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)

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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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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	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)

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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	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	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 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	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	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	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	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	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	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	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	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	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	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	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	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, 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	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