hardening concrete. Creep effects of hardening concrete. Shrinkage strains. Development of mechanical properties of hardening concrete.	5

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L2	Changes in stresses in semi-massive members with a different pattern external restraints. Calculation of crack widths according to the model contained in EC2-3 and according to the Rostasy and Henning approach. Water-tightness classes. Minimal reinforcement.	4
L3	A detailed discussion of examples from the implementation of semi-massive tanks that have cracked from imposed strains.	1
L4	Factors and measures eliminating the cracking of reinforced concrete structures.	2
L5	Displacements, restraints and cracks occurring in concrete structures.	2
L6	Basic assumptions in FEM in modeling of reinforced concrete tanks.	1

7 TEACHING TOOLS

N1 Lectures

N2 Consultation

N3 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	5
Exams and tests during session	3
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	4
Preparing of reports, projects presentations, discussion	18
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Colloquium or oral response.

Summary grade

P1 Course completion assessment in written or oral form.

P2 Weighted average of forming grades.

Conditions for passing the course

L1 The condition of earning credit for the course is a positive grade for each learning outcome. Only the students who have obtained credit for the design part, i.e. they have completed the project fully and correctly and have demonstrated the knowledge necessary for its independent completion, are admitted to obtaining credit for the lectures.

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Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Betony specjalne i specjalne techniki betonowania
Course name in English	Special concretes and concreting techniques
Course code	WIL BUD oIS E2162 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	3.00
Semester	6 and 7

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
7	15	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Repetition and broadening of students knowledge about contemporary concrete technology.

Objective 2 To familiarize students with the chosen non-conventional types of advanced binders (e.g.: other than Portland type cements, geopolymers etc.)

Objective 3 To familiarize students with the chosen new generation concrete types used in building industry (composition, design, properties and exemplary applications).

Objective 4 To familiarize students with selected special / non-conventional techniques of concrete transport, placing and curing in different environmental conditions (with the stress put on extreme weather conditions). This topic includes: the aim and the cause of the technology implementation, the influence of the technology on concrete properties and the methods of their assessment, the examples of usage.

Objective 5 To familiarize students with the influence of materials, technology of structure erection and the way of structure use (environment) on the methods of quality control assessment of fresh and hardened concrete. This is a partial introduction how to conduct experiments being a part of diploma thesis preparation.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Chemistry

2 Building Materials

3 Technology of Concrete

5 LEARNING OUTCOMES

LO1 Knowledge Student knows basic classification of non-conventional binders and special concrete types and knows and understands their basis.

LO2 Skills Knowledge Student knows and understands the methods of modification of ordinary concrete to obtain pre-assumed concrete special properties and modification of accompanying methods of quality control (where significant).

LO3 Knowledge Student knows selected special techniques of concrete transport, placing and curing in the described environmental conditions.

LO4 Skills Student understands and is able to choose the ways to modify traditional concrete in order to obtain specific special properties and associated modifications to the methods of quality control (where significant).

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Revision an broadening of students basic knowledge about ordinary concrete technology.	1
L2	Non-conventional binders to concrete (Non-Portland cements, geomplymers etc.)	2
L3	Methods and materials used as modificators for obtaining special concrete properties.	2
L4	The criteria and classification of special/new generation concrete types. Special concrete as a well-modified traditional concrete.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	The description of chosen types of non-conventional concrete types (e.g. SCC, HPC, , FRC, LWAC etc.). Essentials of composition, design, basic properties and examples of usage.	8
L6	Tendencies of development and perspectives of use of special concretes.	1
L7	Classification, selection rules and directions of application of special concreting techniques and the corresponding environmental conditions.	2
L8	The rules of concreting in extreme weather /climate conditions and chosen corresponding technological solutions.	4
L9	Description of chosen special concreting techniques and examples of usage of special concreting techniques (including transport and curing). This topic includes: the aim and the cause of the technology implementation, the influence of the technology on concrete properties and the methods of their assessment, the examples of usage.	8
L10	Tendencies of development and perspectives of use of special concreting techniques in concrete technology practice.	1

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia Presentations

N3 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	6
Exams and tests during session	6
Hours of autonomous student work	
Preparing for classes, studying literature	35
Developing results	0
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**77**
Total number of ECTS points	3.00

9 Methods of grading

Two-part final test. 1-st part concerns to 3.0 grade, the 2-nd part - to the higher grade. The test is divided into blocks. Each block consists of knowledge described by one Education Effect ("EK" in Polish)

Partial grades

F1 Final test divided into blocks

Summary grade

P1 weighted average of individual marks (blocks)

Conditions for passing the course

L1 Passing of obligatory questions (for 3.0 grade) divided to blocks. All blocks must be passed)

L2 Passing of additional questions (for higher grade) divided to blocks. They are marked starting from 0 point level

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Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Bezsiatkowa analiza problemów inżynierskich
Course name in English	Meshless analysis of engineering problems
Course code	WIL BUD oIS E1 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	2.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	0	0	0	15	0	0

3 COURSE OBJECTIVES

Objective 1 Applications of the meshless methods for practical analysis of the selected engineering problems.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Positive grade obtained in the following courses: "Applied Mathematics and Numerical Methods" as well as "Computational Methods"

2 Basic experience in Matlab programming

5 LEARNING OUTCOMES

LO1 Skills Student knows how to apply meshless solution approach for the analysis of the selected engi- neering problems.

LO2 Skills Student knows how to modify delivered software codes (Matlab), based on meshless algori- thms, for appropriate purposes.

LO3 Knowledge Student is able to solve simple computational problems, based on meshless modelling.

LO4 Knowledge Student is able to co-operate in small groups.

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Meshless modelling - introduction	2
K2	Meshless analysis of the selected 1D problems	4
K3	Meshless analysis of the selected 2D problems	6
K4	Development of the individual assignments	3

7 TEACHING TOOLS

N1 Laboratory exercise

N2 Discussion

N3 Consultation

N4 Work in groups

N5 Multimedia presentation

N6 tasks blackboard

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	15
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	10
Preparing of reports, projects presentations, discussion	10
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 Group project

Summary grade

P1 Weighted average of the midterm tests grades

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	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	Chemia
Course name in English	Chemistry
Course code	WIL BUD oIS B11 24/25
Course category	Przedmioty podstawowe
No. of ECTS points	4.00
Semester	1 and 2

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	15	0	0	0	0	0
2	0	0	30	0	0	0

3 COURSE OBJECTIVES

Objective 1 Introducing basic terms concerning cohesion forces of homogeneous and heterogeneous materials.

Objective 2 Providing students with the problems of dispersed systems in civil engineering.

Objective 3 Providing students with surface phenomena and their significance in civil engineering.

Objective 4 Providing students with the issues of kinetics and chemical equilibrium of chemical reactions taking place while obtaining and applying building materials.

Objective 5 Gaining team work experience.

Objective 6 Preparing students for scientific practice

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic knowledge of chemistry within the scope of the high school program.

5 LEARNING OUTCOMES

LO1 Knowledge A student describes basic notions concerning cohesive forces in homogeneous materials and dispersed systems.

LO2 Skills A student is able to define types of dispersed systems in civil engineering and describe their properties.

LO3 Knowledge A student is able to explain the importance of surface phenomena for durability of building materials.

LO4 Skills A student defines basic thermodynamic and kinetic quantities of reactions taking place in civil engineering and describes processes of concrete and steel corrosion.

LO5 Skills A student is able to carry out the analysis of the usability of water used for civil engine- ering purposes and write down characteristic reactions connected with obtaining and application of building materials.

LO6 Knowledge A student knows selected processes concerning high-molecular compounds and discerns cement- polymeric systems.

LO7 Knowledge A student is able to work in a team.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Cohesive forces of homogeneous and heterogonous materials. States of matter: characterization of liquids, structure of solids crystalline structures and their defects.	2
L2	Chemistry of metals. Basics of electrochemistry: electrolysis, cells. Corrosion of steel.	3
L3	Characterization and division of chemical reactions taking place in civil engineering. Kinetics and chemical equilibrium.	2
L4	Surface phenomena and their significance in civil engineering.	4
L5	Production and chemistry of mineral building materials, especially chemistry of binding materials. Corrosion of cement composites.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L6	Chemistry of polymers and bituminous materials.	1
L7	Macroscopic dispersion on the example of concrete and polymeric composites.	1

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Naming laboratory equipment and inorganic compounds. Concentrations of solutions.	2
L2	Introduction to processes taking place in building materials.	4
L3	Production, setting and application of cement, lime and gypsum binders.	4
L4	Corrosion processes of cement materials.	4
L5	Corrosion of metals.	4
L6	Plastics in civil engineering.	4
L7	Additions and admixtures to mineral binders.	4
L8	Mixing water and concrete exposure classes.	4

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Laboratory classes

N4 Consultations

N5 Others

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	6
Exams and tests during session	9
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	10
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 Grades from tests concerning each main topic and lab report models (in the case of the laboratory classes)

F3 A test from lectures

Summary grade

P2 Mean grade calculated based on all partial grades

Conditions for passing the course

L1 a. Only the students who have successfully completed the lecture course can attend laboratory classes

L2 At least E grade from lectures and laboratory classes

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Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Dokumentacja przetargowa i kosztowa w przedsięwzięciu budowlanym
Course name in English	Tender and cost documentation for construction project
Course code	WIL BUD oIS E7161 24/25
Course category	Subjects related to Diploma Projects
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	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Transfer of knowledge regarding the tender and cost documentation required in Poland for construction enterprises.

Objective 2 Acquiring practical skills in preparing tender documentation and making cost estimates and preparing students for scientific research in the field of construction enterprises costs.

Objective 3 Preparing students for individual and team work in creating tender documentation and preparing cost estimates.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge Tender documentation for construction projects

LO2 Skills Cost documentation for construction projects

LO3 Knowledge Preparation of documentation describing the subject of the contract and making cost estimates

LO4 Knowledge Individual and team work in preparation of tender and cost documentation

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Tender specification - project	6
P2	Functional-utility program - project	8
P3	Performing a cost estimate in the form of PKPP + PKRB based on a functional and utility program	8
P4	Preparation of the cost estimate for selected construction works based on the design documentation.	8

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Project delivery methods of construction projects.	2
L2	Tender specification.	2
L3	Design documentation in the design and build system.	2
L4	Design documentation in a traditional system.	2
L5	The budget of the construction. Preliminary cost studies.	2
L6	Cost estimations in design and build system.	2
L7	Cost estimations in the traditional system.	3

7 TEACHING TOOLS

N1 multimedia presentations

N2 Price bulletins and other book materials

N3 Project documentation in paper and electronic form (PDF, DWG)

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	1
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	20
Developing results	10
Preparing of reports, projects presentations, discussion	4
Total number of hours devoted to the subject	**82**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Completion of the lecture in the form of a test

F2 Project evaluation

Summary grade

P1 Average rating weight

Conditions for passing the course

L1 passing lecture part

L2 passing project part

L3 Presence for min. 80% of project classes

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Study form: full-time

Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

Course name	Ekologia
Course name in English	Ecology
Course code	WIL BUD oIS A2 24/25
Course category	Przedmioty ogólne
No. of ECTS points	2.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 objectives of the subject: Understanding of processes and phenomena occurring in the environment

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Prerequisites for knowledge, skills and other competences: mathematics and physics based on the program of the high school

5 LEARNING OUTCOMES

LO1 Knowledge: understanding some characteristics of regulatory and economic

LO2 Skills: monitoring data interpretation skills

LO3 Knowledge : understanding processes short and long term in the environment

LO4 Skills: calculations and comparison

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Detailed description of the thematic blocks: Basic indicators of environmental assessment (NDS toxic product, quotient toxicity), the energy balance of the building and air pollution. Type of heat source, and emissions of oxides of non-metallic compounds, particulates and dioxins. Construction Solutions Materials: selection of quality and quantity of construction materials for the chemical internal environmental pollution, energy consumption of materials and components construction, assessment of environmental quality criteria for: heat and economy. Measurement of basic parameters of air pollution, development measurement results, the mobile monitoring station. Comparative analysis of measurement results and restrictive parameters of the external environment.	15

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

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Detailed description of the thematic blocks: Fundamentals of ecology. Ecology of the population. Mitigating factors and environmental resources such as: air, water and soil. Tolerance of limiting factors and environmental resources. The law of weakest link. Liebiega Law. Shelford Law. Biocoenosis, ecological niche. Levels trophic. Ecology of rivers and water deposits eutrophication, the characteristics of urban and industrial waste disposal water. Some legal and environmental aspects. Limits contaminants, methods of determining the limit values. The greenhouse effect, acid rain, ozone hole, ozone mundane. Types of land degradation and forest. Sources of vibration and noise occurring in the environment and their limits. Effect of vibration and noise on human health and state construction. Applications of spatial information systems in the assessment of environment. Elements of mycology and toxicology: poisons and toxins, radioactivity. Causes contamination of the environment of internal and external trade in toxic, radioactive. Waste-site formation, classification. Municipal waste, hazardous and industrial morphology. Impact of pollution, vibration and noise on human health and the state structure.	15

7 TEACHING TOOLS

N1 Design exercises

N2 Lectures

N3 Discussion

N4 consultations

N5 Multimedia presentations

N6 work in groups

N7 Table tasks

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	10
exams and passing credit	0
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	10
Preparing of reports, projects presentations, discussion	0
preparation for classes, including studying literature 10hours, compilation of results 10 hours	0
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

behavior that meets the principles of social coexistence

Partial grades

F1 tests

F2 oral answer

F3 Individual project

Summary grade

P1 Weighted average of forming grades

Conditions for passing the course

L1 attendance, systematic work in the semester, subject passed in the semester

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	Ekonomika budownictwa
Course name in English	Economics in Civil Engineering
Course code	WIL BUD oIS D50 24/25
Course category	Przedmioty profilowe
No. of ECTS points	2.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	7	0	0	8	7	0

3 COURSE OBJECTIVES

Objective 1 To familiarize students with the assessment of the construction projects' profitability.

Objective 2 To prepare students to conduct research involving assessment of the construction projects' profitability.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge A student knows the concept of the time value of money.

LO2 Skills A student knows selected measures of construction projects' profitability.

LO3 Knowledge A student can calculate the future value, the present value, the periodic payment equivalent to the future value and the periodic payment equivalent to the present value using the formulas and financial functions of MS Excel.

LO4 Skills A student can calculate the selected measures of construction projects' profitability using the formulas and financial functions of MS Excel.

LO5 Knowledge A student honestly interprets the results of his work and assesses the construction projects' profitability.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Profitability assessment of an example construction project.	7

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Time value of money.	3
L2	Measures of construction projects' profitability	4

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Calculating the future value, the present value, the periodic payment equivalent to the future value and the periodic payment equivalent to the present value using the formulas and financial functions of MS Excel.	2
K2	Calculating the selected measures of construction projects' profitability using the formulas and financial functions of MS Excel.	3
K3	Comparison of the profitability of construction projects based on selected measures.	3

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Laboratory exercises

N4 Design exercises

N5 Consultations

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	22
Consultation hours	1
Exams and tests during session	1
Hours of autonomous student work	
Preparing for classes, studying literature	12
Developing results	12
Preparing of reports, projects presentations, discussion	12
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 - computer laboratories

F3 Test - lecture

Summary grade

P1 Weighted average of formative grades (weights: 0.4 for lecture grade, 0.3 for project grade and 0.3 for computer laboratory grade)

Conditions for passing the course

L1 Passing the calculation tasks and test at computer laboratories.

L2 Passing the project.

L3 Passing the 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	Elementy ochrony własności intelektualnej
Course name in English	Elements of Intellectual Property Protection
Course code	WIL BUD oIS A7 24/25
Course category	Przedmioty ogólne
No. of ECTS points	1.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	6	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Aim of the course 1 The aim of the course is to provide knowledge about the sources of intellectual property law. Students will also receive information on various intellectual property goods created in the course of conducting scientific, economic or professional activities.

Objective 2 Aim of the course 2 The aim of the course is to discuss the nature and scope of protection, and in this context the freedom of own creative activity, both for goods protected by copyright (works) and for industrial property (inventions, utility models, industrial designs, trademarks).

Objective 3 Aim of the course 3 Another objective of the subject is also to provide knowledge about trading in intellectual property goods, i.e. issues related to the conclusion of civil law contracts including licenses.

Objective 4 Aim of the course 4 In addition, the purpose of the course is to provide knowledge about responsibility in the event of violation of other people's intellectual property rights and assert own rights to the effects of creative work.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Requirement 1 None

5 LEARNING OUTCOMES

LO1 Knowledge Learning outcome 1 Knowledge of the main sources of international, EU and national law on protection of intellectual property rights.

LO2 Skills Learning outcome 2 Knowledge of basic principles of copyright protection. Learning the definition of the term "work". Knowledge of the decisive provisions who owns copyright depends on the situation in which the work was created, including the problem of co-creation. Knowledge of differences between property and personal copyright. Knowledge about the possible use of other people's works without infringing copyright.

LO3 Knowledge Learning outcome 3 Knowledge of the definition of the concept of a patentable invention. Knowledge about the rules for obtaining and the scope of patent protection. Knowledge of basic rules of international protection of inventions.

LO4 Skills Learning outcome 4 Knowledge of differences between the utility model and industrial design. Know- ledge about the principles of obtaining and the scope of legal protection.

LO5 Skills Learning outcome 5 Ability to identify a situation of infringement of own intellectual property rights by third parties and legal means that can be used in such case.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Program content 1 The concept of intellectual property and its place in the legal system and sources of law: International agreements Legislation at EU level Polish legislation and implementing acts.	1
L2	Program content 2 Copyright protection: The concept of the work Exclusions from protection Determining the proprietor Personal and property rights Permitted use of other people's songs Computer software	2
L3	Program content 3 Protection of the invention: principles of obtaining protection, procedure, scope and duration of protection. International security systems	1
L4	Program content 4 Utility model and industrial design: Object of protection, rules for obtaining protection, scope and duration of protection.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	Program content 5 Liability for infringement of intellectual property rights: Civil liability, criminal liability.	1

7 TEACHING TOOLS

N1 Tool 1 Lecture

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	6
Consultation hours	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	20
Developing results	0
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**26**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Rating 1

Summary grade

P1 Rating 1

Conditions for passing the course

L1 Rating 1

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	Elementy prawa w praktyce budowlanej
Course name in English	Elements of Law in Engineering Practice
Course code	WIL BUD oIS A6 24/25
Course category	Przedmioty ogólne
No. of ECTS points	1.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	30	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Aim 1 Students should get acquainted with the basic principles of spatial management under the regulations in force, basic terms concerning the Polish civil law, business trading as well as the administrative proceedings.

Objective 2 Aim 2 Students should develop their skills in the area of lawful practice and proper interpretation of the legal provisions relating to their field of study. Students should acquire skills in an independent search for current sources of law.

Objective 3 Aim 3 Students should get acquainted with the issues concerning construction supervision and architectural authorities as well as the competences of the court and public administration authorities.

Objective 4 Aim 4 Students should develop responsible attitude of an engineer who is ready to abide by the legal provisions in force, particularly those in the area of the employment relationships and health and safety regulations (H&S).

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Entry requirements: NONE

5 LEARNING OUTCOMES

LO1 Knowledge Effect 1 Students are able to describe and explain the phenomena and processes as well as the basic legal terms connected with spatial planning, civil law, business trading and administrative proceedings.

LO2 Skills Effect 2 Students are able to apply for the most common administrative acts in the construction processes. Students can run the construction logs and books of the building structure. Students are able to apply to the court in the area of labor law as well as to file a complaint to the National Labor Inspectorate.

LO3 Knowledge Effect 3 Students know the competences and responsibilities of the construction and architectural authorities as well as construction supervision authority. Students know the competences of the court and administrative authorities. Students know the competences of the National Labor Inspectorate.

LO4 Knowledge Effect 4 Students are aware of, and at the same time, responsible for the decisions that are made within the employment relationships with regard to the staff and themselves.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Lecture 1 Spatial planning local spatial management plan, decision on land development and management conditions	2
L2	Lecture 2 Independent technical functions in the construction industry, requirements concerning the obtainment of the construction qualifications certificate, participants in the construction process, types of decisions issued in the construction process	3
L3	Lecture 3 Procedure preceding the commencement of construction works, decision on the construction permit, a notification of the construction	3
L4	Lecture 4 Construction and transfer of building structures for use, the construction log, health and safety regulations in the construction works (H&S)	3
L5	Lecture 5 Maintenance of building structures, obligation to keep the book of the building structure, mandatory control of the construction	2
L6	Lecture 6 The authorities of the architectural and construction administration and the construction supervision basic terms and their competences	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L7	Lecture 7 Basic terms from the Polish civil law persons, legal acts, declaration of will, representation, commercial proxy, limitations of claims	1
L8	Lecture 8 The elements of real rights law real estates as seen by the law, land register and geodesy; ownership, protection of ownership, limited real rights	2
L9	Lecture 9 General provisions concerning the law of obligations non- performance of obligations, contractual rescission right, liquidated damages, liability for non-performance	1
L10	Lecture 10 Chosen contracts of business trading in particular named contracts such as specific work contracts and employment contracts	2
L11	Lecture 11 Construction works contracts parties of the contract, essentialia negotii of the contracts, means of redress and remedies with reference to the construction works contracts	2
L12	Lecture 12 Labor law commencement of an employment relationship, types of labor contracts, termination of the contracts	2
L13	Lecture 13 Employees rights leave, wages, litigations, the National Labour Inspectorate	1
L14	Lecture 14 Health and safety regulations (H&S) with reference to the conditions of the constructions and construction works	2
L15	Lecture 15 The elements of administrative law and administrative proceedings basic terms, parties of administrative proceedings, administrative acts, appeals, emergency appeals, administrative courts and Supreme Administrative Court of Poland	2

7 TEACHING TOOLS

N1 Lectures

N2 Discussion

N3 Power-point presentations

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	0
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

Conditions for passing the course

L1 Min. 60 % of total points in a 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	Elementy zarządzania w budownictwie
Course name in English	Elements of Management in Civil Engineering
Course code	WIL BUD oIS D50 24/25
Course category	Przedmioty profilowe
No. of ECTS points	2.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	8	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 The aim of the course is to introduce students to the nature and role of management in construction.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge Students know and understand the mastered key management concepts related to business.

LO2 Skills Students know and understand the management functions.

LO3 Knowledge Student is able correctly interpret and explain the concepts of business management.

LO4 Knowledge Student is aware that lifelong learning is necessity.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to management.	2
L2	Swot analysis as a strategic planning tool.	2
L3	Management role, skills and functions	2
L4	Lean management and lean construction	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Development project: due diligence analysis	5
P2	Development project: swot analysis	10

7 TEACHING TOOLS

N1 Lecture

N2 Work in groups

N3 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	23
Consultation hours	7
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	8
Developing results	5
Preparing of reports, projects presentations, discussion	5
Total number of hours devoted to the subject	**50**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Team project

F2 Passing lectures

Summary grade

P1 Average from lectures (60%) and projects (40%)

Conditions for passing the course

L1 Positive final rating (3.0 or higher)

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	Etyka
Course name in English	Ethics
Course code	WIL BUD oIS A8 24/25
Course category	Przedmioty ogólne
No. of ECTS points	3.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	30	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Introducing students into fundamental ethical concepts and ideas required for understanding of social and human aspects of technology.

Objective 2 Providing an outline of three types of ethical theories and their achievements: virtue ethics, deontological ethics and ethics based on the idea social utility.

Objective 4 Developing the attitude of professional responsibility and autonomy along with the sensitivity to social and human aspects of technology.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 None

5 LEARNING OUTCOMES

LO1 Knowledge Student explains the aims and methods of ethics, defines the main concepts and problems.

LO2 Skills Student presents and explains the assumptions and achievements of: virtue ethics, deontology and ethics of social utility.

LO3 Knowledge Student describes the principles of engineering ethics end explains their meaning in different cases. Explains the methods and typical cases along with the idea responsibility.

LO4 Skills Student carries out the analysis of ethical aspects of misjudgements improper decisions and disasters, develops correct arguments and searches for the right solutions.

LO5 Knowledge Student actively takes part in discussions, identifies the problems demonstrating the capacity of foreseeing the consequences and the attitude of professional responsibility.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Morality and normative ethics, the aims and methods of ethics, fundamental concepts, ethics and practice in the world of science and technology.	2
L2	Assumptions, methods and achievements of virtue ethics. Development, classical theories, prospects and importance for engineering ethics.	5
L3	Assumptions, methods and achievements of ethics based on the idea of deontological duties. Development, classical theories. Argumentation based on the idea of duties in practice, conflicts of duties and ethical dilemmas, deontological ethics and consequentialism, the importance for engineering ethics.	4
L4	Assumptions, methods and achievements of ethics based on the idea of social consequences. Development, classical theories. Argumentation based on the idea of consequences in practice. The idea of responsibility; responsibility of an agent and universal care, conditions for responsible action.	6
L5	Ethics of engineer in the light of FEANI and other codes. An analysis and model of human action, decision making. The method for case studies.	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L6	Principles of engineering ethics: public safety, the safety and organization of working place, the care for environment, honesty, integrity, loyla and the conflicts of interests, principle of justice and autonomy in management, the duty of professional development and the idea of perfection. Accepting criticism and integrity in professional judgements, the principle of responsibility and its importance.	5
L7	The principles of engineering ethics in practice : designing, constructing, management of systems. Case studies of disasters in civil engineering, {building and bridges) communication, aviation, ecology. The role of professional judgement and positive responsibility in reducing the risk.	4

7 TEACHING TOOLS

N1 Lecture

N2 Multimedia presentation

N3 Discussion

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	15
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	30
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Activity and questions during lectures

Summary grade

P1 Colloquium

Conditions for passing the course

L1 Weighted average of the midterm tests grades

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	Fizyka
Course name in English	Physics
Course code	WIL BUD oIS B8 24/25
Course category	Przedmioty podstawowe
No. of ECTS points	4.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	30	15	15	0	0	0

3 COURSE OBJECTIVES

Objective 1 Course Goal 1. Delivering a concise and systematic overview of fundamentals of physics and applications of modern physics in current technology and engineering.

Objective 2 Course Goal 2. Providing students with an in-depth knowledge on selected topics in physics which are relevant for modern construction and understanding properties of building materials.

Objective 3 Course Goal 3. Providing students with an opportunity to learn elements of metrology, practical aspects of measurements and uncertainties in physics and engineering.

Objective 4 Course Goal 4. Facilitating personal development through the acquisition and use of a wide range of transferable and practical skills.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Prerequisite 1. Basic English communication skills.

2 Prerequisite 2. Having an open mind for new ideas and being prepared for enjoyable and worthwhile studies in the field of physics.

3 Prerequisite 3. Prior courses in physics at a secondary school level are not essential, albeit they may be helpful.

5 LEARNING OUTCOMES

LO1 Knowledge Knowledge of most of the fundamental laws and principles of physics and competence in the application of these principles to diverse areas of engineering, including civil engineering and modern construction.

LO2 Skills Knowledge of scientific theoretical and experimental methods used in physics, understanding uncertainties in measurements with applications in civil engineering.

LO3 Knowledge Ability to solve problems in physics using appropriate mathe- matical and computational tools: ability to identify the relevant physical principles, translate problems into mathematical statements and obtain valid numerical solutions expressed in suitable physical units.

LO4 Skills Ability to execute an experiment or scientific (or engineering) investigation: demonstrating critical analysis of the results and drawing valid conclusions.

LO5 Skills Ability to communicate scientific or engineering information to a range of audiences, discussing scientific problems within the scope of acquired knowledge and producing accurate and concise technical and academic reports based on the lab work or solved problems in physics.

LO6 Knowledge Ability to manage one's work, moivation and time schedule, adopt a responsible attitude towards problems and challenges in a scientific or commercial environment, achieve goals in a logical, organized and ethical manner.

6 COURSE CONTENT

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Determination of acceleration due to gravity using a simple pendulum. Quality of measurements and quality control. Methods of measurements, data analysis, evaluation of experimental results and uncertainties. Significant figures. Standards in presenting experimental data. Assessment methods will include use of e-learning platform PK.	3
L2	Measurement of stress in a loaded cantilever beam.	3

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L3	Light and waves. One of the exercises from the list given below: 1. Properties of light polarization. 2. Determination of sound speed in the air. 3. Measurement of wavelength using a diffraction grating.	3
L4	Properties of solids and liquids. One of the exercises from the list given below: 1. Heat transport. 2. Determination of densities of solids and liquids. 3. Determination of fluid viscosity 4. Measurement of Young's modulus.	3
L5	Modern physics. One of the exercises from the list given below: 1. Studies of magnetic field with a hallotron. 2. Determination of the electrochemical equivalent of hydrogen 3. Identification of atomic spectra using a spectrometer.	3

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Motivation for the physics course. Physics background for engineering. Physics and measurement. Measurements and uncertainties, Dimensional analysis. Conversion of units. Estimates and order-of-magnitude calculations. Significant figures.	2
L2	Mechanics of particles (point-like masses). Motion in one and two dimensions. Position, velocity and acceleration. Instantaneous velocity and acceleration - calculus-based definitions. Motion diagrams. Kinematic equations derived from calculus. Examples: freely falling objects, projectile motion, circular (uniform) motion.	2
L3	The Laws of motion. The concept of force. Inertial frames of reference. Galilean Transformation. Linear momentum conservation law from Newton's laws of motion. Newton's Second Law and its application to physical model analysis - examples. Conditions for an equillibrium state. Newton's Law of Universal Gravitation. Gravitational force: mass and weight. Forces of friction. Motion in the presence of resistive forces. Motion in noninertial (accelerated) frames.	6
L4	Systems and their interaction with environments. Energy of a system. Work done by a constant and varying force. Kinetic energy and the work-kinetic theorem. Potential energy of a system. Conservative and non-conservative forces. Relationship between conservative forces and potential energy. Gravitational potential energy. The Earth density. Gravimetry. Isolated and non-isolated systems. The total mechanical energy conservation law. Power. Collisions. Systems of many particles - the center of mass. Motion of the center of mass. Rocket propulsion.	6
L5	Rigid objects and their motion. Angular position, velocity and acceleration. Angular versus translational quantities. Torque. Equations of motion. Model of a rigid object under a net torque. Moments of inertia. The parallel axis (Huygens-Steiner) theorem. Moment of inertia calculations using calculus and dimensional aanalysis and self-similarity concept.	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L6	Motion in a central force field. Total angular momentum conservation law. Kepler's Laws and the motion of planets. Planet and satellite motion - energy considerations.	2
L7	Static equilibrium and elasticity. Rigid objects in equilibrium. Deformations. Elastic properties of solids. Young's modulus. Sheer modulus. Bulk modulus. Fluid mechanics. Pressure. Pascal's principle. The force exerted on a dam. Buoyant forces and Archimedes's Principle. Fluids and ideal fluids. Fluid dynamics. Bernoulli's equation. Some applications of fluid dynamics. Venturi tube. Torricelli's law. Viscosity. Non-Newtonian fluids.	2
L8	Oscillatory motion. Mass on a spring. A number of masses connected with springs. Damped oscillations. Forced oscillations. The resonance. Wave motion. Travelling waves. Waves on a string. The linear wave equation. The speed of waves. Reflection and transmission. Sound waves. The Doppler effect. Standing waves. Beats. Interference. Light waves.	2
L9	Thermodynamics. Equilibrium, near-equilibrium and non-equilibrium processes. Heat and temperature. Laws of thermodynamics. Entropy. Heat transfer.	2
L10	Modern physics. Special theory of relativity. Lorentz-Fitzgerald transformation. General theory of relativity. Atomic clocks. Global positioning systems and geodesy. Elements of quantum physics. Quantum properties of materials. Applications of quantum physics - modern microscopy.	2

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Methodology of solving problems in physics. Estimating orders of magnitude. Dimensional analysis. Kinematics of point-like mass particles. Motion under constant acceleration. Relationship among position, velocity and acceleration. Making graphs. Uniform circular motion.	3
C2	Finding equilibrium conditions for stationary systems of point-like masses connected with ropes and pulleys. Finding tensions in connecting ropes. Analysis of dynamics of simple mechanical systems. Solving equations of motion with resistive forces.	3
C3	Conservation of linear momentum. Conservation of total mechanical energy. Elastic and inelastic collisions. Ballistic pendulum. Satellite and planetary motion.	3
C4	Calculations of moment of inertia for solids of various shapes. Dynamics of solids rotating around fixed axis. Swinging rod. Galileo's Paradox. Rotational and translational motion. Energy in rotational motion. Equilibrium conditions for a leaning ladder against the wall.	3
C5	Assessment tests. Mid-term test 1, 2 and 3. Tools for remote teaching, including e-learning platform PK will be used.	3

7 TEACHING TOOLS

N1 Lectures, presentations and demonstrations

N2 Tutorials and in-class or remote discussions

N3 Laboratory exercises

N4 Homework and self-study

N5 Consultations

N6 Tools for remote teaching (Teams, e-learning platform Delta PK)

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	15
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	10
Preparing of reports, projects presentations, discussion	10
e-learning platform activities	10
Total number of hours devoted to the subject	**120**
Total number of ECTS points	4.00

9 Methods of grading

The total course outcome (the score) is measured by the outcome index obtained as a weighted average out of various partial grades (e.g. attendance, mid-term tests, physics lab grade, the exam). The index is expressed in per cents. The final grade is assigned according to the linear grading scheme. Assessment methods and the exam will include activities available through dedicated e-learning platforms at the University.

Partial grades

F1 Attendance

F2 Preparation for classes

F3 Performance/activity/answers during classes

F4 Lab reports and the final Physics Lab grade

F5 Mid-term tests

F6 The final exam

Summary grade

P1 The final course grade follows from the grading scheme for obtained score which is a weighted average out of the partial grades.

Conditions for passing the course

L1 Condition 1. Passing grade from lab exercises

L2 Condition 2. Passing grade from tutorials (classes)

L3 Condition 3. Passing grade from the final exam

L4 Condition 4. Performance meet the minimum criteria for the learning outcomes

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	Fundamentowanie
Course name in English	Foundations
Course code	WIL BUD oIS C36 24/25
Course category	Basic
No. of ECTS points	3.00
Semester	5

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

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

3 COURSE OBJECTIVES

Objective 1 Getting to know the classification of foundations and the selection of a foundation to soil conditions

Objective 2 Getting to know the design of direct foundations, check the bearing capacity state and serviceability limit state

Objective 3 Getting acquainted with the design of foundations on piles, checking bearing capacity and serviceability limit state

Objective 4 Getting acquainted with the execution technology of various types of piles

Objective 5 Getting acquainted with the execution technology of diaphragm walls

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Completing the entire course of Soil Mechanics

2 Completing the entire course of Strength of Materials

5 LEARNING OUTCOMES

LO1 Knowledge Student gives the types of foundations and difference of structural solutions

LO2 Skills Student can choose the type of foundation to soil conditions

LO3 Knowledge Student determines the bearing capacity limit state and serviceability limit state for direct foundations

LO4 Skills Students can check the bearing capacity limit state and serviceability limit state for direct foundations according to Polish standards and Eurocode 7

LO5 Skills Student determines the bearing capacity limit state and serviceability limit state for foundations on piles

LO6 Knowledge Students can check the bearing capacity limit state and serviceability limit state for foundations on piles according to Polish standards and Eurocode 7

LO7 Skills Student gives the execution technology of displacement piles screw piles

LO8 Knowledge Student gives the execution technology of diaphragram walls

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Types of foundations. Geotechnical design techniques suitable to geotechnical category.	3
L2	Direct foundations: strip, feet, grates, plates. Bearing capacity limit state according to Polish standard PN-81/B-03020.	3
L3	Direct foundations: strip, feet, grates, plates. Bearing capacity limit state according to Eurokod PN-EN 1997-1	3
L4	Direct foundations. Settlement, serviceability limit state according to Polish standard PN-81/B-03020.	2
L5	Direct foundations. Admissible settlements, serviceability limit state according to standards PN-81/B-03020 and PN-EN-1997-1	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L6	Indirect foundations: on piles, on wells, on diaphragm walls, on caissons. Types and examples.	2
L7	Foundation on piles. Bearing capacity limit state according to Polish standard PN-81/B-03020.	3
L8	Foundation on piles. Bearing capacity limit state according to Eurocode PN-EN 1997-1.	3
L9	Foundation on piles. Bearing capacity limit state according to Polish standard PN-81/B-03020. Exam of the bearing capacity the pile based on static load.	2
L10	Overview of piles technology: drilled piles; displacement piles. Examples of the advantages and disadvantages of each technology.	2
L11	Diaphragm walls. Application and technology execution steps. Examples of implementation as retaining walls and as basement walls.	2
L12	Limit states of special foundations: on walls and on caissons. Summary of the object.	3

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Direct foundation. Bearing capacity limit state according to Polish standard PN-81/B-03020.	3
P2	Direct foundation. Bearing capacity limit state according to Eurocode PN-EN 1997-1.	3
P3	Direct foundation. Consultation and check the individual student project.	1
P4	Foundation on piles. Bearing capacity limit state according to Polish standard PN-83/B-02482.	3
P5	Foundation on piles. Bearing capacity limit state according to Eurocode PN-EN 1997-1.	3
P6	Foundation on piles. Consultation and check the individual student project. Final test.	2

7 TEACHING TOOLS

N1 Lectures

N2 Project tutorials

N3 Team work

N4 Counseling

N5 Discussion

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	7
Exams and tests during session	3
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	15
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 project

F2 Oral mark

F3 Test

Summary grade

P1 Final exam

P2 Weighted average of the positive marks

Conditions for passing the course

L1 The exam may join students who passed the individual projects

L2 The written examination consists of parts of knowledge test and example 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 pass of each effects of training

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	Geologia
Course name in English	Geology
Course code	WIL BUD oIS B9 24/25
Course category	Przedmioty podstawowe
No. of ECTS points	2.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	15	0	15	0	0	0

3 COURSE OBJECTIVES

Objective 1 The course is designed to provide a knowledge to the basic issues of Geology - internal and external processes of the Earth System.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge Student will take knowledge of the Geology as the Earth Science and Earth History and overview of its basic principles. Student gets knowledge about geological materials and processes, know the main minerals and petrographic types of rocks that can be applied as raw materials (building stones, aggregates, clay minerals, salts and other chemical minerals); knows relationships between origin of the rock and its petrographic, structural and textural features and, mechanical properties.

LO2 Skills Student is able to identify, examine and describe basic types of rocks and is able to select proper scientific method and proper tools for practical application.

LO3 Knowledge Student is able to work in a team and plan, share and compile stages of the project and contribution of the team members.

LO4 Knowledge Student will develop valuable skills including critical thinking, written communi- cation, quantitative and technical literacy, teamwork, and problem solving.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	1. Dynamic Earth: course overview, geology overview, geologic time, Earth origins and structure, Earth as a system, the Rock Cycle, Continental Drift, Plate Tectonics	2
L2	Earth Materials: minerals, physical properties of minerals, mineral groups and resources, igneous rocks, magma origen and composition, types of igneous rocks, classification of igneous rocks, sedimentary rocks, types of sedimentary rocks, detrital sedimentary rocks, chemical sedimentary rocks, classification of sedimentary rocks, Sedimentary environments, sedimentary structures, metamorphic Rocks	5
L3	Surface Processes: Weathering & Soils, hydrologic cycle, landslides, streams & floods, groundwater, glaciers & ice ages, atmosphere, climate, deserts	2
L4	Tectonics: volcanoes & other igneous activity, earthquakes and earths interior, seismology, earthquake destruction, seismic waves and earths structure, mountain building, deformation, folds, faults, joints, mountain belts,	5
L5	Elementary soil mechanics: Engineering classification of soils, soil gradation, compaction, consolidation, effective stress, Mechanical and chemical weathering, soil profiles, physical and mechanical properties of soils, Classification of soil particle size and texture,	1

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Mineral Identification: Physical and optical properties of minerals, Structure and classification of silicate minerals, Identify and describe the readily observable properties of minerals and use these properties to identify common minerals with the aid of a flowchart.	2
L2	Igneous Rock Identification: Textures and structures of Igneous rocks, Classification of Igneous rocks Volcanic , Plutonic and Hypabyssal Igneous rocks, Magmatism	2
L3	Sedimentary Rock Identification: Sedimentary structures (Physical structures, Biogenic sedimentary structures, Diagenetic structures), Sedimentary textures (Granulometric analysis, shape and roundness studies, surface textures), Petrography of rocks of clastic, chemical and biochemical origin (Conglomerates, Sandstone, Mudstone, Limestone & Dolomite), Evaporite, Phosphorite, Chert, Iron and Manganese rich sediments, Volcanogenic sedimentary rocks	2
L4	Metamorphic Rock Identification: Grades of Metamorphism, Common minerals of metamorphic rocks, Metamorphic Texture and Structures, Metamorphic facies, Metramorphism types & products	2
L5	Structural Geology/Geologic Maps Interpret and identify the major types of geologic structures (including faults) by completing the subsurface portions of block diagrams given only the outcrop patterns, Identify and describe erosional and depositional fluvial landforms on a map or photographic image.	2
L6	Construction of geological profiles and structural cross section in Geostar, Interpretation of profile sections across the geological maps.	2
L7	Elementary soil mechanics; Engineering classification of soils, index properties.	2
L8	The diagnosis and the description of the geological structure up to investment based on the map	1

7 TEACHING TOOLS

N1 Lectures

N2 Laboratories

N3 Presentations

N4 Practical exercise

N5 Discussion

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	4
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	8
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 Test

F2 Practical exercise

F3 Individual project

F4 Team project

Summary grade

P1 Weighted average of grades

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	Geometria wykreślna
Course name in English	Descriptive Geometry
Course code	WIL BUD oIS C15 24/25
Course category	Basic
No. of ECTS points	3.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Ability to provide representation methods of three-dimensional(3D) objects on a two-dimensional (2D) plane

Objective 2 Ability to "read" 2D drawings and to provide their restitution into a 3D space

Objective 3 Ability to think in a 3D space and to analyze 3D relationships between spatial elements of the constructions. Developing spatial visualization abilities.

Objective 4 Ability to communicate design ideas on the base of graphical representation of the designed structure

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge of basic axioms and theorems of Euclidean geometry

2 Knowledge of basic planimetric constructions, ability to distinguish planimetric form stereometric representations

3 Ability to determine simple 2D and 3D objects

5 LEARNING OUTCOMES

LO1 Knowledge Graduate will know the basic graphical representation methods applied for creating technical documentation of engineering design project.

LO2 Knowledge Graduate will be able to communicate design ideas by using various projection methods to represent designed objects.

LO3 Skills Graduate will be able to "read" technical drawings.

LO4 Knowledge Graduate will gain ability to effectively communicate in a teamwork both at branch-works and at interdisciplinary communities.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Course Introduction & Objectives. Projective Space Definition. Infinite Elements in Projective Space. Projection methods classification and invariants. Multiview projection: U.S Standard and European standard (PN-EN ISO 5456-2: 2002).	3
L2	Mongean Projection Method. Point, line and plane representation. Auxiliary views. Perpendicularity. measuring distances, surface area and dihedral angles.	2
L3	Five Platonic solids - regular polyhedra and their properties.	1
L4	Axonometric projection: oblique and orthographic axonometry. Isometric projection (PN-EN ISO 5456-3:2002).	2
L5	Topographic projection. Point, line and plane representation. Application of the topographic mapping into the earth works. Cuts and fills around a road or a platform. Profile and cross-section construction. Roofs development.	3
L6	Perspective projection method: theory and application (PN-EN ISO 5456-4:2006).	2
L7	Surfaces of revolution and ruled surfaces applied in building constructions: cylinder of revolution, cone of revolution, parabolic - hyperboloid. Sphere and its sections with a plane.	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Multiview projection: U.S Standard and European standard (PN-EN ISO 5456-2: 2002).	1
P2	Sketching as an indispensable element in engineering practice. Lines and curves freehand sketching. Tangential lines to circles. Construction of an ellipse, parabola, hyperbola.	2
P3	Mangena projection: points, lines and planes representation. Basic constructions. Auxiliary Views. True shape and size of plane and True length line. Dihedral angles.	2
P4	The five Platonic solids: a composition made of a tetrahedron, an octahedron and a cube. Designing and modeling.	2
P5	Axonometric projection: orthogonal axonometry of a designed composition of solids. Oblique axonometry of the same composition (PN-EN ISO 5456-3: 2002).	2
P6	Topographic projection. Designing of cuts and fills around a road/ platform construction. Roof design. True shape and size of a roof surface. Dihedral angle between the adjacent roof surfaces.	2
P7	Roof coverings: a rectilinear or a curvilinear patch of surface. 3D Visualization.	2
P8	Perspective projection: perspective drawing of the Platonic solids composition used within L4 (PN-EN ISO 5456-4:2006).	2

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentation

N3 Design exercise

N4 Tasks

N5 Consultation

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	10
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	15
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 Colloquium

F2 Individual project

F3 Tasks

Summary grade

P1 Written exam

P2 Weighted average of the midterm tests grades

Conditions for passing the course

L1 Attendance

L2 Successful completion of all formative assessments

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	Grafika inżynierska
Course name in English	Computer Graphics for Engineers
Course code	WIL BUD oIS C16 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	0	0	0	30	0	0

3 COURSE OBJECTIVES

Objective 1 Capability to create 2D drawing.

Objective 2 Capability to define dynamic blocks.

Objective 3 Capability to prepare template and plot the drawing.

Objective 4 Capability to visualize 3D model.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 None.

5 LEARNING OUTCOMES

LO1 Skills Student is capable of creating 2D drawing. Uses basic drawing tools, such as Grid, Snap, Ortho. Draws using cartesian and polar coordinate systems in relative and absolute coordinates. While drawing uses relative location with respect to objects, polar tracking, tracking relative to objects. Is capable of using Move, Erase, Trim, Break, Offset, Array, Mirror, Copy, Envelope, Area commands.

LO2 Skills Student uses blocks and links. Is capable of defining standard block. Can draw objects with parametric, geometric and dimensional constraints. Can define a dynamic block with attributes. Is capable of editing block attributes. Can extract block data and create a table containing extracted data.

LO3 Knowledge Student is capable of creating a drawing template with layers and liveweights, according to technical drawing's requirements. Student is also capable to properly prepare drawing's layout, using Viewport and Scale commands. Student uses correct paper sheets and knows how to plot the effects of his work.

LO4 Skills Student is capable of drawing 3D objects. Can manage views and local coordinate systems. Knows visual styles. Can create projections and sections of a 3D model.

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Organization of class. Requirements to pass the course. Basics of computer graphics. Basics of AutoCAD drawing environment. File operations. Display. Zoom command and its parameters. Grid, snap, ortho. Relative and absolute coordinates.	2
K2	Drawing basic objects (line, circle) using location and tracking. Location and tracking.	2
K3	Drawing objects: arc, polyline, polygon, points, spline, text, hatching. Divide and measure commands.	2
K4	Managing drawing objects using layers. Dimensioning and annotating a drawing. Dimension styles. Editing text. Object properties.	2
K5	Modifying objects. Methods to create indicator sets. Modify operations: Erase, Move, Rotate, Copy (by offsetting, single, multiple; using axial and central symmetry), Trim, Lengthen, Chamfer, Fillet. Questions.	2
K6	Modifying objects - continued.	2
K7	Test no 1 - drawing and modification of 2D geometry (45'). Drawing using parametric, geometrical and dimensional constraints.	2

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K8	Preparation of plotting sheet with one viewport of drawing. Dimensioning, scale.	2
K9	Block definition, inserting blocks. Dynamic blocks.	2
K10	Preparation of plotting sheet with several viewports of drawing. Dimensioning in viewports. Data extraction. Tables.	2
K11	Preparation of plotting sheet with several viewports of drawing - continued.	2
K12	Test no 2 - Plotting the sheet with several viewports (90′).	2
K13	Introduction to 3D modelling - surfaces and solid modelling. Managing viewports and coordinate systems in 3D. Visual styles. Exercises in solid modelling: solid primitives, simple extrusion, rotation, basic editing (union, difference, sum).	2
K14	Exercises in 3D modelling, continued. Section and Slice. Complex extrusion. Creating projections and sections based on the 3D model. Dimensioning in 3D.	2
K15	Solid modelling, creating projections and sections based on the 3D model. Summary of the course.	2

7 TEACHING TOOLS

N1 Design exercise

N2 Consultation

N3 Discussion

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 project

Summary grade

P1 Weighted average of the midterm tests grades

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	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	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

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	Komputerowe wspomaganie Fizyki Budowli
Course name in English	Computer Aided Building Physics
Course code	WIL BUD oIS E4162 24/25
Course category	Subjects related to Diploma Projects
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	0	0	0	15	0	0

3 COURSE OBJECTIVES

Objective 1 Familiarizing the students with computer software supporting basic calculations connected with heat and humidity transport through the building components.

Objective 2 Familiarizing the students with the principles of selection of 2D and 3D geometry model to calculate heat flux and surface temperatures

Objective 3 Presentation of restrictions and simplifications used in modelling.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Positive result of final test of Building Physics

5 LEARNING OUTCOMES

LO1 Knowledge Student knows standards and guidelines of the detailed calculation of thermal bridges and their influence on thermal balance.

LO2 Skills Student knows computer programs supporting calculation of heat and humidity transport through the building components.

LO3 Knowledge Student is able to use the selected computer programs supporting decisions of proper selection of building partitions.

LO4 Skills Student is able to critically evaluate the results of numerical analysis of mass transport and energy balance for building component.

LO5 Knowledge Student draws conclusions and describes the results of own work.

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	COURSE CONTENT 1 Introduction: Thermal bridges, heat flux, surface temperature - calculation methods.	2
K2	COURSE CONTENT 2 Calculation of total transmission losses including the influence of thermal bridges. Calculation of linear thermal transmittance using interactive catalog of Kobra Program.	5
K3	COURSE CONTENT 3 Principles of modeling of 2D thermal bridges in THERM program. Calculation of linear thermal transmittance for three different thermal bridges in the analyzed building.	5
K4	COURSE CONTENT 4 Simulation of dynamic phenomena of temperature and humidity transport in the building components using WUFI program. Interpretation of the results of computer calculations.	3

7 TEACHING TOOLS

N1 Presentations

N2 Computer exercises

N3 Consultations

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	3
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	3
Developing results	3
Preparing of reports, projects presentations, discussion	2
Total number of hours devoted to the subject	**28**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Individual exercise (project)

F2 Report presenting results

Summary grade

P1 Oral 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	Komunikacja interpersonalna
Course name in English	Interpersonal Communication
Course code	WIL BUD oIS A6 24/25
Course category	Przedmioty ogólne
No. of ECTS points	3.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	30	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Understanding of interpersonal communication process and acquiring knowledge how to communicate more effectively with other people.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 None

5 LEARNING OUTCOMES

LO1 Knowledge Concerning interpersonal communication process

LO2 Skills Concerning variety of communication and self-presentation techniques.

LO3 Knowledge Understanding different elements of interpersonal communication process.

LO4 Knowledge Verbal and non verbal communication and self-presentation skills, active listening.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to interpersonal communication.	2
L2	Impression management strategies of self-presentation.	2
L3	Variety of interpersonal relationships.	2
L4	How personality influences on interpersonal communication?	2
L5	Perception in communication.	2
L6	6 Interpersonal attraction.	2
L7	How to be a good listener?	2
L8	Verbal communication.	3
L9	Nonverbal communication.	3
L10	Effective resolving conflicts.	2
L11	Influence on others how to make people to do what we want?	2
L12	Communication and cultural diversity.	2
L13	Formal emails - how to write to university staff.	2
L14	Savoir vivre in everyday life.	2

7 TEACHING TOOLS

N1 Discussion

N2 Lecture

N3 Multimedia presentation

N4 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	30
Consultation hours	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	0
Developing results	0
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**30**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Practical exercise

Summary grade

P1 Weighted average of the midterm tests grades

Conditions for passing the course

L1 Obtaining a positive summative 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	Konstrukcje betonowe
Course name in English	Concrete Structures
Course code	WIL BUD oIS C41 24/25
Course category	Basic
No. of ECTS points	7.00
Semester	5 and 6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
5	30	0	0	0	30	0
6	15	0	15	0	15	0

3 COURSE OBJECTIVES

Objective 1 Cognition of mechanical characteristics for concrete and reinforcing steel, understanding the conditions of their co-operation in reinforced concrete structures and basic requirements formulated for such structures

Objective 2 Recognition of codes principles and methods for safety, durability and serviceability assurance in the design process

Objective 3 Learning the basis of reinforced concrete structures design according to Limit States Method within the range of: bending, shear, compression, tension, punching shear, together with appropriate codes regulations. Recognition of principles for Ultimate Limit States verification

Objective 4 Recognition of Serviceability Limit States and simplified methods of crack width and deflection verification

Objective 5 Cognition of phenomena connected with slenderness and second order effects and their consideration in reinforced concrete compressed members design

Objective 6 Getting familiar with the methodology of simple laboratory tests and the course of actions taken while testing on the example of reinforced and prestressed concrete beams

Objective 7 Mastering the basis of reinforced concrete elements detailing and working out the structural drawings

Objective 8 Shaping the professional responsibility of structural engineer

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Passing preceding subjects. For semester V: Theoretical mechanics, Technical drawings, Engineering graphics, Building materials, Concrete technology, Strength of materials, Mechanics of structures. b. Passing preceding subjects. For semester VI: Theoretical mechanics, Technical drawings, Engineering graphics, Building materials, Concrete technology, Strength of materials, Mechanics of structures, Concrete structures (semester V).

2 Passing preceding subjects. For semester VI: Theoretical mechanics, Technical drawings, Engineering graphics, Building materials, Concrete technology, Strength of materials, Mechanics of structures, Concrete structures (semester V).

5 LEARNING OUTCOMES

LO1 Knowledge Student knows mechanical characteristics and material models used for reinforced concrete structures, basic rules of materials co-operation and questions of bond between concrete and reinforcing steel

LO2 Skills Student can apply basic rules and methods of safety, serviceability and durability assurance within the design process for reinforced concrete structures according to appropriate valid codes

LO3 Knowledge Student can select initial dimensions of rc elements, set the appropriate actions and combinations of actions, carry out static calculations, verify load-bearing capacity for simple structural elements and produce structural drawings

LO4 Skills Student is able to check Serviceability Limit States for reinforced concrete elements using simplified methods

LO5 Skills Student knows the questions of slenderness and second order effects influence onto behavior of compressed rc elements

LO6 Knowledge Student knows codes detailing rules for the following reinforced concrete elements: slabs, beams, columns, foundation footings, stairs, frames

LO7 Skills Student knows the phases of work and the course of tests conducted for reinforced concrete and prestressed concrete beams, as well as the basic equipment used and measuring techniques applied while conducting laboratory tests

LO8 Social competencies Student is aware of responsibility for structure design correctness and of necessity to improve professional competencies

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Definition and qualification of concrete structures. Basic characteristics for concrete and reinforced concrete structures. Mechanical properties for concrete and reinforcing steel. Requirements for materials. Co-operation between concrete and steel - bond and anchorage.	4
L2	Basic requirements for concrete structures. Limit states method. Criteria for safe and durable concrete structure. Characteristic and design values, safety coefficients.	2
L3	Ultimate limit states (ULS) for bending - phases of work for bent element. Simplified method of verification for ULS according to design assumptions, rectangular and T-beam croos-sections, single- and double-reinforced cross-sections. Designing and checking the capacity of elements under bending. detailing conditions for bent elements	8
L4	ULS for shear. Scheme for shear zone failure, reliable cross-sections for checking the shear capacity. Design conditions for shear. Ultimate values of shear force. Designing and checking capacity for shear. Shear reinforcement between slab and beam. Detailing rules for shear reinforcement (stirrups, bent-up bars)	6
L5	Serviceability limit states (SLS). deflections of rc elements, limit admissible values of deflection, verification of SLS for deflection by simplified method. Cracks in RC structures - crack occurrence, checking crack width with simplified method.	4
L6	Examples of typical structural elements (one-way slabs, beams) - geometry and reinforcement course	6
L7	ULS for compression - eccentrically loaded elements. Buckling, effective length, second order effects, eccentricities, critical load. Methods of design for compressed elements with taking into account the second ordere effects. Designing and checking capacity for cases of big and small eccentricities. Detailing conditions for columns	5
L8	Eccentrically tensiled elements. ULS for tension - equilibrium equations for cross-section.	2
L9	ULS for punching shear - checking the capacity for un-reinforced elements	2
L10	Reinforced concrete monolithical stairs - static behavior and detailing	2
L11	Examples of typical structural elements (two-way slabs, columns, foundation footings, rc frames) - geometry and reinforcement course	4

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

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of slab-beam floor. Static calculations and dimensioning. Design of one-way slab under bending. Design of beam for bending and shear. Checking SLS by simplified methods. Producing structural drawings for slab and beam with taking into account the beam load-bearing envelope.	30
P2	Design of monolithical frame for multi-story building (continuation of theme from semester V). Static calculations for frame. Designing of columns. Designing of foundation footings loaded eccentrically. Structural drawing for columns and footings.	15

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Laboratory tests for reinforced and prestressed concrete beams	15

7 TEACHING TOOLS

N1 Lecture

N2 Design exercise

N3 Laboratory exercise

N4 Multimedia presentation

N5 Consultation

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	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	5
Preparing of reports, projects presentations, discussion	70
Total number of hours devoted to the subject	**210**
Total number of ECTS points	7.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Colloquium

F3 Report on the laboratory exercise

Summary grade

P1 Written exam

P2 Weighted average of the midterm tests grades

Conditions for passing the course

L1 Exam may be taken only by those students who pass design workshops (design part and colloquium) and laboratory workshops

L2 Exam (in writing) include two parts: test and design exercise

L3 Final mark is weighted average from marks from; 1/ design workshops, 2/laboratory workshops, 3/written exam (in semester VI)

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	Konstrukcje drewniane
Course name in English	Timber Structures
Course code	WIL BUD oIS C35 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	5

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

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

3 COURSE OBJECTIVES

Objective 1 Familiarize students with the timber materials and their properties

Objective 2 Familiarize students with simple timber solid structures and with designing structures based on carpentry connections

Objective 3 Familiarize students with the rules of creating documentation of timber structures

Objective 4 Development of the skill of working in project teams

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Strength of Materials

2 Fundamentals of Civil Engineering

3 Structural Mechanics

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the material properties of the timber and is able to use this knowledge to design timber structures

LO2 Skills Student is able to analyze the simple timber structure made of solid wood (floor, stairs, rafter framing)

LO3 Knowledge Student is able to design connections in timber structure (carpentry joints and with basic engineering metal dowel type fasteners - nails, screws etc)

LO4 Skills Student is able to prepare the technical documentation of the designed timber structures

LO5 Knowledge Student knows how to work in a small project team

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of timber floor	10
P2	Design of timber stairs	10
P3	Design of timber rafter framing	10

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction, terms of passing the subject, important references and codes	1
L2	Timber morphology and properties (moisture, density, strength etc.)	4
L3	Engineered wood products - short description of wood based products (glulam, CLT, LVL, PSL, plywood, OSB, SIP)	1
L4	Structure analysis - main primciples for ULS according to Eurocode 5	5

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	Structure analysis - SLS according to Eurocode 5 (deflection of the structure)	2
L6	Connections in timber structures - carpentry joints, short description of metal dowel type connectors (nails, screws, bolts, dowels, staples)	2

7 TEACHING TOOLS

N1 Design Exercises

N2 Lectures

N3 Multimedia presentations

N4 Group work

N5 Consultations

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	5
Developing results	0
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Written tests

F2 Project in groups

Summary grade

P1 Weighted average of the tests grades and the 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	Konstrukcje metalowe II
Course name in English	Metal structures II
Course code	WIL BUD oIS E3172 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	6.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 To acquaint the students with the complex issues of designing steel bar structures

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Issues of the full course of Metal Structures

5 LEARNING OUTCOMES

LO1 Knowledge Individual supplementing and expanding knowledge of metal structures

LO2 Knowledge of the problems of designing and exploitation of simple steel bar structures

LO3 Knowledge of designing metal structures from materials other than steel S235 / 275 / 355

LO4 Skills Analysis of complex cases of stability of steel bar structures based on numerical analysis and standards

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design project of two-levels two-bays steel frame	30

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Advanced aspects of design of steel bar structures.	3
L2	Problems during the design, erection and exploitation of steel structures; reinforcing of steel structures.	4
L3	Introduction to the design of steel bearing piles and steel sheet piles.	2
L4	Stainless steel and high strength steel.	2
L5	Introduction to the design of aluminum structures.	2
L6	Introduction to the design of steel-concrete composite structures.	2

7 TEACHING TOOLS

N1 Lectures

N2 Design exercises

N3 Consultations

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	30
Exams and tests during session	30
Hours of autonomous student work	
Preparing for classes, studying literature	0
Developing results	45
Preparing of reports, projects presentations, discussion	30
Total number of hours devoted to the subject	**180**
Total number of ECTS points	6.00

9 Methods of grading

Partial grades

F1 Individual project

Summary grade

P1 Colloquium

Conditions for passing the course

L1 Individual project completed at least 3.0 (E)

L2 Colloquium completed at least 3.0 (E)

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	Konstrukcje metalowe
Course name in English	Metal Structures
Course code	WIL BUD oIS C42 24/25
Course category	Basic
No. of ECTS points	7.00
Semester	5 and 6

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
5	30	0	15	0	15	0
6	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 To acquaint the students with system of European standards for the design and manufacture of metal structures

Objective 2 To acquaint the students with procedures of dimensioning and execution of simple structural systems: beams, columns and one-level frames

Objective 3 To acquaint the students with issues of dimensioning and execution of joints and connections of steel members

Objective 4 To prepare the students to scientific research

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Issues of the full course of Strength of Materials and the first semester of Structural Mechanics

5 LEARNING OUTCOMES

LO1 Knowledge Individual supplementing and expanding knowledge of metal structures.

LO2 Knowledge of standards for the design of steel bar structures under static loads.

LO3 Knowledge Development of a structure model, load statement, interpretation of FEM program results, load capacity verification based on standards.

LO4 Skills Basic information on the design of aluminum structures.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of steel roof made on lattice girders, purlins and bracings	15
P2	Design of technological platform made of hot-rolled I-beams	15
P3	Design of a single-bay workshop hall without gantries, made of hot-rolled I-beams	15

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Metallurgical processes, selected issues of metallurgy of steel and aluminum, steel and aluminum products	2
L2	Mechanical properties of structural steels and aluminum alloys used in Civil Engineering	2
L3	Introduction to Eurocodes	2
L4	Cross-section classes of steel members	2
L5	Stability of simple steel members	2
L6	Imperfections in steel structures	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L7	Corrosion protection and fire protection of steel structures	2
L8	Rules for shaping of steel structures	4
L9	Lattice girders	2
L10	Bracings in steel structures	2
L11	Steel beams	4
L12	Steel columns	2
L13	Introduction to issues of joints and connections in steel structures	2
L14	Stiffness of steel joints	2
L15	Welds	4
L16	Welded and bolted joints and connections	9

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Geometrical characteristics of hot-rolled steel members	3
L2	Geometrical characteristics of welded steel and aluminum I-beams	3
L3	Tests of mechanical characteristics of steel and aluminum	5
L4	Microcrystalline structure of steel and aluminum	2
L5	Non-destructive testing of weld quality	2

7 TEACHING TOOLS

N1 Design exercises

N2 Lectures

N3 Consultations

N4 Work in groups

N5 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	105
Consultation hours	10
Exams and tests during session	20
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	30
Preparing of reports, projects presentations, discussion	15
Total number of hours devoted to the subject	**210**
Total number of ECTS points	7.00

9 Methods of grading

Partial grades

F1 Individual design projects

F2 Reports from laboratories

Summary grade

P1 Exam

Conditions for passing the course

L1 All individual projects completed at least 3.0 (E)

L2 Exam completed at least 3.0 (E)

L3 All reports from laboratories completed at least 3.0 (E)

Assessment of activity without teacher participation

B1 Individual projects

B2 Reports from laboratories

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	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	Konstrukcje murowe
Course name in English	Masonry Structures
Course code	WIL BUD oIS C34 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	5

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

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

3 COURSE OBJECTIVES

Objective 1 Knowledge of the rules concerning the basics of designing of unreinforced masonry structures.

Objective 2 Knowledge of the principles of execution and quality control of masonry structures.

Objective 3 Ability to select appropriate structural materials and solutions for masonry walls and piers construction and use methods of design of masonry structural elements.

Objective 4 Ability to responsible design of masonry structures.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Fundamentals of Civil Engineering, Building materials, Technical drawing, Strength of materials, Structural mechanics (1)

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the rules concerning designing and detailing of typical masonry structural elements for low-rise buildings.

LO2 Skills Student knows the basic requirements applied for construction and execution of masonry buildings.

LO3 Knowledge Student is able to apply in practice the principles of design and dimensioning of selected masonry structural elements for buildings.

LO4 Knowledge Student is able to carry out a masonry structure design project with full responsibility.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of masonry structure of a low-rise residential building. Choice of structural form and selection of main structural materials. Ultimate Limit State (STR) verification of masonry walls/piers in accordance with current regulations and applicable codes of practice.	15

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Historical and contemporary masonry - brief history of masonry. Masonry walls and structures types, masonry structural elements - basic terms and definitions connected with masonry structures.	4
L2	Structural systems and materials in masonry buildings. Mechanical properties of masonry.	2
L3	Principles of one- and multi-layer wall design and detailing.	1
L4	Loads acting on masonry structure of a building. Statement of loads acting on walls and piers.	2
L5	Methods of designing masonry elements - models, limit states verification.	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L6	Detailing and execution requirements according to the codes.	2

7 TEACHING TOOLS

N1 Lecture

N2 Design exercise

N3 Consultation

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	10
Developing results	10
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Colloquium

F2 Individual project

F3O online tasks

Summary grade

P1 Weighted average of the midterm tests grades

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	Konstrukcje stalowe cienkościenne
Course name in English	Thin-walled steel structures
Course code	WIL BUD oIS E3161 24/25
Course category	Subjects related to Diploma Projects
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	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Students are introduced to the design procedures and principles of constructing thin-walled steel structures

Objective 2 Preparing the student to solve engineering tasks and participate in scientific works and research

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Metal Structures

5 LEARNING OUTCOMES

LO1 Knowledge Acquiring knowledge of the design principles of ultimate and serviceability limit states of steel halls

LO2 Skills Acquiring knowledge of the design principles of ultimate limit states and serviceability of cold-formed purlins

LO3 Knowledge Acquiring skills in shaping the geometry of single-nave steel halls

LO4 Skills Acquiring the ability to choose construction solutions for light steel elements

LO5 Knowledge The student is able to supplement and expand knowledge of thin-walled structures

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Assortment of steel products from thin sheets, examples of thin-walled steel constructions	1
L2	Global, local and distortion stability issues for thin-walled steel elements	3
L3	Design and modern methods of static and strength analysis of one-story single-aisle steel halls	4
L4	Load-bearing conditions of steel cross-sections and thin-walled bars in simple and complex stress distribution according to PN-EN 1993-1-3	3
L5	Ultimate and serviceability Limit states of purlins restrained by sheeting	4

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of a steel hall made of thin-walled elements	20
P2	Design of beams restrained by sheeting	10

7 TEACHING TOOLS

N1 Lectures

N2 Design exercises

N3 Consultations

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	0
Hours of autonomous student work	
Preparing for classes, studying literature	5
Developing results	21
Preparing of reports, projects presentations, discussion	2
Total number of hours devoted to the subject	**75**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Design exercises

F2 Oral exam

Summary grade

P1 Weighted average of formulating grades

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	Konstrukcje żelbetowe w budownictwie miejskim i przemysłowym I
Course name in English	Reinforced Concrete Structures in Urban and Industrial Building I
Course code	WIL BUD oIS E1161 24/25
Course category	Subjects related to Diploma Projects
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	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Knowledge and practical skills pertinent to simple issues in design of RC structures

Objective 2 Knowledge and practical skills pertinent to shaping and modelling 2 and 3 D structures using traditional and computer methods

Objective 3 Shaping professional responsibility of building engineer

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Prerequisites: Strength of Materials, Structural Mechanics, Concrete Structures

5 LEARNING OUTCOMES

LO1 Knowledge pertinent to theory of thin plates bending moment - curvature relations, load - shear force - bending moment relations, boundary conditions, moment distribution in rectangular plates

LO2 Skills pertinent to shaping, modelling, computation of internal forces, dimensioning and detailing of RC plates

LO3 Knowledge Practical skills: ability of shaping, modelling, computation of internal forces, dimensioning and detailing of RC multi-panel floor

LO4 Social skills: awareness of professional responsibility for structural design, aware- ness of importance of upgrading professional skills

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design pertinent to diploma thesis (accepted by diploma supervisor) - multipanel RC floor: shaping, modelling, load list, computations of internal forces, dimensioning (ULS), detailing	30

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Theory of thin elastic plates: kinematic relations, physical relations, moment-curvature relations, load - shear force - bending moment relations	4
L2	Theory of thin elastic plates: boundary conditions, moment distribution for rectangular plates	2
L3	Two-way RC slabs: shaping, load combinations, modelling, computations of internal forces, dimensioning (ULS)	4
L4	Two-way RC slabs: detailing, openings, corners	2
L5	Traditional and computer modelling of RC structures	3

7 TEACHING TOOLS

N1 Lecture

N2 Multimedia presentation

N3 Consultation

N4 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	0
Hours of autonomous student work	
Preparing for classes, studying literature	15
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 Design assignment

F2 Test

Summary grade

P1 final grade = average of design assignment + test

Conditions for passing the course

L1 Handing over design assignment

L2 Passing 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	Konstrukcje żelbetowe w budownictwie miejskim i przemysłowym II
Course name in English	Reinforced Concrete Structures in Urban and Industrial Building II
Course code	WIL BUD oIS E1172 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	6.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Knowledge and practical skills pertinent to simple issues in design of RC structures

Objective 2 Knowledge and practical skills pertinent to shaping and modelling 2 and 3 D structures using traditional and computer methods

Objective 3 Shaping professional responsibility of building engineer

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Prerequisites: Strength of Materials, Structural Mechanics, Concrete Structures, RC Structures in Urban and Industrial Building I

5 LEARNING OUTCOMES

LO1 Knowledge of bracing and stiffening elements in RC skeleton systems: shear walls, stiffening cores; knowledge of retaining walls, knowledge of strip and raft (mat) foundations

LO2 Knowledge of RC elements loaded in 2 directions: beams, columns, spread footings; knowledge of RC stairs, landings, ramps, lift shafts

LO3 Knowledge Practical skills: ability of shaping, modelling, computation of internal forces, dimensioning and detailing of RC plane or 3 D skeleton system

LO4 Social skills: awareness of professional responsibility for structural design, aware- ness of importance of upgrading professional skills

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design pertinent to diploma thesis (accepted by diploma supervisor) : shaping, modelling, computation of internal forces, dimensioning (ULS) and detailing of RC plane or 3 D skeleton system	30

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Bracing and stiffening elements in RC skeleton systems: shear walls, stiffening cores	2
L2	RC retaining walls	4
L3	RC strip and raft (mat) foundations	3
L4	RC elements loaded in 2 directions: beams, columns, spread footings	4
L5	RC stairs, landings, ramps, lift shafts	2

7 TEACHING TOOLS

N1 Lecture

N2 Multimedia presentation

N3 Consultation

N4 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	0
Hours of autonomous student work	
Preparing for classes, studying literature	45
Developing results	0
Preparing of reports, projects presentations, discussion	90
Total number of hours devoted to the subject	**180**
Total number of ECTS points	6.00

9 Methods of grading

Partial grades

F1 Design assignment

F2 Test

Summary grade

P1 final grade = average of design assignment + test

Conditions for passing the course

L1 Handing over design assignment

L2 Passing 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	Konstrukcje zespolone mostowe i inne
Course name in English	Composite structures for bridges
Course code	WIL BUD oIS E3272 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	6.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Introduction of the basic concepts in the field of composite structures with focus on bridge structures.

Objective 2 Understanding and classication of modern structures and methods of construction of bridge composite structures.

Objective 3 Introduction students with modern trends in building of composite bridges and skeletal/frame buildings.

Objective 4 Possessing of basic knowledge on structural analysis used during the design and analysis of composite bridge elements, characteristics and load carrying capacity calculations.

Objective 5 Developing the ability to team solving construction and calculation problems.

Objective 6 Preparing the student for scientific work and scientific research by acquiring the ability to solve engineering tasks, modeling and analysis of the work of the structure.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Concrete structures

2 Steel structures

3 Structural mechanics

4 Strength of materials

5 LEARNING OUTCOMES

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

LO2 Knowledge on design and construction of composite steel-concrete 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 steel-concrete composite bridge to EC (set of conceptual drawings of the bridge, combinations of actions, structural analysis, calculations for ultimate limit states and serviceability limit states)

LO5 Knowledge Ability to effectively work in teams, lead a team or be a part of a design team. The student gains social competences - the student cooperates in a team. The student is basically prepared for scientific work and scientific research.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to the subject: construction solutions, nomenclature. Short presentation of textbooks. Historical introduction.	1
L2	Composite solutions in concrete-to-concrete and concrete-to-steel structures, connector types - part 1 bridge structures.	1
L3	Materials (concrete, reinforcing steel, structural steel, connecting devices), durability (Corrosion protection at the steel concrete interface in bridges)	1
L4	Composite bridges: typical construction methods, execution phases, solutions of cross sections.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	Analysis of selected bridge and general construction solutions.	1
L6	Use of composite structures in general construction: beams, structures ceiling slabs, pillars.	1
L7	Determination of the basic characteristics of a composite girder sections.	1
L8	Effects of shrinkage, creep and temperature in composite structures.	1
L9	Solutions for important structural details in composite bridges and civil/general structures.	1
L10	Discussion of the principles, rules and formulae contained in EC4 - buildings part 1	1
L11	Discussion of principles, rules and formulae contained in EC4 - bridges part 2	1
L12	Composite structures based on the use of corrugated sheets.	1
L13	Composite structures: concrete-to-concrete type: structural solutions, calculation principles, erection techniques, connectors, examples.	1
L14	Composite structures: wood-concrete: structural solutions, calculation principles, erection techniques, fasteners, examples.	1
L15	Modern trends in the use of various composite materials in nowadays structures.	1

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Setting up the structural form, communication layout on the bridge, location of the bridge and selecting the main accessories of the bridge	2
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 other when applicable). Calculations carried out for the deck and main girders	4
P4	Detailed structural calculations for RC deck (ULS and SLS to be considered)	2
P5	Detailed structural calculations for main steel-concrete composite girder (ULS and SLS to be considered)	10
P6	Execution of selected detailed drawings and preparation of final report.	6

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Discussion

N4 Design exercises

N5 Consultation

N6 Group 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	9
Exams and tests during session	0
passing the project	1
Hours of autonomous student work	
Preparing for classes, studying literature	40
Developing results	40
Preparing of reports, projects presentations, discussion	45
Total number of hours devoted to the subject	**180**
Total number of ECTS points	6.00

9 Methods of grading

The grading methodology uses an assessment of the student's oral response to a specific question and an assessment of free speech on the subject.

Partial grades

F1 Individual assessment from a team project

F2 Activity during classes

Summary grade

P3 Weighted average of formulating grades

Conditions for passing the course

L1 Positive assessment of the project

L2 Positive assessment of lecture activity

Assessment of activity without teacher participation

B1 passing the presentation

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	Kontrola i zarządzanie jakością w produkcji materiałow i wyrobów budowlanych
Course name in English	Quality control and management in the process of building materials and products manufacturing
Course code	WIL BUD oIS E2172 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	2.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 To acquaint students with the quality definitions and with the basic knowledge of quality management systems

Objective 2 Provide students with the basic knowledge regarding the scope of the required conformity assessment procedures as well as construction products marking in order to placed them on the market

Objective 3 To acquaint students with the legal and technical aspects of the production and sale of construction products and application of building regulations

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge of subjects: Building Materials and Concrete Technology

5 LEARNING OUTCOMES

LO1 Knowledge A student understand and defines the term "quality" and quality management principles.

LO2 Skills A student understand and defines the methods of construction products marking.

LO3 Knowledge A student understand and explains the procedures for assessing conformity of construction products.

LO4 Skills A student can find provisions relating to the discussed issues and apply them in a specific case of construction product.

LO5 Knowledge A student is responsible for reliable preparation of a presentation and its interpretation.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Development of quality idea and definitions of the "quality" term.	2
L2	Presentation of the structure of ISO 9000 standards and the process approach to quality management system.	3
L3	Documentation of quality management system.	2
L4	Legislative base of free products movement within the European Union - CE marking. Construction Products Regulation 305/2011 - basic definitions and content.	2
L5	Basic requirements for construction works. The basic principle of construction products CE marking carried out in accordance with the Regulation: system assessment and verification of constancy of performance, Factory Production Control and a product type testing.	2
L6	Declaration of performance of construction products submitted by the manufacturer, FPC certificate and a certificate of product conformity. Basic principles of national supplementary conformity system of construction products - building mark.	2
L7	Market surveillance of construction products, the scope of activities of the Authority Building Control.	2

7 TEACHING TOOLS

N1 Lecture

N2 Presentation

N3 Consultations

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	10
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	15
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

Obtaining a positive grade in the subject determines the achievement of all learning outcomes specified for the subject, meeting the criteria for at least 3.0.

Partial grades

F1 Test

F2 Presentation

Summary grade

P1 Weighted arithmetic mean of forming notes

Conditions for passing the course

L1 Obtaining both positive forming notes

Assessment of activity without teacher participation

B1 Presentation

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	Kosztorysowanie
Course name in English	Cost Estimation
Course code	WIL BUD oIS C37 24/25
Course category	Basic
No. of ECTS points	2.00
Semester	5

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

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

3 COURSE OBJECTIVES

Objective 1 To provide students with information related to the quantity surveying in construction projects. To get students acquainted with methods of cost estimation. To familiarize students with various types of cost analyses carried out during construction project.

Objective 2 To get students acquainted with applied formulas of cost estimation. To familiarize students with cost estimation elements. To familiarize students with sources of technical and financial information required in cost estimation. To prepare students (at a basic level) to take part in research within the field of construction cost management.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge on building materials.

2 Knowledge on types of building structures and their elements.

3 Knowledge on technology of construction works.

5 LEARNING OUTCOMES

LO1 Knowledge Basic knowledge within the field of quantity surveying and cost estimation.

LO2 Skills Basic knowledge on applied types of cost analyses carried out during construction project.

LO3 Knowledge Ability to solve basic problems within the field of quantity surveying. Ability to estimate cost of a simple construction element. Ability of basic analyses of cost data.

LO4 Knowledge Ability to solve simple cost estimation problem working alone or in team. Being responsible for obtained results of cost estimations.

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Taking-off and quantity analyses of simple construction elements.	4
K2	Cost estimations of simple construction elements.	7
K3	Analysis and presentation of quality analyses and cost estimations results.	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to quantity surveying. Definitions and concepts of cost estimation in construction projects.	2
L2	Quantity take-off. Problem of measuring quantities of construction works. Methods of quantity measuring. Sources of technical information for cost estimation. Workshop on quantity take off.	3
L3	Elements of cost estimation. Direct costs, indirect costs and profit. Sources of information about the demand for resources for cost estimation. Sources of financial information for cost estimation.	3

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L4	Cost estimation methods and formulas according to standards applied in Poland. Simplified method and detailed methods of cost estimation. Workshop on cost estimation.	3
L5	Legal conditions and principles of cost estimation for public procurement in Poland.	1
L6	Types of cost estimation documents regarding the objectives of cost estimation process. Functions of cost estimation documents. Chosen problems of quantity measuring, quantity surveying and cost estimation.	3

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Computer laboratory tasks

N4 Workshops

N5 Discussion

N6 Other

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	3
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	5
Preparing of reports, projects presentations, discussion	5
Total number of hours devoted to the subject	**58**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Reports from computer laboratory tasks and assignments.

Summary grade

P1 Final test

Conditions for passing the course

L1 Completion of all of the computer laboratory tasks within the deadlines.

L2 Positive grade on final test.

Assessment of activity without teacher participation

B1 Assessment of the reports and involvement in the discussion

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	Koszty cyklu życia budynku
Course name in English	Life cycle cost of building
Course code	WIL BUD oIS E7172 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	6.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Introduce students to the stages of the life cycle of a building

Objective 2 An introduction to the issues of activities undertaken by a construction engineer at individual stages the building’s life cycle and related costs

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the stages of the life cycle of the building

LO2 Skills Student is able to estimate the costs incurred in individual stages of the building life cycle

LO3 Knowledge The student is able to estimate the cost of renovation work carried out in the building

LO4 Knowledge The student can formulate opinions on the LCC

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Determining the life cycle costs of a building using various methods calculation	10
P2	Calculation of building design documentation costs	5
P3	Calculation of building renovation costs	10
P4	Calculation of building demolition works costs	5

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	The stages and phases of the building's life cycle and their costs	4
L2	Methods of the life cycle cost of a building calculation	3
L3	Costs of preparing building design documentation	2
L4	Costs incurred during the building operation phase	2
L5	Renovation costs	2
L6	Life cycle costing problems	2

7 TEACHING TOOLS

N1 Consultations

N2 Lectures

N3 Exercises

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	15
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	30
Preparing of reports, projects presentations, discussion	30
Total number of hours devoted to the subject	**152**
Total number of ECTS points	6.00

9 Methods of grading

Partial grades

F1 Project

Summary grade

P1 written 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	Kształtowanie budynków niskoenergetycznych
Course name in English	Low Energy Building Enclosure
Course code	WIL BUD oIS E4173 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	2.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Introduction of the basic principles of energy use and balance.

Objective 2 Detailed solutions of low energy building design.

Objective 3 Computational assessment methods and aspects of the building components.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Credits for the course: Building Physics.

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the basic rules of design and construction of low energy building.

LO2 Skills Student is able to make the appropriate design decisions regarding a low energy building and its structural details.

LO3 Knowledge Student understands importance of sustainable development and sustainable building design

LO4 Skills Student knows how to check basic requirements regarding heat and moisture.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Heat transfer basic issues, component and whole building approach. Formal requirements.	4
L2	Material thermal features for stationary and transient analysis.	4
L3	Selected building components: walls and flat roofs. Detailed design.	4
L4	Low energy building design rules of thumb and examples. Specific solutions.	3

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design of low energy building enclosure - material and component selection, detailed solutions of joints, requirements check.	15

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 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	4
Exams and tests during session	6
Hours of autonomous student work	
Preparing for classes, studying literature	0
Developing results	0
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**50**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Exercise test

F2 Lecture test

Summary grade

P1 Weighted mean grade

Conditions for passing the course

L1 Positive both grades

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	Makroekonomiczne podstawy polityki gospodarczej (współczesne wyzwania)
Course name in English	Macroeconomics Foundations of Economic Policy (Modern Challenges)
Course code	WIL BUD oIS A6 24/25
Course category	Przedmioty ogólne
No. of ECTS points	3.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	30	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Provide students with ability to analyze statistical data on gross domestic product (GDP), balance-of-payments (BOP), unemployment and inflation as a prerequisite for understanding and theoretically-consistent interpretation of the most important developments on the national and international scale.

Objective 2 Provide sufficient coverage of the most popular macroeconomic models and theoretical concepts, as the saving-investment balance, the IS-LM-BP, AD-AS, the Phillips curve, which is necessary for independent analysis of present economic policy issues and future challenges.

Objective 3 Provide with a student-friendly way of acquiring analytical skills on the basis of formal macroeconomic models in respect to fiscal and monetary policies, determinants of inflation, unemployment and migration, as well as BOP adjustment.

Objective 4 Explain underlying differences between major schools of economic thought, with a focus on their policy implications for major economic policy debates of the modern world, as the viability of global imbalances, approaches for an increase in the saving rate in industrial countries, recipes for the balanced growth path, tackling with the high unemployment problems, feasibility of the fiscal and monetary stimuli during a recession, the pattern of anti-deflationary and anti-inflationary policies

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Minimal mathematical skills

5 LEARNING OUTCOMES

LO1 Knowledge Student demonstrates general knowledge of the income accounting, with a detailed analysis of the GDP components, as consumption, investment, government expenditure, exports and imports, as well as the BOP relationships. Student is able to interpret the law of one price and provide assessment of the national models of economic growth, with a focus on important differences between consumption-led and export-led growth

LO2 Skills Student possesses applied skills in the interpretation of the saving-investment balance relationships, including current policy debate on the merits of fiscal austerity measures at the national and international levels, international spillovers within the framework of global imbalances, explanation of the underlying mechanisms of the twin deficit and the Ricardo Equivalence.

LO3 Knowledge Student is able to explain basic policy implications of the Solow growth model, such as changes in the saving rate, population growth and amortization rates, the golden rule of capital accumulation. It is necessary to distinguish between the determinants of growth in traditional and endogenous growth models, in relation to present discussion of the Poland's convergence to the average productivity level of the EU countries

LO4 Skills Student has analytical skills to analyze fiscal and monetary policy effects within the theoretical framework of the AD-AS model, with an ability to explain the effects of demand and supply shocks. Student understands important differences between New Classical Macro and New Keynesian explanations of the business cycle and relevant stabilization policy proposals, with a focus on macroeconomic developments and stabilization policies in the wake of the 2008-2009 financial crisis regarding major industrial countries and Poland

LO5 Skills Student analyzes the interplay between demand and supply factors on the labor market, being able to explain the phenomena of jobless growth and the concept of natural rate of unemployment. Based on the Okuns law, student calculates the natural GDP growth rate. Student explains selection problems in international migration and potential benefits and costs of labor migration for donor and acceptor countries

LO6 Knowledge Student understands inflationary developments in general and the Phillips curve relationships in particular, being able to explain determinants of inflationary pressure and the course of anti-inflationary policies.

LO7 Skills Student is able to expound on multiple faucets of the current discussion on the euro adoption in Poland and important static and dynamic features of the public debt, with a focus on policy challenges for highly-indebted eurozone countries as Greece, Italy, Ireland, Portugal and Spain.

LO8 Knowledge Student compares different explanatory hypothesis behind the 2008 world financial crisis and competing views on the role of government in a modern economy within the framework of conventional economic concepts.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Income Accounting. Concepts of aggregate supply and aggregate demand. Instruments of economic policy. Stabilization policy. Schools of Thought. Classical versus Keynesian assumptions. Neoclassical synthesis. Nominal versus real GDP. Price indexes. Quality of economic growth. Purchasing Power Parity. The Law of One Price. Big Mac Index. Components of GDP: consumption, investment, government expenditure, exports, imports. The Balance-of-Payments. Open and closed economies. Consumption-led and export-led growth. Import substitution. National models of economic growth.	2
L2	Consumption, Saving Behavior and Credit Markets. Theories of consumption. The saving-investment balance. The wealth effect. The real exchange rate. The Feldstein-Horioka puzzle. The permanent income hypothesis. Incentives for savings. The twin deficit. The Ricardo Equivalence. Global imbalances. External debt	4
L3	Growth Models. Determinants of growth in the short- and long-run. Economic growth and economic development. The Harrod-Domar model. Neoclassical model. The Solow model. Convergence. Endogenous growth models.	2
L4	IS-LM-BP Model. The Mundell-Fleming model as an open economy extension of the IS-LM model. Capital mobility. Fiscal-monetary policy mix. Crowding out. Domestic and external equilibrium. Policy assignments. The Samuelson-Tobin synthesis.	2
L5	AD-AS Model and Potential Output. Structure of the AD-AS model. Price flexibility. Devaluation effects. Supply-side economics. Keynesian demand policies. Natural level of income. Potential output. Overheating.	2
L6	New Classical Macro and New Keynesian Explanations of the Business Cycle. Regularities of business cycles. Theories of output fluctuations: monetary, psychological, political etc. Imperfect information and the Real Business Cycle Model. Assessment of RBC model. New Keynesian explanations of the business cycle: markup pricing, sticky wages, monopolistic price setting, efficiency wages. Deterministic and stochastic cycles	2
L7	Stabilization Policies. Demand and supply disturbances. Stabilization targets and instruments. Policy rules. Assessment of alternative rules: money supply, interest rate, and GDP. Policy pitfalls: lags, multiplier uncertainty, forecasting errors. Time inconsistency, credibility, and reputation. Rules vs. discretion. Policy dilemmas.	2
L8	Labor Markets. Types of unemployment. The employment and unemployment rates. Voluntary and involuntary unemployment. The natural rate of unemployment. Structural unemployment. The output gap. The Okuns law. Policies to tackle unemployment problems. The phenomenon of jobless growth. National models of labor market.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L9	Money, Interest and Inflation. The Phillips Curve. Money and inflation. Effects of inflation. Costs of inflation. Unpleasant consequences of deflation. Nominal and real interest rates. The Fisher rule. Expectations and the inflation cycle. Anticipated and unanticipated inflation. Hyperinflation. Stagflation. Cures for inflation. Modern variants of the Phillips Curve. Income policies.	2
L10	Monetarism and Expectations. The quantity theory and the neutrality of money. The modern quantity theory: monetarism. The money multiplier and the monetary base. Policy implications of monetarism. Rational expectations revolution. The Lucas supply curve. Different effects of anticipated and unanticipated money supply. The rational expectations equilibrium approach to policy	2
L11	Benefits and Risks of Common Currency. Pros and cons for fixed exchange rates. Arguments in favor of eurozone accession. Potential challenges for eurozone members among the Central and East European countries. Discussion on the euro adoption issues in Poland.	2
L12	Modern Problems of Public Debt. The government budget constraint, seignories, and the inflation tax. Determinants of rapid debt accumulation in industrial countries. Public debt macroeconomic effects. Dynamic features of public debt. Domestic vs. foreign financing of budget deficit. European Pact of Stability and Growth. Non-Keynesian effects in fiscal policy. Public debt challenges in Poland.	2
L13	Costs and Benefits of Migration. Models of migration behavior. Return and repeat migration flows. The Roy model of migrants selection. Static and dynamic costs of migration for donor- and acceptor countries. The labor migration trap in donor countries. Brain drain. Challenges for labor market liberalization in the European Union.	2
L14	The Role of Government in a Modern Economy (the lessons of the 2008 World Economic Crisis). Sources of instability in the private economy: consumption, investment, regulation of financial markets. Business confidence, speculation, and overbuilding. Competing explanations of the 2008 World Economic Crisis real estate bubble, easy credit conditions, sub-prime lending, deregulation, over-leveraging, incorrect pricing of risk, commodities boom). Main lessons of the world economic crisis (money supply non-neutrality, control of asset prices, prudent fiscal policy during good times, focus upon non-price competitiveness, the current account adjustment, better management of risk in the financial sector, the danger of deindustrialization).	2

7 TEACHING TOOLS

N1 Lectures (if online, with the use of the MS TEAMS and DELTA platforms)

N3 E-learning (handouts, tests, useful links on DELTA platform)

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	50
Developing results	25
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**105**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Test

F2 Practical exercise

Summary grade

P1 Test

P2 Written 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	Matematyka
Course name in English	Mathematics
Course code	WIL BUD oIS B10 24/25
Course category	Przedmioty podstawowe
No. of ECTS points	12.00
Semester	1 and 2

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	45	30	0	0	0	0
2	30	30	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Introduction to mathematical analysis.

Objective 2 Introduction to linear algebra with geometry.

Objective 3 Introduction to the ordinary differential equations.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge of the topics from the field of high school mathematics

5 LEARNING OUTCOMES

L01 Knowledge of definitions, theorems and methods of mathematical analysis

L02 Solving mathematical analysis tasks

L03 Knowledge of definitions, theorems and methods of linear algebra

L04 Solving linear algebra tasks

L05 Knowledge of definitions, theorems and methods in the area of differentia equations

L06 Solving ordinary differentia equations

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Infinite sequences and their limits, basic examples, the sandwich theorem for sequences, the nondecreasing sequence theorem.	3
L2	Functions of one real variable. Limits and continuity, inverse functions, composite functions, basic results on continuous functions, the definition of the derivative and interpretation, rules of differentiation, including chain rule, higher derivatives. Rolles theorem, the mean value theorem, Taylors theorem, l'Hopitals rule, extreme values of functions, monotonic functions, asymptotes, sketching graphs.	9
L3	Indefinite integrals. The definition of the indefinite integral, basic integration formulas. Methods of integration: substitution, by parts, integration of rational functions by partial fractions, trigonometric integrals.	6
L4	Matrices and determinants, systems of linear equations. The definition of a matrix, matrix operations. Determinants, basic properties, inverse matrices, singular matrices, simultaneous linear equations, Cramer's rule, the Kronecker-Capelli theorem.	6
L5	Elements of analytic geometry. Vector operations (addition, scalar product, dot product, cross product). Straight lines and planes in the 3-dimensional Euclidean space.	6
L6	Linear algebra. Vector spaces, linear independence of vectors, basis and dimension of a vector space, coordinate vectors, changing bases in vector spaces, linear transformations and their matrices, eigenvalues and eigenvectors, orthonormal bases, Einstein summation convention, Cartesian tensors, operations on tensors.	9

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L7	Definite integrals. The definition of the definite integral, basic properties, the Fundamental Theorem of Calculus, applications of definite integrals, improper integrals.	6
L8	Complex numbers. Arithmetic operations with complex numbers, the modulus-argument form of a complex number, powers and roots.	3
L9	Functions of several variables. Limits and continuity, partial derivatives, directional derivatives, the total differential, the chain rule. Applications of partial derivatives. Higher-order partial derivatives, Taylor's theorem, local extreme values. Definite integrals. The definition of the definite integral, basic properties, the Fundamental Theorem of Calculus, applications of definite integrals, improper integrals.	6
L10	Double and triple integrals. The definition of the double and triple integrals, iterated integrals, Fubini's theorem, curvilinear coordinates, Jacobi's theorem.	6
L11	Line and surface integrals. The definition of the line integral of the first kind, basic properties and applications. The area of a surface, the definition of the surface integrals of the first kind, its applications. Line and surface integrals of the second kind. The definition of the line integral of the second kind, its physical meaning, the path independence principle, Greens theorem. The definition of the surface integrals of the second kind, Gausss theorem.	9
L12	Ordinary differential equations. First-order differential equations, particular and general solutions, the existence and uniqueness theorem, separation of variables, exact equations, linear equations. Second-order linear equations with constant coefficients, the characteristic equation, variation of parameters, undetermined coefficients, systems of linear differential equations.	6

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Finding limits of sequences using theorems introduced in the lectures.	2
C2	Functions of one real variable, their domains and other properties, finding function limits and examination of continuity, practice in differentiation, using l'Hopital's rule to find limits, function examination, optimization problems.	6
C3	Indefinite integrals. Integration practice using the techniques introduced in the lectures.	4
C4	Operations on matrices, calculating determinants, solving systems of linear equations.	4
C5	Vector operations, dot and cross products and their applications, lines in space, equations of a plane, distances and symmetry of space objects: points, lines and planes.	4

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C6	Linear algebra: identifying vector spaces and subspaces, linear independence of vectors, calculating coordinates of vectors in different bases, evaluating the matrix of a linear transformation in different bases, finding eigenvalues and eigenvectors, practice in operations on Cartesian tensors.	6
C7	Evaluating definite integrals, applications to computing the areas of domains, the arc length, the volume of a solid of revolution, examples of improper integrals.	4
C8	Complex numbers: practice following the concepts introduced in the lectures.	3
C9	Functions of two and three variables: limits, continuity, practice in partial and directional differentiation, finding local extreme values.	6
C10	Evaluating double integrals over rectangles and nonrectangular regions, computing triple integrals, geometrical and physical applications of multiple integrals.	6
C11	Evaluating line and surface integrals, computing the total mass of a weighted curve, the work done by a vector field along a path, conservative vector fields, applications of Gauss' theorem.	9
C12	Solving differential equations of various types, initial-value problems, solving systems of linear differential equations.	6

7 TEACHING TOOLS

N1 Lectures

N2 Blackboard tasks

N3 Consultation

N4 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	135
Consultation hours	45
Exams and tests during session	20
Hours of autonomous student work	
Preparing for classes, studying literature	160
Developing results	0
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**360**
Total number of ECTS points	12.00

9 Methods of grading

Partial grades

F1 Colloquium

Summary grade

P1 Written exam

P2 Weighted average of the midterm tests grades

P3 Exam oral

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	Matematyka stosowana i metody numeryczne
Course name in English	Applied Mathematics and Numerical Methods
Course code	WIL BUD oIS B13 24/25
Course category	Przedmioty podstawowe
No. of ECTS points	4.00
Semester	3

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	30	0	0

3 COURSE OBJECTIVES

Objective 1 To teach students some mathematical theorems that are a background of good understanding of the numerical methods and conduction of scientific research

Objective 2 To teach students how to apply computational methodologies to solve selected engineering problems

Objective 3 To teach students how to assess the error of computer modeling

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basis of algebra and programming in Matlab

5 LEARNING OUTCOMES

LO1 Knowledge Understanding the basic mathematical notions and theorems that are necessary to proper use of selected numerical methods

LO2 Skills Knowing sources of errors of numerical methods

LO3 Knowledge Knowing which numerical methods should be applied to the solution of selected problems

LO4 Skills Knowing how to apply the basic numerical methods to the solution of selected problems

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Vectors, tensors and matrices	2
L2	Systems of linear and nonlinear equations	5
L3	Algebraic eigenproblem	4
L4	Approximation of functions and solutions of IVP, error estimation	6
L5	Numerical integration and differentiation	4
L6	Finite difference and Galerkin's methods for BVP	5
L8	Basis of optimization and statistics	4

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Recapitulation of programming in Matlab	2
K2	Vectors, tensors and matrices	2
K3	Systems of linear and nonlinear equations	4
K4	Algebraic eigenproblem	4
K5	Approximation of functions and solutions of IVP	4
K6	Numerical integration and differention	4

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K7	Finite difference and Galerkin's methods for BVP	6
K9	Basis of optimization and statistics	4

7 TEACHING TOOLS

N1 Laboratory sessions

N2 Lectures

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	20
Hours of autonomous student work	
Preparing for classes, studying literature	20
Developing results	0
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**120**
Total number of ECTS points	4.00

9 Methods of grading

Partial grades

F1 Passing grade earned in Laboratory Sessions

Summary grade

P1 Final exam

Conditions for passing the course

L1 Passing grades earned in Laboratory Sessions and 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	Materiały budowlane
Course name in English	Building Materials
Course code	WIL BUD oIS C17 24/25
Course category	Basic
No. of ECTS points	5.00
Semester	1 and 2

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	15	15	0	0	0	0
2	0	0	30	0	0	0

3 COURSE OBJECTIVES

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

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

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

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

Objective 5 Preparing students for teamwork.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the basic groups of building materials and products as well as their assortments.

LO2 Knowledge: The student knows the internal structure of particular groups of building materials.

LO3 Knowledge The student knows the basic processes of production of various materials and products as well as their relationship with the properties of particular materials.

LO4 Knowledge: The student knows and is capable of explaining the influence and the mechanisms of the action of various environmental factors on the changes in the properties of materials and products during their lifetime.

LO5 Knowledge: The student knows the properties of particular groups of building materials and products as well as the directions for their applications.

LO6 Knowledge: The student knows the methods of determination of the properties of materials and products and can choose the necessary equipment.

LO7 Skills: The student can choose a building product appropriately to the conditions in which the product is used.

LO8 Knowledge Skills: The student can conduct laboratory tests of the chosen properties of building materials and products.

LO9 Social competences: The student can work independently and in a team on a given task.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction, the scope of the subject, the basic definitions, material versus a building product. Basic information on standardization and attestation.	1
L2	Basic information concerning the durability of materials and products: environmental factors, the mechanisms and the results of their actions.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L3	The general classification of building materials and products. The classification of the properties of building materials and the presentation of the basic physical properties.	1
L4	Stone materials and their application in civil engineering. Building ceramics: the basic processes of production, properties, the groups of burnt clay products.	2
L5	Thermal and acoustic insulation materials: required internal structure, porosity, the influence of material moisture content. Bitumens and the products for damp insulation.	2
L6	Timber (internal structure, anisotropy, species, properties, durability) and wood waste products. Presentation of sawmill products (structural timber).	2
L7	Glass in civil engineering: composition and types of glass, production of flat glass, other glass products.	2
L8	Mineral binders: air-hardening (lime, gypsum, anhydrite, magnesia) and hydraulic (hydraulic lime and cements).	3

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Presentation of the health and safety requirements for laboratory classes.	1
L2	Determination of the selected physical properties of building materials, such as: density by pycnometer and Le Chatelier flask, apparent density by direct method and by hydrostatic weighing, density index and porosity, water absorption along with the course of absorption, moisture content along with the course of drying (with the use of a moisture analyzer), the height of capillary action in porous materials.	5
L3	Methodology and determination of the selected properties of building stones, such as: compressive and flexural strength, abrasion resistance by Boehme and wide wheel abrasion tests.	2
L4	Conducting the initial type test for clay masonry units, determining the following properties: dimensions and dimensional tolerances, geometry shape and features, gross dry density and net dry density, compressive strength.	7
L5	Presentation of the methods of determination of the thermal conductivity coefficient. Conducting laboratory tests for the two kinds of foamed polystyrene (EPS and XPS), determining and comparing their following properties: apparent density, compressive strength at 10% deformation and flexural strength.	2

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L6	Methodology and determination of the selected properties of asphalt (a raw material for bituminous damp proofing products), such as: softening point, breaking point, penetration (hardness), ductility. Determination of maximum tensile force and elongation for various types of asphalt sheets.	3
L7	Methodology and determination of the selected mechanical properties of various types of timber, such as: compressive strength, tensile strength parallel and perpendicular to grain, static bending strength with modulus of elasticity in bending, shear strength, hardness by the Janka method. Presentation of the influence of timber moisture content on its mechanical properties (determination of the moisture content of specimens with the use of a hygrometer).	6
L8	Determination of compressive and flexural strength of gypsum as well as softening factors in compression and tension using beams from gypsum paste. Determination of the selected properties of gypsum cardboards (e.g. failure load in bending in transverse and longitudinal direction). Determination of surface hardness and water absorption capacity for gypsum blocks.	4

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Classification of the properties of building materials and products and presentation of the methods of determination of the most important ones.	4
C2	Presentation of the assortment and the range of applications of stone materials and products.	1
C3	Presentation of the assortment and the range of applications of burnt clay products.	3
C4	Presentation of the assortment and the range of applications of thermal and acoustic insulation materials.	2
C5	Presentation of the assortment and the range of applications of bitumen damp insulation materials.	2
C6	Presentation of the assortment of selected timber and wood waste products.	2
C7	Presentation of the assortment and the range of applications of building glass products.	1

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Laboratory exercises

N4 Group work

N5 Office hours

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	9
Exams and tests during session	9
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	22
Preparing of reports, projects presentations, discussion	20
Total number of hours devoted to the subject	**150**
Total number of ECTS points	5.00

9 Methods of grading

Partial grades

F1 Test

F2 Lab report

Summary grade

P1 Test

P2 Weighted mean, obtained from the combined grades

Conditions for passing the course

L1 Semester 2: Weighted mean, obtained from the combined grades (weight: Lab report - 0,3; Test - 0,7)

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	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 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

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	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

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	Metody oceny energetycznej budynków
Course name in English	Methods of Building Thermal Evaluation
Course code	WIL BUD oIS E54 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	2.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Introduction of the advanced principles of energy use and balance.

Objective 2 Computational analysis of low energy building design.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Credits for the course: Building Physics.

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the basic rules of design and construction of low energy building.

LO2 Skills Student is able to make the appropriate design decisions regarding a low energy building and its structural details.

LO3 Knowledge Student understands importance of sustainable development and sustainable building design

LO4 Skills Student knows how to model advanced building systems in terms of heat transfer,

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Basic components of heat balance equation.	2
L2	Stationary and transient heat transfer analysis.	4
L3	Thermal model of the basic low energy solutions.	4
L4	Computer aided whole building simulation.	5

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Consultations

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	3
Exams and tests during session	6
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	0
Preparing of reports, projects presentations, discussion	16
Total number of hours devoted to the subject	**50**
Total number of ECTS points	2.00

9 Methods of grading

Summary grade

P1 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	Modelowanie kompozytów
Course name in English	Modelling of composites
Course code	WIL BUD oIS E1073 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	2.00
Semester	7

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

Semeste r	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	5	0	0	10	0	0

3 COURSE OBJECTIVES

Objective 1 Introduction to multiscale modeling of composite structures. Presentation of selected research topics conducted in the L10 Chair.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge Introduction to the composite structures and its applications.

LO2 Skills Basics concepts of the composite modeling.

LO3 Knowledge Student will be able to perform asymptotic homogenization and apply concept of RVE.

LO4 Skills Student will be able to create his own computer code and use Abaqus numerical code to perform calculations for a heterogeneous domain.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to the composite structures and its applications, homogenization method, upscaling.	2
L2	Asymptotic homogenization.	2
L3	Homogenization based on the RVE approach.	1

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Calculation examples with own created code and Abaqus.	10

7 TEACHING TOOLS

N1 Lecture

N2 Multimedia presentation

N3 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	15
Consultation hours	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	20
Developing results	0
Preparing of reports, projects presentations, discussion	15
Total number of hours devoted to the subject	**50**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Practical exercise

Summary grade

P1 Written 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	Modelowanie komputerowe programem REVIT
Course name in English	Modelling in REVIT
Course code	WIL BUD oIS E1061 24/25
Course category	Subjects related to Diploma Projects
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	10	0	0	20	0	0

3 COURSE OBJECTIVES

Objective 1 Introduction to Building Information Modeling, its basic concepts, technologies and business value

Objective 2 Revit based, practical introduction to architectural modeling of a building with BIM technology

Objective 3 Revit based, practical introduction to structural modeling of a building with Revit BIM technology

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic course of IT. A good understanding of Windows OS and practical ability to work on a PC computer

2 Fundamental understanding of structural engineering and mechanics of structures

3 Basic knowledge of CAD (AutoCAD) on 2D level

5 LEARNING OUTCOMES

LO1 Knowledge Fundamental knowledge of the BIM technology and its advantages in the area of structural engineering

LO2 Skills Ability to develop BIM-standard conformant structural models of buildings

LO3 Knowledge Ability to develop new BIM object families

LO4 Skills Ability to visualize/render 3D models

LO5 Knowledge Ability and skillset for collaborative working

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Modeling of a residential building in Revit Architecture. Design development on 3D level. Generating quantity schedules, 2D/3D views and cross-sections. Dimensioning and annotations. Plotting.	4
K2	Terrain modeling/grading, 3D visualizations and renderings. Green modeling: Solar studies. Animations and walk-throughs.	2
K3	Structural modeling of a commercial building in Revit Structure. Linking CAD files. Structural components, beams, joists, beam systems, slabs, foundations. Analytical views/analytical models. Modeling loading, point/line/area loading. Hosted loading. Bill of materials, material schedules. Cost schedules. Green modeling: carbon trace calculations/schedules. Rebar modeling	6
K4	Defining custom object families and their application in modeling. Adding parameters and parametric relations. A new Window family and modification of a Compound Wall family.	4
K5	Advanced Revit topics: Variants and Phasing	2
K7	Final test	2

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

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to BIM. Ideas, definitions, implementations. Business advantages and deployment. CAD vs. BIM, BIM models. BIM as a business process. Parametric modeling, BIM as a PLM system. Review of BIM software types and main software product lines.	2
L2	BIM models dimension taxonomy (BIM 3D/ 4D/5D/6D/7D) and BIM maturity models. Building Information Model, Project Information Model (PIM) and Asset Information Model (AIM). LOD Level of Definition.	2
L3	Interoperability of BIM software/models. Open standards for BIM data models, IFC object classes . BIM standards: IFD/bSDD, MVD, BCF, COBie. Building SMART initiatives and norms. OpenBIM	2
L4	BIM modeling processes and standards. Collaborative working. BIM model types in project and building life-cycles. Multidisciplinary coordination and collision detection. BIM in Facility Management. BIM and green/sustainable construction.	2
L5	Case studies. Course close-out and final test.	2

7 TEACHING TOOLS

N1 Lecture

N2 Laboratory exercise

N3 Consultation

N4 Multimedia presentation

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	30
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	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Practical project assignments

F2 Test

Summary grade

P1 Averaged partial scores

Conditions for passing the course

L1 Positive forming 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	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	Ochrona budowli przed korozją
Course name in English	Protection of structures against corrosion
Course code	WIL BUD oIS E2163 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	3.00
Semester	6 and 7

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
7	15	0	0	0	0	0

3 COURSE OBJECTIVES

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

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

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

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

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

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

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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

5 LEARNING OUTCOMES

LO1 Knowledge The student understands the social and ethical responsibility that is associated with performance construction engineer profession - understands the meaning of the term "profession of social trust".

LO2 Knowledge The student collaborates in a team and is responsible for partial and overall the results of your group's work.

LO3 Knowledge The student is able to describe the basic symptoms of corrosion of construction materials (concrete, steel, ceramics, organic materials).

LO4 Skills The student is able to formulate the basic research problem in the field of determining the method material destruction in the building structure and on this basis, in the basic scope, plan performing an experiment modeling the problem and interpreting the obtained results.

LO5 Skills The student is able to propose a method of protecting the structure or its elements against corrosion.

LO6 Knowledge The student knows the causes and effects of physical, chemical and biological corrosion of building materials.

LO7 Skills The student explains the basic concepts of corrosion of construction materials (concrete, steel, ceramics, organic materials).

LO8 Knowledge The student knows the principles of protection of reinforced concrete, steel, masonry and wooden structures.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Impact of the external environment on the durability of concrete and concrete building components. Classification of aggressive environments against concrete and reinforced concrete structures.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L2	Processes and mechanisms of physical, chemical and thermal destruction of mineral building materials. Laboratory methods of modeling building mineral material destruction processes.	2
L3	Mechanism of reinforcement corrosion in a reinforced concrete structures. Laboratory and field methods for estimation of the protective properties of concrete. Methodology for measuring threat of reinforcement corrosion in reinforced structures.	2
L4	Corrosion processes of steel and other metals in building structures. Classification of aggressive environments towards steel structures. Laboratory and field methods of structures damage assessment.	4
L5	Processes of masonry corrosion.	2
L6	Biological corrosion of building materials - causes and effects.	2
L7	Durability vs. sustainability of building structures. General rules for protection of building structures and their material, technological and environmental factors.	3
L8	Rules for the protection of reinforced concrete structures: material and structural protection, surface protection. Requirements for surface protected reinforced concrete structures.	3
L9	Products and systems for the protection and repair of concrete structures: hydrophobic impregnation, sealing impregnation, coating protections, injection products for filling cracks, voids and gaps in concrete.	4
L10	Requirements for steel structures operating in environments with increased aggressiveness. Protection of steel structures: metal coatings, paint protections. General requirements, detail solutions.	4
L11	Protection of elements made of organic materials against biological corrosion and fire action.	2

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia and oral presentations

N3 Team working

N4 Discussion

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	10
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	10
Total number of hours devoted to the subject	**85**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Classwork/Test

F2 Oral presentation

Summary grade

P1 Average weight of formative assessment

Conditions for passing the course

L1 Presence at classes

L2 Teamwork

L3 Active discussion at classes

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	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

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	Pakiet Abaqus
Course name in English	Abaqus computer code
Course code	WIL BUD oIS E1062 24/25
Course category	Subjects related to Diploma Projects
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	0	0	0	15	0	0

3 COURSE OBJECTIVES

Objective 1 Obtaining practical skills to use a computational package operating on the basis of the Finite Element Method, on the example of typical engineering structures, using various types of analysis (statics, dynamics, calculations in a linear and non-linear range)

Objective 2 Acquaintance with the library of finite elements of the ABAQUS program and the criteria for their use

Objective 3 Acquaintance with selected material models and types of analysis available in ABAQUS

Objective 4 Preparation of students for conducting scientific research covering non-linear structure analysis issues on the example of elastic-plastic calculations

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Passed course of Information Technology

2 Basic knowledge of the Finite Element Method

5 LEARNING OUTCOMES

LO1 Knowledge The student is able to characterize the ABAQUS program and give its typical applications

LO2 Skills The student is able to characterize the FEM elements available in the program and correctly select the element for the calculated task

LO3 Knowledge The student is able to characterize the FEM elements available in the program and correctly select the element for the modeled structure

LO4 Skills Student is able to perform calculations, in the linear-elastic range, of bar structures, panels, plates and shells in the ABAQUS system

LO5 Skills The student is able to perform calculations, in the elastic-plastic range, of a plate structure in the ABAQUS system

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Pre and postpprocessing - data entry as well as processing and visualization of results on the example of a beam	4
K2	Rules for finite element selection in ABAQUS	2
K3	Principles of linear and nonlinear analysis on the example of plate construction	2
K4	Making an individual assignment (panel or plate)	4
K5	Modeling of plate structure in the elasto-plastic range. Elements of dynamic analysis of the structure.	3

7 TEACHING TOOLS

N1 Computer laboratories

N2 Consultations

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	5
Developing results	8
Preparing of reports, projects presentations, discussion	2
Total number of hours devoted to the subject	**30**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Student is required to actively take part in the computer laboratory course

F2 Student is required to prepare complete reports presenting and discussing the results concerning given computational tasks

Summary grade

P1 Weighted average of forming grades

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	Podstawy computerj mechaniki materiałów
Course name in English	Introduction to computational mechanics of materials
Course code	WIL BUD oIS E1 24/25
Course category	Subjects related to Diploma Projects
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	10	0	0	5	0	0

3 COURSE OBJECTIVES

Objective 1 Student should obtain fundamental knowledge of nonlinear models of engineering materials.

Objective 2 Student should get acquainted with selected aspects of nonlinear FEM modelling.

Objective 3 Student should acquire experience in analysis of structures using nonlinear material models.

Objective 4 Student should get prepared for scientific research.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Passed courses of Strength of Materials and Computational Methods.

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the fundamentals of non-linear models.

LO2 Skills Student knows the concept of the algorithm for nonlinear FEM computations.

LO3 Knowledge Student understands and is able to analyze and interpret the results of nonlinear (e.g. elastic- plastic) computations for simple structures.

LO4 Skills Student is aware of limitations resulting from the assumption of linear elasticity.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Recapitulation of linear elastic FEM computations.	2
L2	Nonlinear FEM analysis.	2
L3	Overview of selected nonlinear material models for FEM computations. Presentation of results of example simulations.	4
L4	Selected material models - seminar with student presentations.	2

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Computation of a 2D or 3D problem using elastic-plastic model.	5

7 TEACHING TOOLS

N1 Lecture

N2 Multimedia presentation

N3 Consultation

N4 Discussion

N5 Computer exercise

N6 Seminar

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	7
Developing results	0
Preparing of reports, projects presentations, discussion	8
Total number of hours devoted to the subject	**30**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Project

F2 Presentation

Summary grade

P1 Oral exam

Conditions for passing the course

L1 The oral answer to questions about design issue and presentation

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 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 planowania komunikacyjnego
Course name in English	Introduction to Transportation Planning
Course code	WIL BUD oIS C24 24/25
Course category	Basic
No. of ECTS points	3.00
Semester	3

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
3	22	0	0	0	23	0

3 COURSE OBJECTIVES

Objective 1 Presenting of main tasks and terminology of transport planning. Basic information about modes of transport together with their functionalities, advantages and disadvantages.

Objective 2 Acquiring skills in the field of traffic forecasting, planning and development of transport network.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Not specified.

5 LEARNING OUTCOMES

LO1 Knowledge Basic knowledge of spatial planning including transport aspects.

LO2 Skills Basic knowledge about modes of transport, its application conditions and their functional impact on transport system.

LO3 Knowledge Demand forecasting skills aimed on development and application of transport models both for private and public transport analysis.

LO4 Knowledge Student is able to solve engineering problems with consideration of transport aspects.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Basic information about transport system. Role of the transport planning in development of agglomerations.	3
L2	Demand modelling and traffic forecast methodologies.	6
L3	Basic rules in development of road network.	3
L4	Role of public transport in modern cities - rules of planning and examples.	4
L5	Modes of transport - description, strengths and weaknesses.	2
L6	Rules of planning transport service at living districts.	2
L7	Road safety analysis and rules of traffic calming.	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Development of the street network model for chosen small town.	2
P2	Estimation methods of variables for demand modelling (no. of inhabitants, employees, students etc.)	3
P3	Calculation of trip generation parameters.	3
P4	Calculation of share of private car trips and forecasting analysis.	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P5	Estimation of origin-destination matrix with consideration of external traffic.	4
P6	Optimization of road network development.	2
P7	Simulation analysis of changes in road network in chosen city - application of macro-simulation model in PTV software.	4
P8	Calibration procedures and parametrization of the obtained results.	3

7 TEACHING TOOLS

N1 Lectures

N2 Project development

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	10
Exams and tests during session	10
Hours of autonomous student work	
Preparing for classes, studying literature	5
Developing results	5
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**85**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Test

F2 Project

Summary grade

P1 Weighted average mark of test (0,45) and project (0,55)

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	Praktyka zawodowa - budowlana
Course name in English	Practical training in construction
Course code	WIL BUD oIS C32 24/25
Course category	Basic
No. of ECTS points	4.00
Semester	4 and 6

2 NUMBER OF WEEKS

Semester	Number of weeks
4	4.00
6	4.00

3 COURSE OBJECTIVES

Objective 1 Practical knowledge about functioning of construction company and design office

Objective 2 Direct acquaintance with a construction site and basic technologies of construction works

Objective 3 Acquaintance with basic construction site documentation and its flow

Objective 4 Cooperation in a team project

Objective 5 Basics of human resources management at the construction site

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 no requirements

5 LEARNING OUTCOMES

LO1 Knowledge about the stages of the construction process. Knowledge of site organization and documentation flow.

LO2 Skills Student knows how to move safely around the construction site, is able to recognize the hazards associated with construction works and knows how to avoid them.

LO3 Knowledge Student is able to supervise simple construction works.

LO4 Knowledge of basic technologies for construction works (earthworks, reinforced concrete and masonry works). Knowledge of the assembly rules for prefabricated elements.

6 COURSE CONTENT

Praktyka zawodowa

No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
PZ1	Organizational structure of a construction company	24
PZ2	Operation of services and special units in a construction company	20
PZ3	Health and safety policy in a construction company	16
PZ4	Methods of construction: Earthworks	30
PZ5	Methods of construction: Foundations works	30
PZ6	Methods of construction: RC structures	45
PZ7	Methods of construction: Assembly of steel structures and elements	45
PZ8	Methods of construction: Wood structures and scaffoldings	36
PZ9	Methods of construction: Finishing works and outfitting	30
PZ10	Requirements for construction site documentation	24

7 TEACHING TOOLS

N1 Other

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	0
Consultation hours	0
Exams and tests during session	0
Passing the Report	2
Hours of autonomous student work	
Preparing for classes, studying literature	40
Developing results	0
Preparing of reports, projects presentations, discussion	18
Participating in construction processes	240
Total number of hours devoted to the subject	**300**
Total number of ECTS points	4.00

9 Methods of grading

Partial grades

F1 The oral exam

Summary grade

P1 The oral exam

Conditions for passing the course

L1 Submission of an approved practice report

Assessment of activity without teacher participation

B1 Other

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	Praktyka zawodowa - geotechniczna
Course name in English	Practical training in geotechnics
Course code	WIL BUD oIS C31 24/25
Course category	Basic
No. of ECTS points	1.00
Semester	4

2 NUMBER OF WEEKS

Semester	Number of weeks
4	1.00

3 COURSE OBJECTIVES

Objective 1 Getting to know with practical geotechnical investigation in the field , training in use of dynamic cone test and sampling

Objective 2 Getting to know the drill field, sampling type A, B and C

Objective 3 Preparing a report of geotechnical field investigation for a building designer based on in situ and laboratory tests

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Completing the entire course of Soil Mechanics

5 LEARNING OUTCOMES

LO1 Knowledge Student explains the sequences of the investigation made by dynamic cone test and vane test **LO2 Skills** Student can perform dynamic cone test and vane test and soil sample for laboratory analysis

LO3 Knowledge Student explains the soil drilling execution in field investigation

LO4 Skills Student is able to perform geological engineering report based on research carried out field and laboratory

6 COURSE CONTENT

Praktyka zawodowa

No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
PZ1	Training in use of dynamic cone test and sampling	5
PZ2	Getting to know the drill field, sampling type A, B and C	5
PZ3	Making a report of geotechnical field investigation for a building designer based on in situ and laboratory tests	5

7 TEACHING TOOLS

N1 Laboratories

N2 Team work

N3 Projects

N4 Consulting

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	0
Consultation hours	15
Exams and tests during session	0
Hours of autonomous student work	

Preparing for classes, studying literature	5
Developing results	5
Preparing of reports, projects presentations, discussion	5
Total number of hours devoted to the subject	**30**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Practical exercises

F2 Team project work

F3 Final report

Summary grade

P1 Practical exam

Conditions for passing the course

L1 For those who took part in the field research the credit is granted.

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	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

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	Projektowanie dróg samochodowych
Course name in English	Road Design
Course code	WIL BUD oIS C38 24/25
Course category	Basic
No. of ECTS points	5.00
Semester	5

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
5	45	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Transfer of knowledge in the basics of road geometric design with the design determinants

Objective 2 Preparation for designing of less complicated elements of road infrastructure

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 knowledge of infrastructure designing determinants resulting from transportation planning and land development principles

5 LEARNING OUTCOMES

LO1 Knowledge of basic legal requirements and technical criteria for the geometric design of roads and intersections

LO2 Knowledge of designing techniques of roads and intersections

LO3 Skills of using standards, guidelines and instructions in the design of road infrastructure

LO4 Skills ability of independent analysis of determinants of geometric design and selection of appropriate solutions

LO5 Skills ability to solve problems connected with roads drainage

LO6 Knowledge ability to independently complement and extend knowledge in the field of road design

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Conceptual design of road section in two variants with the choice of geometrical alignment and calculations necessary for their dimensioning. Selection of crosssection type. Detailed design solution for the selected element from the project - intersection, culvert, transition curve. Technical escription preparation including design determinants and justification of the solutions	30

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	The classification of roads and streets with its formal and technical determinants, indicators describing the road network, basic road design parameters and their determination.	3
L2	Designing determinants resulting from the mechanics of movement criteria, road safety, cost and environmental requirements.	6
L3	Vertical and horizontal alignment roads - elements and the basic of design criteria. Detailed principles of design: straight, curves, transition curves, elements of vertical alignment, alignment coordination. Homogeneity assessment of geometric horizontal alignment.	6
L4	Elements of cross-section roads and their imensioning, shaping the road ramps.	3

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	Earthworks operations, calculation of earth-moving asses and designing of earth movements.	3
L6	Classification of road intersections, the basic design requirements, criteria for selecting intersection type, the elements of specific solutions for channelized intersections.	6
L7	Elements of road drainage - the types and usage objectives. Characteristics of rainfall and etermination of calculated water runoff for imensioning drainage road facilities.	3
L8	Dimensioning of open channels. Water discharge, taking into account environmental considerations. Streets and squares drainage	4
L9	Road culverts, designing and construction.	2
L10	Subsoil drainage system, typical design solutions.	2
L11	Parking and service roads to the buildings	4
L12	Traffic organization and control measures. Traffic calming measures	3

7 TEACHING TOOLS

N1 Lectures

N2 Project exercises

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	10
Exams and tests during session	3
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	**148**
Total number of ECTS points	5.00

9 Methods of grading

Partial grades

F1 Individual project

Summary grade

P1 Final exam

Conditions for passing the course

L1 Mandatory participation in design classes, positive mark from final exam, pass project by checking the knowledge during the consultation and confirming the correctness of the project implementation by the supervisor

Assessment of activity without teacher participation

B1 Assessment of the discussion on individual 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	Projektowanie i diagnostyka budynków murowych
Course name in English	Design and diagnostics of masonry buildings
Course code	WIL BUD oIS E1 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	6.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	30	0

3 COURSE OBJECTIVES

Objective 1 Knowledge of the selecting materials and structural solutions for masonry buildings and engineering structures. Knowledge of the methods and models used in verifying load-carrying capacity of masonry structural elements.

Objective 2 Knowledge of the diagnostic, repair and strengthening methods of masonry structures.

Objective 3 Ability to select appropriate structural materials and solutions for masonry buildings and engineering structures taking into account the methods of strengthening.

Objective 4 Ability to responsible design of masonry structures and the strengthening.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Masonry structures, Strength of materials, Structural mechanics

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the rules concerning the selection of materials and structural solutions for masonry buildings and engineering structures. Student knows the methods and models used in verifying load-carrying capacity of masonry structural elements.

LO2 Skills Student knows the most common masonry defects/damage and the main causes of them, she/he knows the main diagnostic methods of masonry structures.

LO3 Knowledge Student is able to select appropriate structural materials and solutions for masonry buildings, engineering structures and the strengthening. She/he is able to use proper methods and models for the analysis of strengthened and non-strengthened masonry.

LO4 Knowledge Student is conscious of professional responsibility in structural design and is aware of necessity of continuous upgrade of professional competences.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Design of unreinforced and reinforced masonry structures residential and public buildings as well as engineering structures.	6
L2	Masonry buildings in mine subsidence areas.	2
L3	Defects identifying in masonry buildings determining the cause of cracks, diagnostic methods.	3
L4	Strengthening and repair of unreinforced masonry structures.	4

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Design solutions agreed with the bachelors thesis supervisor.	30

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	5
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	25
Developing results	35
Preparing of reports, projects presentations, discussion	35
Total number of hours devoted to the subject	**150**
Total number of ECTS points	6.00

9 Methods of grading

Partial grades

F1 Colloquium

F2 Individual project

Summary grade

P1 Weighted average of the midterm tests grades

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	Przygotowanie pracy dyplomowej
Course name in English	Preparation of Diploma Project
Course code	WIL BUD oIS E52 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	15.00
Semester	7

2 No. of class hours

Semester	No. of class hours
7	5.00

3 COURSE OBJECTIVES

Objective 1 Acquisition of the ability to obtain and use scientific and technical information, including foreign sources, preparing the student for scientific work.

Objective 2 Acquisition and demonstration of the ability to work independently on the solution of a selected engineering task, in particular related to scientific activity conducted at the university.

Objective 3 Acquisition and improvement of the ability to use various computational tools, including computer programs, preparing the student for scientific work.

Objective 4 Acquisition and demonstration of skills needed for critical assessment of the results obtained and presenting solutions of a selected engineering task in the form of a written scientific report, preparing the student for scientific work.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Student enrolled for the last semester of study should have sufficient learning outcomes to prepare the diploma thesis.

5 LEARNING OUTCOMES

LO1 Knowledge The student is able to communicate with other people in order to obtain the necessary information and make the necessary arrangements at work.

LO2 Knowledge The student is aware of the responsibility for the reliability of the results of his work and their interpretations.

LO3 Knowledge The student is aware of the need to raise professional competences and independently supplements and broadens the knowledge of engineering issues being the subject of the diploma thesis.

LO4 Skills The student is able to use literature, standards, techniques and computer programs to develop an engineering, research, or study type subject which is the subject of a diploma thesis.

LO5 Skills The student is able to define the purpose and scope of the work, solve the engineering problem and formulate conclusions.

LO6 Knowledge The student is able to develop a complete documentation, meeting the formal requirements, of the engineering task in the form of a diploma thesis.

LO7 Skills The student has expanded knowledge of the engineering issue that is the subject of the thesis.

LO8 Knowledge The student is aware of applying the principles of respect for copyright and protection of intellectual property rights.

6 COURSE CONTENT

Praca dyplomowa

No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
PD1	Specifying the topic, purpose, scope and methods of preparing thesis.	1
PD2	Analysis, discussion and verification of proposed solutions and obtained results.	2
PD3	Determining the final form of the diploma thesis. Substantive and editorial control of the presented work.	2

7 TEACHING TOOLS

N1 Discussion

N2 Consultations

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	0
Consultation hours	5
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	90
Developing results	180
Preparing of reports, projects presentations, discussion	95
Total number of hours devoted to the subject	**370**
Total number of ECTS points	15.00

9 Methods of grading

Summary grade

P1 Evaluation of the prepared and completed thesis.

P2 Assessment of the student's commitment, reliability, systematicity and independence during the preparation of the diploma thesis

Conditions for passing the course

L1 Positive assessment of the submitted diploma thesis.

Assessment of activity without teacher participation

B1 Made indirectly based on work progress assessment.

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	Seminarium dyplomowe- Betonowe konstrukcje specjalne
Course name in English	Diploma seminar - Special Concrete Structures
Course code	WIL BUD oIS E1171 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	3.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	0	0	0	0	0	15

3 COURSE OBJECTIVES

Objective 1 Learning the form and method of preparing the diploma thesis

Objective 2 Expanding construction knowledge beyond the scope of major subjects

Objective 3 Exchange of experiences and insights on the topics of theses being carried out

Objective 4 Learning knowledge about the importance of the issues raised in the work in the construction industry and the main rules of business construction activities

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge The student will discuss and exchange experiences in a mature way

LO2 Skills The student has the technical and editing skills needed to prepare the thesis

LO3 Knowledge The student has additional construction knowledge

LO4 Skills The student has additional knowledge about the importance of the issues raised in the work in the construction industry, knows the rules of business construction activities

6 COURSE CONTENT

Seminar		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
S1	COURSE CONTENT 1	15

7 TEACHING TOOLS

N1 Lecture

N2 Student presentations

N3 Discussion

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	0
Developing results	0
Preparing of reports, projects presentations, discussion	5
Total number of hours devoted to the subject	**20**
Total number of ECTS points	3.00

9 Methods of grading

Summary grade

P1 Assessment covering all learning outcomes

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	Seminarium dyplomowe- Inżynieria materiałów budowlanych i ochrona budowli przed korozją
Course name in English	Diploma seminar - Building Materials Engineering and Protection Structures Against Corrosion
Course code	WIL BUD oIS E2171 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	3.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	0	0	0	0	0	15

3 COURSE OBJECTIVES

Objective 1 Objective 1 To familiarize students with the principles of preparation and scope of scientific and technical rapports and their presentation (context: preparation and presentation of diploma rapport and public defence).

Objective 2 Objective 2 Increase student knowledge by the information provided by the other participants during the seminar and the accompanying discussion. The scope depends on other participants subjects of interest.

Objective 3 Objective 3 The discussion of diploma exam topic related to building materials and structure protection against corrosion.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 All required credits

5 LEARNING OUTCOMES

LO1 Knowledge Acquisition of knowledge about the essential elements of scientific and technical public and methods used in their preparation.

LO2 Knowledge: Broaden knowledge of the problems presented by the other participants of the seminar.

LO3 Social competence: Acquisition of skills appropriate for preparation and presentation of the final rapport.

LO4 Social competences: Acquisition of discussion skills, including the defence of their own views.

6 COURSE CONTENT

Seminar		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
S1	The discussion of the general principles related to the content of a standard degree rapport.	2
S2	Provide general principles for the appropriate preparation of a multimedia presentation of an educational and comprehensive presentation of scientific and technical issues.	2
S3	Approval of the program and the specific topics presented by the seminar participants.	1
S4	Presentations prepared by the seminar participants on the selected topic, related to the scope of the diploma rapport (topic decided in consultation with the supervisor). Discussion.	5
S5	Presentations related to diploma topic.	5

7 TEACHING TOOLS

N1 Presentations

N2 Discussion

N3 Consultations

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	5
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	10
Preparing of reports, projects presentations, discussion	20
Total number of hours devoted to the subject	**80**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Presentation 1

F2 Presentation 2

Summary grade

P1 Mean value of two marks

Conditions for passing the course

L1 Presentation of and presentation of selected topics

L2 Active participation in the discussion after the presentations of other seminar participants

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	Seminarium dyplomowe- Konstrukcje metalowe
Course name in English	Diploma seminar - Metal Structures
Course code	WIL BUD oIS E3171 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	3.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	0	0	0	0	0	15

3 COURSE OBJECTIVES

Objective 1 Understanding the principles of preparing an engineering thesis project, study and research, collecting source materials and presenting the results of own work.

Objective 2 Mastering the ability to use the correct technical terminology in the field of civil engineering and formulating conclusions resulting from design, study and research analyzes. The acquired knowledge and skills prepare the student to report the results of implemented engineering and scientific tasks.

Objective 3 Mastering the ability to present the results of own study, design and research work, as well as conduct discussions. The acquired knowledge and skills prepare the student to report the results of implemented engineering and scientific tasks.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge about the shaping, design and static and strength analyzes of building structures.

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the rules for preparing an engineering, diploma and research thesis.

LO2 Skills The student is able to prepare the diploma thesis in accordance with the principles of preparing construction designs, study or research works.

LO3 Knowledge The student is able to work independently on the assigned task and is responsible for the dependability of his/her work.

LO4 Knowledge The student is able to formulate conclusions and opinions regarding the imple- mented engineering task and present them to a wider audience.

6 COURSE CONTENT

Seminar		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
S1	Discussion of formal requirements for developing an engineering diploma thesis. Discussion of the specifics of preparing design, study and research studies, including finding source materials. Presentation of the principles of proper presentation of the diploma thesis.	3
S4	Presentation of an engineering issue related to the thesis prepared by students based on technical literature.	6
S5	Presentation of selected elements of own diploma theses by students.	6

7 TEACHING TOOLS

N1 Seminars

N2 Multimedia presentations

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	15
Consultation hours	2
Exams and tests during session	0
Presentation of engineering issues and own diploma thesis	3
Hours of autonomous student work	
Preparing for classes, studying literature	20
Developing results	25
Preparing of reports, projects presentations, discussion	25
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Oral answer

F2 Multimedia presentation

Summary grade

P1 Average of forming grades

Conditions for passing the course

L1 Preparation of the presentation of an engineering problem based on technical literature and the presentation of selected elements of his own diploma thesis. Average of forming grades a minimum of 3.0.

Assessment of activity without teacher participation

B1 Preparation of multimedia presentations on a selected engineering issue and own diploma thesis.

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	Seminarium dyplomowe- Modelowanie komputerowe
Course name in English	Diploma seminar - Computer Modelling
Course code	WIL BUD oIS E1071 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	3.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	0	0	0	0	0	15

3 COURSE OBJECTIVES

Objective 1 Student should get acquainted with the guidelines of writing a diploma work

Objective 2 Student should learn the rules of edition and presentation of short papers

Objective 3 Student should get prepared for participation in scientific research and discussion

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Elementary knowledge and capabilities related to the use of sources of scientific information

5 LEARNING OUTCOMES

LO1 Knowledge Student properly presents in writing the information on a selected subject

LO2 Skills Student can make use of different sources of scientific information

LO3 Knowledge Student knows the writing guidelines and standard scope of a diploma work

LO4 Knowledge Student can express and substantiate her/his opinion during a discussion on a gi- ven subject

LO5 Skills Student can readily profit from different methods of presentation of scientific information

LO6 Knowledge Student knows the basic rules of preparation and delivering of a presentation

6 COURSE CONTENT

Seminar		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
S1	Fundamental principles of research and publishing, structure and rules of writing a diploma work, principles of using scientific information and proper citations	2
S2	Presentation of selected scientific and technological problems in contemporary civil engineering	2
S3	Colloquium presentations of diploma works of students	11

7 TEACHING TOOLS

N1 Multimedia presentation

N2 Discussion

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	20
Developing results	15
Preparing of reports, projects presentations, discussion	20
Total number of hours devoted to the subject	**70**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Oral answer

Summary grade

P1 Oral examination

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	Seminarium dyplomowe- Planowanie i analizy kosztowe
Course name in English	Diploma seminar - Planning and Cost Analysis
Course code	WIL BUD oIS E7171 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	3.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	0	0	0	0	0	15

3 COURSE OBJECTIVES

Objective 1 To prepare students to write the thesis and to familiarize students with graduation exam rules.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Fulfillment of the requirements according to the the study regulations at Cracow University of Technology and rules and procedures at Faculty of Civil Engineering CUT.

5 LEARNING OUTCOMES

LO1 Knowledge Students are aware of the requirements for the bachelor degree theses.

LO2 Skills Students can prepare their theses plans. Students are able to define aims and scope of work. Students are able to present their theses concepts. Students have mastered a technique of writing theses.

LO3 Knowledge Students are able to take part in the discussion about their theses. Students formulate remarks about their own and colleagues work and accept criticism.

LO4 Skills Students know and are aware of the rules of the theses reviews. Students know the rules of their final diploma grade determination.

6 COURSE CONTENT

Seminar		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
S1	Discussion on the purpose of the seminar. Overview of selected or proposed theses topics. Initial remarks on the topics of theses.	2
S2	Presentation of the general requirements for the theses (volume, division of theses, contents, selection and use of sources). Presentation of the formal requirements for theses (writing technique, language, drawings and tables descriptions, citations and references, bibliography).	4
S3	Presentation of the rules and criteria of reviewing theses. Discussion about graduation exam and requirements for theses presentations. Information about the demanded scope and form of theses presentations.	2
S4	Presentations of the theses conceptions prepared by the students (presentations, discussions, comments, opinions, remarks).	7

7 TEACHING TOOLS

N1 Seminar, discussion.

N2 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	15
Consultation hours	2
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	30
development of theses plans	13
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Grade on thesis concept presentation.

Summary grade

P1 Grade on thesis concept presentation.

Conditions for passing the course

L1 Development and presentation of the thesis concept.

L2 Active participation in discussions on own and others theses concepts.

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	Seminarium dyplomowe- Projektowanie budynków - forma, funkcja i energia
Course name in English	Diploma seminar - Building Design - Form, Function and Energy
Course code	WIL BUD oIS E4171 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	3.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	0	0	0	0	0	15

3 COURSE OBJECTIVES

Objective 1 Prepare students to write the thesis and familiarize students with graduation exam rules

Objective 2 Prepare students for scientific work

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge and capabilities related to the use of sources of scientific information

5 LEARNING OUTCOMES

LO1 Skills Students have knowledge about the basic elements of scientific and technical publications and methods used in their preparation and are able to prepare plan of their own thesis, define aims and scope of the work

LO2 Skills Students are able to formulate their own opinions and conclusions about the thesis

LO3 Knowledge Students take part in the discussion about their thesis. Students formulate re- marks about own and colleagues work, defend their own views and accept criticism

LO4 Skills Students have knowledge of selected topics presented during the seminar and connected with their thesis

6 COURSE CONTENT

Seminar		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
S1	Presentation of general and formal requirements for the thesis	2
S2	Presentation of fundamental principles of research and publishing and principles of using scientific information and proper citations	2
S3	Presentation of the rules and criteria of reviewing thesis. Discussion about graduation exam and requirements for thesis presentations. Information about the scope and form of thesis presentations	2
S4	Students' presentations of selected elements of their thesis	9

7 TEACHING TOOLS

N1 discussion

N2 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	30
Developing results	10
Preparing of reports, projects presentations, discussion	30
Total number of hours devoted to the subject	**85**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 grade on multimedia presentation of the thesis

Summary grade

P1 grade on multimedia presentation of the thesis

Conditions for passing the course

L1 Preparing a presentation of the thesis and selected problem, presence at the seminar, active participation during the discussion

Assessment of activity without teacher participation

B1 multimedia presentation

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	System Robot
Course name in English	Robot computer code
Course code	WIL BUD oIS E1072 24/25
Course category	Subjects related to Diploma Projects
No. of ECTS points	4.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	0	0	0	30	0	0

3 COURSE OBJECTIVES

Objective 1 Get student familiarized with an integrated computational environment oriented on Civil Engineering.

Objective 2 Show and explain selected aspects of practical numerical analysis (definition of geometry and loads) and their influence on quality of final results. Let students master dimensioning basic structural components.

Objective 3 Let students master basics of preparing documentation in an electronic form.

Objective 4 Develop a habitual critical approach to results obtained using computerized engineering support.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic knowledge on Finite Element Method, basics of reinforced concrete structure and metal structure design.

5 LEARNING OUTCOMES

LO1 Knowledge Student is familiarized with Robot computer code.

LO2 Skills Student defines geometry (shape and boundary conditions), defines loads and load combina- tions for simple engineering structure according to rules of Robot computer code.

LO3 Knowledge Student performs engineering calculations for a linear and nonlinear statics problem using Robot computer code, including dimensioning of main structural components. Student prepares a presentation of obtained solution.

LO4 Skills Student prepares basic documentation of a design solution obtained by himself.

LO5 Skills Student performs a critical analysis of numerical results obtained by himself.

LO6 Knowledge Student prepares, shows and defends a presentation on his design, including a critical analysis of obtained results.

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Autodesk Student Community, course passing rules, general introduction to "Robot" structural code - preferences, case preferences.	2
K2	Exercise 1 - design for a 3D frame structure - definition of geometry and loads, copying, automatic load combinations, calculations, display of results.	2
K3	Exercise 2 - design for 3D frame structure - modification of geometry and loads, gamma angle, manual load combinations, verification and dimensioning of structural components.	2
K4	Exercise 3 - design for 3D frame structure - dimensioning of bar joints, climate loads, screen shots, documenting design.	2
K5	Exercise 4 - design for 3D frame structure - advanced bar characteristics, nonlinear analysis. First design exercise issued and discussed.	3
K6	Exercise 5 - design for reinforced concrete plate - definition of geometry and loads, reinforcement parameters, FEM mesh generation, display of results, reinforcement dimensioning, documenting design. Second design exercise issued and discussed.	5
K7	Exercise 6 - design for reinforced concrete structure - definition of geometry and loads, FEM mesh generaton, display of results, dimensioning reinforced concrete structural components (column, beam, plate, wall), documenting design.	3

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K8	Exercise 7 - design for steel shell structure - definition of geometry and loads, geometrical limits, calculations, display of results.	2
K9	Exercise 8 - design for 3D steel truss structure subject to moving loads - definition of geometry and loads, prestressing, calculations, display of results.	2
K10	Exercise 9 - dynamic analysis of a 3d steel shell structure - definition of geometry and loads, modal analysis, dynamic analysis, calculations, display of results.	2
K11	Exercise 10 - dimensioning of a footing - soil calculator, soil database, geometry of a footing, surface area loads in the vicinity of designed footing.	2
K12	Exercise 11 - thermal loads - definition of loads on spherical shell, calculations, display of results in various coordinate systems.	2
K13	Presentation of student projects.	1

7 TEACHING TOOLS

N1 Multimedia presentations

N2 Laboratory exercises

N3 Consultations

N4 Discussion

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	15
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	25
Preparing of reports, projects presentations, discussion	15
Total number of hours devoted to the subject	**100**
Total number of ECTS points	4.00

9 Methods of grading

Partial grades

F1 Individual design exercise

Summary grade

P1 Mean of formative grades

Assessment of activity without teacher participation

B1 Indirectly via evaluation of design exercises

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	Technologia betonu
Course name in English	Technology of Concrete
Course code	WIL BUD oIS C23 24/25
Course category	Basic
No. of ECTS points	3.00
Semester	3

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

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

3 COURSE OBJECTIVES

Objective 1 TO FAMILIARIZE STUDENTS WITH CONSTITUENT MATERIALS FOR ORDINARY CONCRETE, THEIR PROPERTIES, TEST METHODS AND REQUIREMENTS.

Objective 2 TO FAMILIARIZE STUDENTS WITH BASIC PHENOMENONS OCCURRING IN CEMENT PASTE.

Objective 3 TO FAMILIARIZE STUDENTS WITH RULES OF DESIGNING OF CONCRETE MIXTURE COMPO- SITION AND MEASUREMENTS OF ITS BASIC PROPERTIES.

Objective 4 TO FAMILIARIZE STUDENTS WITH BASIC PROPERTIES OF HARDENED CONCRETE, METHODS OF THEIR TESTING AND GENERAL QUALITY CONTROL PRINCIPLES.

Objective 5 TO FAMILIARIZE STUDENTS WITH BASIC TECHNOLOGICAL PROCESSES AND THEIR INFLU- ENCE ON FINAL PROPERTIES OF CONCRETE IN A MEMBER OR A STRUCTURE

Objective 6 TO PREPARE STUDENTS FOR TEAM WORKING

Objective 7 TO PREPARE STUDENTS FOR RESEARCH

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 BASIC KNOWLEDGE ON CHEMISTRY AND PROPERTIES OF MINERAL BINDERS

2 BASIC KNOWLEDGE ON STRENGTH OF MATERIALS

5 LEARNING OUTCOMES

LO1 Knowledge A STUDENT KNOWS BASIC GROUPS OF CONSTITUENTS MATERILAS OF ORDINARY CONCRETE AND THEIR GENERAL ROLE IN THE CONCRETE.

LO2 Skills A STUDENT KNOWS BASIC PROCESSES OCCURING IN CEMENT PASTE.

LO3 Knowledge A STUDENT KNOWS BASIC RELATIONSHIPS BETWEEN CONCRETE COMPOSITION AND PROPERTIES OF FRESH AND HARDENED CONCRETE.

LO4 Skills A STUDENT KNOWS BASIC PROPERTIES OF HARDENED CONCRETE

LO5 Skills A STUDENT KNOWS BASIC TECHNOLOGICAL PROCESSES AND CAN EXPLAIN THEIR INFLUENCE ON QUALITY OF HARDENED CONCRETE.

LO6 Knowledge A STUDENT CAN DESIGN COMPOSITION OF ORDINARY CONCRETE OF ASSUMED PROPERTIES.

LO7 Skills A STUDENT CAN CARRY OUT LABORATORY TESTS OF BASIC PROPERTIES OF CONCRETE CONSTITUENT MATERIALS, FRESH AND HARDENED CONCRETE.

LO8 Knowledge A STUDENT CAN WORK INDIVIDUALLY AND COOPERATE IN A TEAM ON AN ASSIGNED TASK.

LO9 Knowledge A STUDENT IS RESPONSIBLE FOR THE RELIABILITY OF THE ACHIE- VED RESULTS OF HIS/HER WORK AND THEIR INTERPRETATION.

6 COURSE CONTENT

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Testing basic properties of cement. Making paste of standard consistence for determination of setting time. Making standard mortar and preparation of specimens for cement strength test. Testing cement flexural and compressive strength and determination of cement class.	2

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L2	Testing basic properties of aggregate: sieve analysis, determination of loose and compacted bulk densities, determination of tightness and voids content. Selection of optimal aggregate grading for concrete by a method of successive approximations.	2
L3	Making concrete mixture designed by a trial method. Testing its basic properties: density, consistence (by slump test, Vebe test, Degree of compatibility test and flow table test), air content by pressure method. Moulding specimens for strength tests.	2
L4	Approval of assumptions and correction of calculations of concrete composition for individually assigned subjects of a design project.	3
L5	Testing basic properties of hardened concrete: density, compressive strength, flexural strength, tensile splitting strength. Determination of compressive strength class of the concrete. Demonstration of stands for testing freeze/thaw resistance and water permeability of concrete.	2
L6	Non-destructive testing: presentation of basic methods of testing hardened concrete in a structure. Determination of rebound number with a sclerometer of N-type.	2
L7	Solving problems applying in design of concrete composition, prediction of hardened concrete properties and concrete strength classification.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to ordinary concrete. Basic therms, components, definitions and classifications. Concrete application. Special types of concrete.	2
L2	Portland cement: production outline, oxide and mineralogical composition of cement clinker. General survey of common cements. Basic information on cement setting and hardening process. Cement paste and water/cement ratio. The role of cement paste in moddeling of basic concrete properties.	2
L3	Aggregate and its role in concrete. Classification, basic properties and requirements. Relationship between voids content, specific surface and cement paste demand.	2
L4	Water for concrete, its classification and role in concrete mixture. Consistence condition. Chemical admixtures for concrete and their general classification. Fresh concrete and its basic properties. Tightness condition.	2
L5	Hardened concrete: definition, general characteristic, role in structural members, structure, types of properties.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L6	Mechanical properties of hardened concrete: Compressive strength: classification, conformity criteria, formulas. The other mechanical properties:tensile strength; modulus of elasticity, creep. Factors affecting mechanical properties of concrete. Concrete deformability under load.	2
L7	Physical properties of hardened concrete: density, volume changes of unload concrete (thermal expansion and contraction, drying and autogenous shrinkage, swelling). Durability: deffinition, working life, types of detrimental actions, factors determining durability, exposure classes, requirements concerning concrete composition and properties.	2
L8	Basic technological processes (mixing, delivery, placing, compaction and curing) and their influence on quality of concrete in a member or a structure.	2

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Common cements. Types of cements, their application fields, classification, basic properties and their testing.	2
C2	Aggregates for concrete. Classification, types of tests, test methods for basic properties, methods of optimal aggregate selection for concrete.	2
C3	Concrete mixture. Basic properties and their test methods. Practical method of designing concrete composition.	2
C4	Chemical admixtures and mineral additives for concrete. Basic types, effects and fields of application.	2
C5	Designing concrete composition by analytical methods: of sand point, of covering of coarse aggregate particles with mortar, of overfilling voids of coarse aggregate particles with mortar.	3
C6	Testing properties of hardened concrete. Testing mechanical properties: compressive strength, tensile splitting strength, flexural strength. Rules for determination of concrete compressive strength class. Testing physical properties: density, water absorption, depth of penetration of water under pressure, freeze/thaw resistance.	2
C7	Destructive, semi-destructive and non-destructive methods of testing concrete in an element or construction.	2

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Laboratory classes

N4 Work in groups

N5 Table tasks

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	45
Consultation hours	6
Exams and tests during session	6
Hours of autonomous student work	
Preparing for classes, studying literature	12
Developing results	9
Preparing of reports, projects presentations, discussion	12
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

To obtain a positive grade in the subject a student should achieve all learning effects specified for the subject, with at least the criteria for grade 3.0 being met.

Partial grades

F1 Written test on the material delivered in lectures

F2 Written test on the material delivered in tutorials and laboratories

F3 Oral defence of the individual project

Summary grade

P1 Weighted average of forming grades ((F1 - 0,5; F2 - 0,3; F3 - 0,2)

Conditions for passing the course

L1 Getting credits for all forms of classes.

L2 Participation in tutorials and laboratory classesies. One unjustified absence in each form of classes is accepted.

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	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	Tunele, parkinkgi, przejścia podziemne
Course name in English	Tunnels, car-parks, underground passages
Course code	WIL BUD oIS E3262 24/25
Course category	Subjects related to Diploma Projects
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	0	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 Knowledge of the principles of construction of underground passages under different communication routes. Knowledge preparing students to solve engineering tasks as well as to participate in scientific research in the eld of design and construction of underground structures.

Objective 2 Knowledge of the methods of the tunnels construction and tunnels equipment: lighting, drainage, pavements, ventilation.

Objective 3 Knowledge of the principles for determining the dead and live loads of shallow tunnels: loads of the floor slab, walls and bottom plate. Knowledge preparing students to solve engineering tasks as well as to participate in scientific research in the eld of design and construction of underground structures.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Completing the course: Strength of Materials

3 Completing the course: Concrete Structures

4 Completing the course: Soil Mechanics

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the rules and methods of the construction of the tunnels and underground crossings.

LO2 Skills The Student knows the rules of determining the dead and live loads of shallow tunnels

LO3 Knowledge The student is able to prepare the structural drawings of the shallow underground crossing and is able to prepare load specification for the structure.

LO4 Knowledge The student works independently and cooperates in a team and is responsible for the reliability of the work performed.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Organizational topics for Tunnels, car-parks, underground passages classes. Conceptual design of the communication solutions and structural system of the concrete underground passage.	2
P2	Elaboration of the concept of structural solution of underground passage for pedestrians - cross-section. Choosing of the elements of the tunnel equipment: lighting, drainage, pavements. Preparation of structural drawings.	4
P3	Elaboration of the concept of structural solution of underground passage for pedestrians - longitudinal section, top view. Preparation of structural drawings.	3
P4	Loads of underground structures. Load specification and combination.	2
P5	Specification of shallow tunnels construction methods	4

7 TEACHING TOOLS

N1 Design classes

N2 Multimedia presentations

N3 Work in groups

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	15
Consultation hours	2
Exams and tests during session	0
Passing the project	1
Hours of autonomous student work	
Preparing for classes, studying literature	4
Developing results	4
Preparing of reports, projects presentations, discussion	4
Total number of hours devoted to the subject	**30**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Team project

F2 Oral answer

Summary grade

P1 Average of forming grades

Conditions for passing the course

L1 Correctly made project and 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	Wprowadzenie do BIM
Course name in English	Introduction to BIM
Course code	WIL BUD oIS C39 24/25
Course category	Basic
No. of ECTS points	0.50
Semester	5

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
5	8	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Familiarizing students with the concepts of the modern information technology methods and solutions for the construction industry and their role in changing paradigms of the design, analysis, construction and management of the built environment

Objective 2 Familiarize students with the latest BIM tools and workflows in the BIM-oriented project delivery, information models of buildings, their creation during design phaze and versatile use in the life cycle of the object.

Objective 3 Familiarizing students with new collaborative BIM processes of the construction industry, a new sociology of work, new processes of ensuring information quality and the role of new technologies in the delivery of modern, sustainable, pro-ecological and pro-social building objects.

Objective 4 Familiarizing students with the capabilities of the BIM technology in information management, cost reduction and increasing the overall efficiency of the construction industry at the execution of construction works and operation of the assets.

Objective 5 Presentation of the role and importance of BIM technology and methodology in the context of other dynamic phenomena of the construction industry digitization: mobile technologies, reverse engineering with the use of modern 3D imaging/measuring tools, additive manufacturing, IoT, as well as augmented and virtual reality (AR/VR) techniques.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 A general knowledge of the construction projects, their design, construction and operation

2 A general knowledge of CAD systems

3 Some experience in actual designing and/or scheduling/estimating construction projects as well as in the IT area (data structures, database system) will be welcome

5 LEARNING OUTCOMES

LO1 Knowledge Students know the basic concepts of BIM technology and methodology, see the fundamental differences between CAD and BIM technology, know what is structural and semantic information, what is an information model of a building / structure, are aware that BIM technology describes a building object as a database of semantic components, relationships and limitations which they are subject to and the processes they generate. Students are aware how BIM relate to other digital methods of modern construction, like reverse engineering technologies (3D laser scanning / 3D photogrammetry, georadar techniques, virtual reality technology (VR / AR).

LO2 Skills Students know that the information model data can be used extensively throughout the object's lifecycle, know new BIM tools and processes, are aware of the universality of the BIM data models and the possibility of using it for various analyses. Students distinguish BIM modeling from BIM information management, know the advantages of BIM in the design, scheduling, costing, construction and operation of building structures. They know the basics of integrated project delivery (IPD) and the role of BIM as a platform integrating the IPD processes. Students know native and open BIM formats and differences between them. They know the BIM context in the public procurement law.

LO3 Knowledge Students know the BIM software ecosystem and are competent to choose right programs for given BIM worlkflows. They are able to select the right file formats for a planned information exchange

LO4 Skills Student is able to do a rather simple costing/scheduling based on BIM models, can plan the BIM use in planning and execution of construction works

LO5 Knowledge Student are aware that the BIM revolution is also of social kind, creates and/or redefines roles and responsibilities on the labor market, know that the new roles and functions related to BIM create opportunities for self development and vocational training. Students are aware of the new BIM teamwork and multi-discipline processes, are aware of the role of soft skills and openness to others, are aware of the growing importance of the information technology in the construction industry and importance of continuous learning. They are aware of the relationship between the BIM methodology and sustainable construction, green construction, lean construction.

LO6 Knowledge Students can work in teams on team projects, share work and responsibility. They can search for information and critically evaluate information suitability, can form opinions and effectively communicate knowledge and enthusiasm for new technologies also with use of modern techniques like multi- media presentations.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	The nature and importance of information in construction industry. Traditional circulation of design information and the digital revolution. Why CAD technology did not solve the problems of digitalization of construction industry. What is structural and semantic information, what is the information model, what is the information model of the building / structure. BIM as a true digital revolution in the construction industry. IT foundations of BIM technology: parametric 3D modelers, intelligent BIM components, data semantics. BIM as a life cycle system. BIM and PLM, BIM in the context of lean and sustainable construction.	2
L2	Digital twins: BIM models and the building objects and the "Build-it-twice" rule. The BIM model as the central database of building objects. Bew-Richards taxonomy of BIM maturity levels. BIM dimensions from 3D to 7D (and beyond). New BIM processes: concurrent work, inter-disciplinary cooperation, digital information exchange in the life cycle of a building, 3D information coordination and collision detection. The BIM tools ecosystem. The challenges of digitization and the new role of Digital Construction Engineer (DCE).	2
L3	Building Information Modeling vs Building Information Management. Communication as one of BIM drivers. BIM-centric information management tools. IPD (Integrated Project Delivery). BIM-based documentiion for project outset. BIM and public procurement. BIM in scheduling and costing of construction projects. Teamwork project.	2
L4	Mobile devices. Drones/3D laser scanning as a tool for inventory and inspection of construction works. Virtual and Augmented reality. 3D printing of building objects. BIM technology for project managers and inspectors.	2

7 TEACHING TOOLS

N1 Lectures

N2 Teamwork

N3 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	8
Consultation hours	2
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	3
Developing results	0
Preparing of reports, projects presentations, discussion	2
Total number of hours devoted to the subject	**15**
Total number of ECTS points	0.50

9 Methods of grading

Partial grades

F1 Test

F2 Project group

Summary grade

P1 Average of the forming grades

Conditions for passing the course

L1 Positive final 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	Wprowadzenie do ekonomiki budownictwa
Course name in English	Introduction to Economics in Civil Engineering
Course code	WIL BUD oIS D50 24/25
Course category	Przedmioty profilowe
No. of ECTS points	2.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	7	0	0	8	7	0

3 COURSE OBJECTIVES

Objective 1 To familiarize students with the basics of assessment of the construction projects' profitability.

Objective 2 To prepare students to conduct research involving assessment of the construction projects' profitability.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge A student knows the concept of the time value of money.

LO2 Skills A student knows basic measures of construction projects' profitability.

LO3 Knowledge A student can calculate the future value, the present value, the periodic payment equivalent to the future value and the periodic payment equivalent to the present value using the formulas and financial functions of MS Excel.

LO4 Skills A student can calculate the basic measures of construction projects' profitability using the formulas and financial functions of MS Excel.

LO5 Knowledge A student honestly interprets the results of his work and assesses the construction projects' profitability.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Profitability assessment of an example construction project.	7

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Time value of money.	3
L2	Basic measures of construction projects' profitability	4

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Calculating the future value, the present value, the periodic payment equivalent to the future value and the periodic payment equivalent to the present value using the formulas and financial functions of MS Excel.	2
K2	Calculating the basic measures of construction projects' profitability using the formulas and financial functions of MS Excel.	3
K3	Comparison of the profitability of construction projects based on basic measures.	3

TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Laboratory exercises

N4 Design exercises

N5 Consultations

7 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	22
Consultation hours	1
Exams and tests during session	1
Hours of autonomous student work	
Preparing for classes, studying literature	12
Developing results	12
Preparing of reports, projects presentations, discussion	12
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

8 Methods of grading

Partial grades

F1 Individual project

F2 Test - computer laboratories

F3 Test - lecture

Summary grade

P1 Weighted average of formative grades (weights: 0.4 for lecture grade, 0.3 for project grade and 0.3 for computer laboratory grade)

Conditions for passing the course

L1 Passing the calculation tasks and test at computer laboratories.

L2 Passing the project.

L3 Passing the 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	Wprowadzenie do profili dyplomowania
Course name in English	Introduction to Diploma Profiles
Course code	WIL BUD oIS C40 24/25
Course category	Basic
No. of ECTS points	0.50
Semester	5

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
5	12	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Presentation of the proposed diploma profiles, taking into account the specificities of individual chairs supervising diplomas for 1st cycle students.

Objective 2 Presentation of sample subjects of diploma theses.

Objective 3 Presentation of the specialties offered at the MSc. Degree level which are a continuation of individual diploma profiles.

Objective 4 Presentation of the labor market in terms of the demand for graduates of individual specialties.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge The student is aware of the need to deepen knowledge in the field of construction.

LO2 Knowledge The student is aware of the need to deepen his professional competence.

LO3 Knowledge Student formulates opinions on technical and technological processes in construction.

LO4 Knowledge The student is aware of the need for mobility in the labor market.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Presentation of the offer of diploma profiles related to construction issues (concrete, prestressed, metal, timber and masonry structures, general and industrial construction, bridge structures). Presentation of job offers related to the above topics (with the possible participation of local employers) and the possibility of continuing education in the above-mentioned specialties at MSc. level studies.	4
L2	Presentation of the offer of diploma profiles related to the subject of building materials engineering, energy-saving construction, design and maintenance of rail and road infrastructure. Presentation of job offers related to the above topics (with the possible participation of local employers) and the possibility of continuing education in the above-mentioned specialties at MSc. level studies.	3
L3	Presentation of the offer of diploma profiles related to technology and organization in construction as well as planning and cost analysis. Presentation of job offers related to the above topics (with the possible participation of local employers) and the possibility of continuing education in the above-mentioned specialties at MSc. level studies.	2
L4	Presentation of the offer of diploma profiles related to issues of mechanics of materials and building structures, geotechnics and computer modeling. Presentation of job offers related to the above topics (with the possible participation of local employers) and the possibility of continuing education in the above-mentioned specialties at MSc. level studies	3

7 TEACHING TOOLS

N1 Multimedia presentations

N2 Lectures

N3 Discussion

8 Student workload

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	12
Consultation hours	0
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	0
Developing results	0
Preparing of reports, projects presentations, discussion	0
Selection of the diploma profile based on the information acquired during lectures	3
Total number of hours devoted to the subject	**15**
Total number of ECTS points	0.50

9 Methods of grading

Summary grade

P1 Attendance

Conditions for passing the course

L1 Selection of diploma profile from the offer presented

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	Wybrane problemy mostownictwa
Course name in English	Selected issues of bridge design
Course code	WIL BUD oIS E3261 24/25
Course category	Subjects related to Diploma Projects
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 knowledge of foundation engineering. Bridge foundations: shallow (spread footings) and deep foundations (displacement piles and screw piles). Bridge substructure - shaping and dimensioning of bridge supports (abutments, piers, columns, etc.)

Objective 2 Understanding the basic construction methods for concrete, steel and composite bridges (short and long span structures) and their impact on the dimensioning of the structure.

Objective 3 Basic knowledge of modern trends in bridge engineering: design of steel, concrete and composite bridge structures.

Objective 4 Basic understanding of the importance of hydrologic and hydraulic calculations for bridge structures. Calculation of minimum area under the bridge. Understanding the principles of a design of small culverts, small bridges and footbridges across creeks and rivers.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge about the strength of materials and structural mechanics

2 Knowledge about design and construction of concrete structures, steel structures

5 LEARNING OUTCOMES

LO1 Knowledge Student has the knowledge on foundation engineering and bridge foundations in particular. Student has the basic knowledge about shallow (spread footings) and deep foundations (displacement piles and screw piles), bridge substructure - shaping and dimensioning of bridge supports (abutments, piers, columns, etc.)

LO2 Skills Student has the knowledge on the basic construction methods for concrete, steel and composite bridges (short and long span structures) and their impact on the dimensioning of the structure.

LO3 Knowledge The student has a basic understanding of the importance of hydrologic and hydraulic calculations for bridge structures. Calculation of minimum area under the bridge. Understanding the principles of design of small culverts, small bridges and footbridges across creeks and rivers.

LO4 Skills The student is able to design the solid abutment of the bridge structure (selecting preliminary abutment dimensions, analyzing and combining force effects) and the concrete slab of the road bridge.

LO5 Knowledge Ability to effectively work in teams, lead a team or be a part of a design team.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Organizational topics for Selected issues of bridge design classes. Bridge substructure substructures - shaping and dimensioning of bridge supports (abutments, piers, columns, etc.) Bridge foundations: shallow and deep foundations.	4
L2	Construction methods for concrete, steel and composite bridges (short and long-span structures) and their impact on the dimensioning of the structure. Loads combinations rules for the bridge deck designing in the road bridges.	4
L3	Modern trends in bridge engineering: design of steel, concrete and composite bridge structures.	4
L4	Hydrologic and hydraulic calculations for bridge structures. Calculation of minimum area under the bridge. Understanding the principles of a design of small culverts, small bridges and footbridges across creeks and rivers.	3

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Part 1: Obtaining design criteria, selecting optimum abutment type and selecting preliminary abutment dimensions.	2
P2	Computing dead load effects, live load effects and other effects on backwall, stem and footing.	2
P3	Analyzing and combining force effects on backwall, stem and footing. Checking stability and safety requirements.	3
P5	Part 2: Development of the concrete road bridge concept (cross-section).	2
P6	Dead and live load specification and combination for bridge slab. Design of reinforced slab in plate girder road bridge.	4
P7	Preparation of the structural drawing of the bridge slab reinforcement.	2

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Discussion

N4 Design exercises

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	2
Exams and tests during session	0
Passing the project	2
Hours of autonomous student work	
Preparing for classes, studying literature	8
Developing results	10
Preparing of reports, projects presentations, discussion	8
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Lecture - written assignment

F2 Team project - correct preparation of the project

F3 Team project - oral answer

Summary grade

P1 Average of forming grades

Conditions for passing the course

L1 The average of forming grades minimum 3.0

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	Wybrane zagadnienia z materiałów budowlanych
Course name in English	Selected issues of building materials
Course code	WIL BUD oIS E2161 24/25
Course category	Subjects related to Diploma Projects
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 Expanding students' knowledge of the newest building materials and products

Objective 2 Presentation of basic relationships between the production and use of building materials, and the principles of sustainable development

Objective 3 Providing students with the materials used to repair concrete elements and structures, and the basic principles of their selection

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge of Chemistry, Building materials and Technology of concrete

5 LEARNING OUTCOMES

LO1 Knowledge of modern building materials and products as well as their development trends

LO2 Knowledge Awareness of the need to respect the principles of sustainable development in the pro- duction process and the use of building materials

LO3 Knowledge of the properties, directions and methods of application of repair materials

LO4 Skills Students' ability to select and apply modern building materials and products conscio- usly and independently

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Revision of the basic physical properties, porous structure and principles connected with durability of building materials	2
L2	Production and application of building materials and products vs. the sustainable development	2
L3	Presentation of selected modern building materials (from the groups of thermal and damp insulation materials, ceramic materials, etc.)	7
L4	Materials for repairing reinforced concrete elements (characteristics and classification, criteria and rules for the selection and application)	3
L5	Recent trends in the development of building materials and products	1

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Office hours

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	2
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	0
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**29**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Test

Summary grade

P1 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	Wytrzymałość materiałów
Course name in English	Strength of Materials
Course code	WIL BUD oIS C25 24/25
Course category	Basic
No. of ECTS points	10.00
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	30	0
4	30	15	15	0	0	0

3 COURSE OBJECTIVES

Objective 1 To familiarize the students with basic notions, definitions and theorems of the statics of plane bar statically determinate structures.

Objective 2 To familiarize the students with fundamentals of mechanics of continua and boundary problems as theoretical basis to analyze simple and complex cases of strength of materials in order to learn design rules for cross- sections in limit states of bearing capacity and usability.

Objective 3 To familiarize the students with working of beam elements in nonlinear range to establish material reserves in the case of the work in the elastic-plastic range.

Objective 4 To familiarize the students with the stability problem of straight bars (without imperfections) along with the simple analyses of effective design of such bars.

Objective 5 To draw students' attention to the importance of understanding of theoretical and experimental results and the ability to interpret them in order to avoid the error of uncritical confidence in standards and numerical results preparing them for performing scientific work

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Credit for 1st year of mathematics and 1st semester of theoretical mechanics

5 LEARNING OUTCOMES

LO1 Knowledge Student has ordered and theoretically founded knowledge in the scope of statics of bar structures statically determined.

LO2 Skills Student can draw the cross-section forces diagrams for beams, arches, trusses and combined structures.

LO3 Knowledge Student has knowledge of simple and composed cases of building elements and uses it to design structural elements in the limit states of strength and usability.

LO4 Skills Student can identify the working case and design cross-section in simple stress state as well as in complex stress state.

LO5 Skills Student has the basic knowledge of non-elastic behavior of simple beam elements and analyses limit bearing capacity in elastic and plastic range.

LO6 Knowledge Student has sufficient knowledge of the stability problem of straight bars, its importance in design and can analyze simple engineering cases.

LO7 Skills Student has basic knowledge of recent trends in the subject matter of the strength of materials.

LO8 Knowledge Student can formulate tasks and independtly or in group work on them.

6 COURSE CONTENT

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Importance of experiments in Strength of Materials.	2
L2	Introduction to the strain gauges: mechanical and electric.	2
L3	Quasi-static tensile strength test of metal samples. Elastic and non-elastic behaviour of material during tension. Mechanisms of failure.	4

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L4	Verification of the equations of linear theory of elasticity through determination of elastic modulus from elongation and deflection measurement.	2
L5	Photoelastic analysis of structures. Photoelastic and strain gauges analysis of the stress in beams and shields.	3
L6	Stress state analysis in curved bars and its verification by strain gauges experiments.	2

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Geometric characteristics of cross-section.	2
C2	Torsion of bars with circular, rectangular and thin-walled cross-section.	2
C3	Simple and biaxial bending.	3
C4	Eccentric tension, cross-section core.	2
C5	Transversal bending.	2
C6	Limit analysis of beams in elastic-plastic range.	2
C7	Analysis of structure in complex stress states.	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Classification of structures, loadings and constraints. Geometric rigidity.	2
P2	Determination of constraints reactions.	2
P3	Determination of cross-sectioon forces in simple beams.	2
P4	Determination of cross-sectioon forces in not single span beams.	2
P5	Determination of cross-sectioon forces in continuous beams.	2
P6	Determination of cross-sectioon forces in slanted beams.	2
P7	Determination of cross-sectioon forces in frames.	2
P8	Determination of cross-sectioon forces in circular and parabolic arches.	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P9	Determination of cross-sectioon forces in trusses.	2
P10	Determination of cross-sectioon forces in combined structures.	2
P11	Stress state analysis. Static boundary conditions. Shields.	2
P12	Strain state analysis. Kinematic boundary conditions.	2
P13	Constitutive equations of elastic continua.	2
P14	Torsion of bars with circular, rectangular and thin-walled cross-section.	2
P15	Completion and reserve.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to the subject of Strength of Materials (SM). Basic notions and assumptions. Internal and cross-sectional forces.	4
L2	Cross-section forces in plane bar structures. Static calculations for simple and continuous beams, frames, circular and parabolic arches. Forces in trusses.	10
L3	Theory of stress state - basic definitions and notions. Stress matrix and its transformation at coordinate set rotation. Principal stresses. Equations of equilibrium (Navier's) in material point. Static boundary conditions.	5
L4	Theory of strains state and displacements of material point. Strain matrix and displacements vector. Geometric equations (Cauchy's). Kinematic boundary conditions.	3
L5	Constitutive equations for linearly elastic material (Hooke's). Stiffness and compliance matrices. Boundary problem formulation in linear theory of elasticity.	3
L6	Geometric characteristics of cross-section - static and inertia moments. Matrix of inertia and its transformation due to coordinate set rotation and translation (Steiner's theorems). Principal, central axes and inertia moments.	2
L7	Boundary problem formulation for twisted straight bars. Torsion of bars with circular and rectangular cross-section. Approximate analysis of torsion of thin-walled profiles.	4
L8	Analysis of simple and composed cases (tensions, simple bending, biaxial bending, eccentric tension, transversal bending).	12
L9	Determination of beams' deflections using differential equation and Mohr's analogy.	4

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L10	Analysis of axially compressed struts strength - Euler's problem. Cross-section design. Design of steel members.	5
L11	Non-elastic behavior of elastic-plastic materials. Limit elastic and plastic bearing capacity of the cross-section and the bar structure (kinematic method).	4
L12	Elastic energy of continua and its determination for bar member (Maxwell-Mohr's formula). Effect hypotheses for structure elements (Galileo, Coulomb, Tresca-Guest, Huber-Mises-Hencky and Mohr hypotheses).	4

7 TEACHING TOOLS

N1 Lectures

N2 Exercises

N3 Laboratories

N4 Design classes

N5 Office hours

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	15
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	60
Developing results	10
Preparing of reports, projects presentations, discussion	80
Total number of hours devoted to the subject	**290**
Total number of ECTS points	10.00

9 Methods of grading

Partial grades

F1 Test

F2 Individual project

F3 Laboratory exercise report

F4 Final test

Summary grade

P1 Weighted average of forming grades

Conditions for passing the course

L1 Active participation in lectures and classes - presence will be verified and taken into consideration

L2 Design projects approved on time

L3 Positive grade from the design tests

L4 Positive grade from the final test

Assessment of activity without teacher participation

B1 Individual 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	Zarządzanie w budownictwie
Course name in English	Management in Civil Engineering
Course code	WIL BUD oIS D50 24/25
Course category	Przedmioty profilowe
No. of ECTS points	2.00
Semester	7

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	8	0	0	0	15	0

3 COURSE OBJECTIVES

Objective 1 The aim of the course is to introduce students to the nature and role of management in construction.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge Students know and understand the mastered key management concepts related to business.

LO2 Skills Students know and understand the management functions.

LO3 Knowledge Student is able correctly interpret and explain the concepts of business management.

LO4 Knowledge Student is aware that lifelong learning is necessity.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
P1	Development project: due diligence analysis	5
P2	Development project: swot analysis	10

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to management.	2
L2	Swot analysis as a strategic planning tool.	2
L3	Management role, skills and functions	2
L4	Lean management and lean construction	2

7 TEACHING TOOLS

N1 Lectures

N2 Work in groups

N3 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	23
Consultation hours	7
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	8
Developing results	5
Preparing of reports, projects presentations, discussion	5
Total number of hours devoted to the subject	**50**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Passing lectures

F1 Team project

Summary grade

P1 Average from lectures (60%) and projects (40%)

Conditions for passing the course

L1 Positive final rating (3.0 or higher)

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	Zasady makroekonomii (obecny kontekst europejski)
Course name in English	Principles of Macroeconomics (the Current European context)
Course code	WIL BUD oIS A6 24/25
Course category	Przedmioty ogólne
No. of ECTS points	3.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
1	30	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Study of basic macroeconomic concepts in relation to various economic issues in the European Union countries, such as opening of the labor markets, aging of population, spillover effects of trade and capital flows, with a focus upon the European-style socially-oriented model of development.

Objective 2 Obtaining basic skills of the analysis within the fields of income accounting and the balance-of-payments, consumption and saving decisions, capital and labor market functioning.

Objective 3 Making use of formal economic constructions, as IS-LM-BP and AD-AS models, for analytical interpretation of such applied issues as (a) capital flows between EU countries, (b) excessive debt accumulation, (c) determination of nominal and real exchange rates, (d) macroeconomic policy coordination.

Objective 4 Ability of independent evaluation of macroeconomic (monetary and fiscal) policies in either core European Union countries or the Central and Eastern European (CEE) countries.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge of basic economic concepts.

2 Solution of linear equations.

5 LEARNING OUTCOMES

LO1 Knowledge Student demonstrates a proper command of income and balance-of-payment accounting and such concepts as the real exchange rate and law of one price within the framework of standard textbook macro- economic models, being able to distinguish pros and cons of the consumption-led vs. export-led growth, as well socially-oriented vs. liberal economic development model. Modern challenges to various national models of economic development should be understood.

LO2 Skills Student is able to interpret analytically within the framework of the saving-investment balance policy implications of several macroeconomic developments, such as changes in the consumption pattern, aging of population, public and private debt accumulation etc.

LO3 Knowledge Student is able to explain most important links between income redistribution and long-term growth, as contrasted with standard neoclassical and human capital growth models. Student distinguishes between traditional and endogenous growth factors, being able to discuss actual proposals for the innovation policies, educational goals and globalization challenges to the European countries.

LO4 Skills Student has analytical qualifications for a thorough analysis of the fiscal-monetary mix within the framework of IS-LM-BP and AD-AS models, being able to explain effects of demand and supply shocks as well as the pros and cons of stabilisation policies.

LO5 Skills Student is able to discuss basic features of the monetary union, requirements of the Stability and Growth Pact (SGP), relationship between tax competition and income inequality, challenges for policy coordination in the European Union, arguments in favor of the Eurozone accession as well potential risks in the case of leaving it.

LO6 Knowledge Student analyzes the relationship between demand and supply on the labor market and understands the concept of the natural rate of unemployment and jobless growth. Based on the Phillips curve, the income-inflation trade-off is analyzed, within the context of the European countries.

LO7 Skills Student explains the problem of selection in international migration and relevant costs-benefits balance for donor and source countries. Recent experience of European countries with opening of their labor markets is analyzed.

LO8 Knowledge Student explains different aspects of economic growth in the CEE countries, as trade and capital flows openness, the fiscal-monetary mix and the choice of the exchange rate regime. Several other issues are to be discussed: stabilisation policies of 2008-2009 and post-crisis recovery in the CEE co- untries, challenges of the COVID-19 lockdown, approaches for human capital accumulation, effectiveness of local investment policies etc.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	1.Income, welfare and life satisfaction. Key analytical identities for gross domestic product (GDP) and the balance-of-payments (BOP). Price indexes. Quality of economic growth. Purchasing Power Parity. The Law of One Price. Income and well-being. Satisfaction and comparison income. The rise of the modern welfare state, ideology and institutions. Welfare State and Life Satisfaction. Wealth and welfare states. Basic income and the two dilemmas of the welfare state.	2
L2	National models of economic development. Consumption-led and export-led growth. Import substitution. The European social model. Evolution of the European-style welfare state. Modern challenges to the Nordic Welfare State.	2
L3	3.Savings and investments in a socially-oriented model of development. Theories of consumption. The permanent income hypothesis. The saving-investment balance. The Feldstein-Horioka puzzle. Incentives for savings. The root causes of the European imbalances. The Ricardo Equivalence. External debt.	4
L4	4.Private and public debt accumulation. The government budget constraint, seignorage, and the inflation tax. Determinants of rapid debt accumulation in the European countries. Public debt macroeconomic effects. Dynamic features of public debt. Domestic vs. foreign financing of budget deficit. European Stability and Growth Pact. Non-Keynesian effects in fiscal policy. Public debt challenges for the European Union countries.	2
L5	5.Income redistribution policies and growth. Keynesian and Neoclassical models of economic growth in the long-run. Convergence. Endogenous growth models. Determinants of preferences for income redistribution. Welfare states and income equality. Growth effects of redistribution policies in the European welfare regimes. Bureaucracy-related problems in the welfare state. Welfare systems and educational goals. Globalization and the future of the welfare state.	4
L6	6.Fiscal and monetary policies in the short run. The Mundell-Fleming model as an open economy extension of the IS-LM model. Fiscal-monetary policy mix. Crowding out. Internal and external equilibriums. Demand and supply shocks in the AD-AS model. Devaluation effects. Supply-side economics. Potential output. Overheating.	4
L7	7.Economic cycles in the European countries. Theories of output fluctuations: monetary, psychological, political etc. Imperfect information and the Real Business Cycle Model. New Keynesian explanations of the business cycle: markup pricing, sticky wages, monopolistic price setting, efficiency wages. Stabilisation policies in the wake of the 2008-2009 financial crisis and the COVID-19 lockdown.	2
L8	8.Inflation. Policy implications of the Phillips curve. Redistributive effects of inflation and deflation. Nominal and real interest rates. The Fisher rule. Expectations and the inflation cycle. Anticipated and unanticipated inflation. Stagflation. Cures for inflation. Income policies. Monetarism.	2
L9	9.Monetary union and policy coordination in the Eurozone countries. Stability and Growth Pact (SGP). Tax Competition and social costs of policy coordination. Other challenges for policy coordination in the European Union. Arguments in favor of the Eurozone accession.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L10	10.European labor markets. Voluntary and involuntary unemployment. The natural rate of unemployment. Structural unemployment. The output gap. The Okuns law. Policies to tackle unemployment problems. The phenomenon of jobless growth. National models of labor market. The Employment effects of different regimes of the welfare state taxation: Minimum wage policies in the enlarging European Union.	2
L11	11.Migration flows in the European countries. Models of migration behavior. Return and repeat migration flows. The Roy model of migrant selection. Static and dynamic costs of migration for donor- and acceptor countries. Brain drain. The labor migration trap in donor countries. Challenges for labor market liberalization in the European Union and income distribution in the Welfare states. Welfare-State determinants of individual attitudes towards immigrants.	2
L12	12.Economic developments in the Central and East European (CEE) countries. Potential differences in economic policies between CEE countries with fixed and floating exchange rate. Growth effects of capital inflows. Potential challenges for the Eurozone members among the CEE countries. Stabilisation policies of 2008-2009 and 2020 and post-crisis recovery in the CEE countries. Discussion on the euro adoption issues in Poland.	2

7 TEACHING TOOLS

N1 Lectures

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	20
Exams and tests during session	10
Hours of autonomous student work	
Preparing for classes, studying literature	20
Developing results	10
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Colloquium

F2 Test

Summary grade

P1 Test

P2 Quiz

Conditions for passing the course

L1 50 percent of maximum scores for two quizzes and two tests