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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Elementy betonowe sprężone i prefabrykowane
Course name in English	Prestressed and Precast Concrete Elements
Course code	WIL BUD oIIS D1 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 Knowing the detailed principles of work, dimensioning, conditions and the possibility of using prestressed concrete structures

Objective 2 Understanding the specifics of precast concrete structures, principles of shaping and dimensioning structures and structural elements

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Completed first degree of studies in the field of Civil Engineering

5 LEARNING OUTCOMES

LO1 Skills Ability to select the type of structure, selection of compression, analysis of the prestressing force over time, dimensioning of prestressed cross-sections due to the requirements of limit states

LO2 Skills The ability to shape the structures of prefabricated buildings, dimensioning and shaping connections

LO3 Knowledge of the applicability of prestressed concrete structures, working principles and dimensioning

LO4 Knowledge of the applicability of prefabrication in reinforced concrete construction

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	About the need to prestress concrete, idea of prestressing. Technology for introducing prestressing force.	2
L2	Prestress losses - causes and classification. Analysis of prestressing force over time and over the length of the tendon. Immediate and rheological prestress losses	2
L3	Limit states and design situations in prestressed structures. Serviceability limit state (stresses in concrete and prestressing steel, deflection, diagonal and perpendicular cracking)	2
L4	Dimensioning of the anchoring zone in post-tensioned elements, anchoring zone in pre-tensioned elements	2
L5	Design of prestressed structures with unbonded tendons and external tendons	2
L6	Design of statically undeterminated elements. Examples of post-tensioning in buildings.	2
L7	Discussion of contemporary prefabricated construction on the example of selected buildings. Constructional concepts of prefabricated buildings.	2
L8	Precast floor systems	1

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
D1	Design of one-span simply-supported post-tensioned concrete beam.	15

7 TEACHING TOOLS

N1 Lectures

N2 Consultations

N3 Design classes

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	0
Preparing of reports, projects presentations, discussion	20
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Practical exercise

F2 Individual project

Summary grade

D1 Design exercise

D2 Practical examp

D3 Theoretical test

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Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Elementy budownictwa energooszczędnego
Course name in English	Principles of Low Energy Building
Course code	WIL BUD oIIS D6 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	2

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

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

3 COURSE OBJECTIVES

Objective 1 Introduction of the basic principles of energy balance and thermal assessement of building.

Objective 2 Introduction to the low energy building design rules.

Objective 3 Introduction to existing standards of low energy building design, detailed solutions.

Objective 4 Computational assessement methods of the components and whole building shell.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Credits for Building Physics

5 LEARNING OUTCOMES

LO1 Skills Student is able to make up the elements of building energy balance.

LO2 Knowledge Student knows the basic rules of design and construction of low energy building.

LO3 Skills Student is able to make the appropriate design decisions regarding a low energy building and its structural details.

LO4 Social competences Student is able to work alone and to cooperate. Student understands the basic ideas of sustainable development.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Building location and orientation. Thermal and moisture aspects of component design. Energy balance elements. Efficiency of heat gain use. Formal requirements and building thermal assessment methods.	3
L2	Low energy building design rules of thumb. Minimization of heat losses and maximization of heat gains. Passive solar energy use.	2
L3	Low energy building standards, basic solutions and design of the structural details. Examples.	2
L4	The principles of the passive solar systems design: direct, indirect, isolated gain. Renewable energy share in building energy balance. Windows and glazing	4
L5	Modern components and systems. Experimental testing methods, infiltration control.	4

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	A concept of a designed building shape and function. Building location and orientation.	2
D2	Selection of the building materials and layer arrangement in the building shell. Thermal resistance of the homogeneous and complex walls. European standard 6946.	4

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D3	Computational methods of heat transfer through the ground: walls and floors below ground level.	2
D4	Computational rules of two-dimensional temperature field. Simplified method. Minimization of the thermal losses.	3
D5	Window sizing procedure. Heat transfer coefficient of the building shell. Simplified energy balance of the building.	4

7 TEACHING TOOLS

N1 Lecture

N2 Presentations

N3 Consultation

N4 Design exercise

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	6
Exams and tests during session	3
Hours of autonomous student work	
Preparing for classes, studying literature	0
Developing results	0
Preparing of reports, projects presentations, discussion	10
Preparation for the final exam	3
Total number of hours devoted to the subject	**52**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Individual project

Summary grade

D1 Written exam

Conditions for passing the course

L1 The final grade is the average of two markss. If the obtained number is inconclusive, the greater importance is attached to the exam result.

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Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Fundamenty specjalne
Course name in English	Special Foundations
Course code	WIL BUD oIIS D2 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 Knowledge of the design of retaining walls, checking the ultimate limit state and serviceability limit state

Objective 2 Get to know the design of diaphragm walls, sheet piles and soil anchors

Objective 3 Retaining structures made of reinforced soil. System retaining structures. Ground replacement.

Objective 4 Get to know the use of geosynthetics to strengthen slopes and soil under the roads

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Bachelor of Science in civil engineering or equivalent

5 LEARNING OUTCOMES

LO1 Knowledge Student defines the active and passive soil pressure and limit states for retaining walls

LO2 Skills Student can design a retaining wall in accordance with standards and local requirements

LO3 Knowledge Student knows diaphragm wall technology, types of sheet piling walls and ground anchors and defines the limit states

LO4 Skills Students can perform static calculations retaining structure resting on the soil

LO5 Knowledge Student gives the types of geosynthetics and can apply them to strengthen the slopes and embankments and roads subgrades

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Retaining wall. Ultimate limit state calculations according to the PN-81/B-03010 and PN-EN-1997-1.	10
D2	Retaining structure based on susceptible soil, calculations using the FEM program.	5

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Retaining wall. Active, and passive earth pressure and pressure at rest.	3
L2	Retaining walls. Limit states according to PN-83/B-03010 and EN- 1997-1.	3
L3	Diaphragm walls, sheet piling, types and conditions for proper execution, limit states.	3
L4	Retaining structures made of reinforced soil. Retaining system (precasted) structures. Ground replacement rules	3
L5	Geosynthetics: types and applications to enhance and strengthen the soil slopes. Values of mechanical parameters.	3

7 TEACHING TOOLS

N1 Lectures

N2 Projects

N3 Counseling

8 STUDENT WORKLOAD

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

9 Methods of grading

Partial grades

F1 Individual project

F2 Test

F3 Oral mark

F4 Colloquium

Summary grade

D1 Project

D2 Oral exam

D3 Weighted average positive mark

Conditions for passing the course

L1 Weighted average of positive mark

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1 COURSE INFORMATION

Course name	Kierowanie budową
Course name in English	Construction Management
Course code	WIL BUD oIIS D12 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	2

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

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

3 COURSE OBJECTIVES

Objective 1 Objective 1: Transfer knowledge concerning the organization and management of construction and the competences of the site manager in this respect.

Objective 2 Objective 2: Prepare students to perform academic research on the methods of planning and monitoring construction projects.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge The student is to know essential terms associated with the theory of the organization of work, organizational structures and management styles

LO2 Knowledge The student is to know the professional competences of the site manager

LO3 Knowledge The student is to become familiar with the essential precepts and procedures of performing, approving and handing over construction work

LO4 Skills The student is to be able to build network models with a determined and undetermined structure and to perform their deterministic and probabilistic analysis for the purposes of effective construction project planning

LO5 Skills The student is to be able to calculate the budget of a construction project and apply selected methods of monitoring construction progress

LO6 Social competences The student is able to interpret the results of analysing network models and the monitoring of construction progress and present the results to stakeholders (possibly non-specialists) in a manner they can understand

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Network planning of construction projects. The PERT method	4
D2	Analysis of the planned construction project for the purposes of preparing the construction budget	5
D3	Planning of the construction budget	6

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Basic terms: Basics of work organization, organizational structures, management styles	2
L2	Construction project planning	4
L3	Construction project budget planning	2
L4	Construction project monitoring	2
L5	Professional competences of the site manager	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L6	Technical requirements of the performance and handover of construction work	3

7 TEACHING TOOLS

N1 Lectures

N2 Tasks on the board

N3 Design exercises

N4 Multimedia presentations

N5 Discussion

N6 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	6
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	5
Preparing of reports, projects presentations, discussion	2
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Preparing an assignment project and its presentation

F2 Test based on lectures

Summary grade

D1 The final grade for lectures, assignment projects and computer laboratory classes is a weighted average (weights: 0.4 for the lectures grade and 0.6 for the assignment grade)

Conditions for passing the course

L1 The student is given a pass grade for the module upon receiving positive grades for lectures and assignments

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Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Komunikacja w organizacji
Course name in English	Communication within an organization
Course code	WIL BUD oIIS A3 23/24
Course category	General subjects
No. of ECTS points	2.00
Semester	3

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

Semester	Lecture	Class exercise	Laboratory	Laboratory Computer	Design exercise	Seminar
3	9	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Providing students with knowledge on basic concepts concerning communication in organization.

Objective 2 Knowledge on principles and methods of effective communication in organization.

Objective 3 Acquiring the skill of effective communication in different professional and social situation.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 None

5 LEARNING OUTCOMES

LO1 Knowledge Student can use the conceptual tools concerning the communication within organization.

LO2 Skills Student can plan and carry out effective communication using proper methods and techniques at working place.

LO3 Skills Student can effectively search for information.

LO4 Social competences Student can effectively communicate in different professional and social contexts.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Fundamental principles of cognitive psychology and communication.	1
L2	Aims, features and models of communication process; cultural norms and codes, emotions in communication.	1
L3	Verbal and non verbal communication; effective listening; public speeches.	1
L4	The principles of active searching for information.	1
L5	The communication processes in groups and organizations.	2
L6	The methods of internal communications within organization.	2
L7	Basic principles of public relation in business activity.	1

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Discussion

N4 Group work

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	9
Consultation hours	9
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	0
Preparing of reports, projects presentations, discussion	25
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Practical exercise

F2 Individual project

F3 Group project

F4 Test

Summary grade

D1 Weighted average of the marks

Conditions for passing the course

L1 Obtaining a positive summative grade

Assessment of activity without teacher participation

B1 Individual project

B2 Group project

B3 Test

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Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Konstrukcje betonowe II
Course name in English	Concrete Structures II
Course code	WIL BUD oIIS C8 23/24
Course category	Major subjects
No. of ECTS points	3.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 Knowledge and practical dimensioning of selected advanced design problems in RC - torsion, short and slender columns with biaxial bending - with elements of preparation for scientific work

Objective 2 Knowledge and practical dimensioning for SLS (cracking and deflections) in RC (including Working Stress Theory for Phases I and II)

Objective 3 Knowledge and practical computations and dimensioning of RC flat slabs (structural modelling, shaping, dimensioning and detailing of structure, deflection computations), punching shear - with elements of preparation for scientific work

Objective 4 Knowledge of engineering modelling of RC and masonry structures (hand computations and FEM) and Strut & Tie Method - with elements of preparation for scientific work

Objective 5 Shaping of professional responsibility in civil engineering

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 None

5 LEARNING OUTCOMES

LO1 Knowledge Student knows RC torsion theory - with elements of the latest scientific

developments

LO2 Skills Student can dimension RC element for pure torsion and torsion with shear

LO3 Skills Student can dimension slender RC column for biaxial bending (with axial force)

LO4 Knowledge Student knows principles of SLS theory in RC (including crack and deflection computations based on Working Stress Theory)

LO5 Skills Student can compute stress in concrete and steel according to Working Stress Theory in Phases I and II, can compute crack width and deflection in exact way

LO6 Knowledge Student knows selected problems of flat slab design (structural modelling, shaping, dimensioning and detailing)

LO7 Knowledge Student knows selected problems of punching shear theories- with elements of the latest scientific developments

LO8 Skills Student can compute, dimension and detail flat slab structure (equivalent frame method and FEM) including dimensioning for punching shear

LO9 Knowledge Student has basic knowledge of engineering modelling of RC and masonry structures (hand computations and FEM) and Strut & Tie Method - with elements of the latest scientific developments

LO10 Social competences Student is conscious of professional responsibility in structural design and is aware of necessity of continuous upgrade of professional competences

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Torsion of RC elements - with elements of the latest scientific developments	2
L2	Biaxial bending of RC slender columns	2
L3	SLS (Serviceability Limit State) - Working Stress Theory	2

L4	SLS - exact computations of crack width and deflections	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L5	Flat slabs - shaping, structural modelling (FEM and equivalent frame method), dimensioning and detailing	2
L6	Punching shear in RC flat slabs - slabs without and with punching shear reinforcements - with elements of the latest scientific developments	2
L7	Engineering modelling of RC and masonry structures (hand computations and FEM) and Strut & Tie Method - with elements of the latest scientific developments	3

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Flat slab structure - parking lot: preliminary design, load list and load combinations, FEM modelling, computations of internal forces, internal forces envelope, slab dimensioning (ULS), crack and deflection computations for slab(SLS), punching shear dimensioning, design slender RC column for biaxial bending, shop drawings for slab and column	15

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Consultations

N4 Design exercises

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	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	30
Total number of hours devoted to the subject	**90**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Tutorial - Design assignment

F2 Tutorial -Test

F3 Written exam

Summary grade

D1 Final grade - weighted average of tutorial and exam

Conditions for passing the course

L1 Exam comprises test and design parts - both parts have to be passed positively

L2 Final grade is weighted average of tutorial and exam (50% + 50%)

L3 Passed tutorial (design exercise and test) is prerequisite for exam

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Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Konstrukcje drewniane II
Course name in English	Timber Structures II
Course code	WIL BUD oIIS D9 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	2

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

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

3 COURSE OBJECTIVES

Objective 1 Presentation of a brief historical outline of the development of wooden structures in terms both of structures and materials.

Objective 2 Acquainting students with materials and structure solutions of complex beam and plate timber structures,

glulam beams, trusses and the principles of their work. Showing examples of objects constituting milestones in the development of wooden structures.

Objective 3 Extend students' knowledge of modern wood based materials (LVL - Laminated Veneer Lumber, PSL - Parallel Strand Lumber, CLT - Cross Laminated Timber etc.). To acquaint students with material technological novelties related to wood.

Objective 4 Extend the students knowledge of the connectors and familiarize them with the connections used in modern timber structures and with the rules of designing joints in such structures.

Objective 5 Familiarize students with the principles of designing timber structures in case of fire. To familiarise students with the protective measures used to protect wood and its structural elements.

Objective 6 Showing the possibilities of shaping large structures such as: high buildings, domes, halls, bridges.

Objective 7 Introducing research issues on wooden and laminated wood construction elements. The importance of slenderness as an element of architectural beauty and at the same time a threat to the static and dynamic of structural elements.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge from courses: Theoretical Mechanics, Strength of Materials, Structural Mechanics, Technical Drawing, Timber Structures I

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the path of historical development of wooden structures with examples of the state-of-the-art solutions.

LO2 Knowledge The student has knowledge in the field of construction of solid and glued laminated wood structures, he also knows examples of modern, contemporary solutions.

LO3 Skills The student is able to pre-design and model complex wooden structures (glulam hall, bridges, observation towers, etc.).

LO4 Skills Student is able to prepare clear forms of the results of his project and of a scientific nature work (introduction and preparation to scientific and research works).

LO5 Knowledge The student is familiar with the basic principles of designing wooden structures in case of fire and knows what wood protection measures are available.

LO6 Social competences Student knows how to work independently or in cooperation in small project team over specific tasks.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	The history of development of wooden structures with the presentation of outstanding examples of world and Polish structures. Part 1.	1
L2	The history of development of wooden structures with the presentation of outstanding examples of world and Polish structures. Part 2.	1

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L3	Revision of main timber properties and glulam technology	1
L4	Revision and extension of students knowledge of characteristic and properties of modern wood-based products (glulam, CLT - Ross Laminated Timbers, PSL - Parallel Strand Lumber, LVL- Laminated Veneer Lumber, SIPs-Structural Insulated Panels etc.)	1
L5	Examples of glued laminated timber truss construction. Node construction solutions. Protection against moisture.	1
L6	Selected issues of ULS and SLS designing on the example of glued laminated timber frames and composite sections. Part 1.	1
L7	Selected issues of ULS and SLS designing on the example of glued laminated timber frames and composite sections. Part 2.	1
L8	Different types of connectors used in glulam structures.	1
L9	Examples of interesting solutions for contemporary domes, halls, high buildings, observation towers, masts and bridges. Part 1.	1
L10	Examples of interesting solutions for contemporary domes, halls, high buildings, observation towers, masts and bridges. Part 2.	1
L11	Connection stiffness of timber structures - Rigidity of wooden structure joints	1
L12	Designing of connections in timber structures	1
L13	Prestressed wooden structures - examples of solutions used in bridges.	1
L14	Designing of timber structures in case of fire	1
L15	To acquaint students with material technological innovations related to wood.	1

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Individual project - design of glulam hall (purlin, glulam beam, bracing, connection calculation etc.)	11
D2	Calculation of selected timber structures in case of fire	4

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Design exercises

N4 Consultations

N5 Educational films

N6 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
passing lectures	1
Hours of autonomous student work	
Preparing for classes, studying literature	9
Developing results	6
Preparing of reports, projects presentations, discussion	14
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 Assessment for the pass presentation of the lecture

F3 Passing a lecture presentation - pass conversation

Summary grade

D1 Weighted average of the grades from the project and presentation

Conditions for passing the course

L1 Positive both formulation marks

Assessment of activity without teacher participation

B1 Individual project and presentation

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1 COURSE INFORMATION

Course name	Konstrukcje metalowe II
Course name in English	Metal Structures II
Course code	WIL BUD oIIS C9 23/24
Course category	Major subjects
No. of ECTS points	3.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 To acquaint the students with procedures of dimensioning of complex steel structures

Objective 2 To prepare students to report the results of project and scientific research

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Issues of the full first step of study, especially Metal Structures

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the principles of designing complex steel bar structures

LO2 Knowledge The student knows the principles of designing steel shell and tensile structures

LO3 Skills Student is able to apply known principles in the process of design of steel structure

LO4 Social competences The student is able to publicly report the results of his work and calculations

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Steel high buildings	2
L2	Introduction to steel shell structures	2
L3	Crane supporting structures	7
L4	Long-span steel bar structures	2
L5	Tension structures	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Initian project of steel cylindrical tank	6
D2	Design project of crane supporting structure	9

7 TEACHING TOOLS

N1 Lectures

N2 Design projects

N3 Consultations

N4 Exam

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	10
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	**80**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Design projects

Summary grade

D1 Exam

Conditions for passing the course

L1 Completed first design project

L2 Completed second design project

L3 Completed exam

Assessment of activity without teacher participation

B1 Design projects

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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Konstrukcje zespolone stalowo-betonowe
Course name in English	Composite Steel and Concrete Structures
Course code	WIL BUD oIIS D8 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	2

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

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

3 COURSE OBJECTIVES

Objective 1 Students are introduced to principles of design of steel-concrete composite structures

Objective 2 Students are familiarized with specifics of steel-concrete composite structures, design principles, calculation of structural elements

Objective 3 Preparing the student to solve engineering tasks and participate in scientific works and research

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Structural Mechanics

2 Metal Structures

3 Concrete Structures

5 LEARNING OUTCOMES

LO1 Knowledge Acquiring knowledge of the design principles of selected steel-concrete composite structures in ultimate and serviceability limit states

LO2 Knowledge Acquiring knowledge of the design principles of selected connections of steel structure elements with reinforced concrete structure in ultimate limit states

LO3 Skills Acquiring skills in design of selected steel-concrete composite structures

LO4 Skills Acquiring the ability to design of selected connections of steel structure elements with rein- forced concrete structure

LO5 Social competences The student is able to supplement and expand knowledge of steel-concrete composite structures

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Basic information about composite structures, methods of analysis, work in an uncracked and cracked condition.	2
L2	Connector types in composite elements - requirements, load bearing-capacity and rigidity.	2
L3	Design of selected composite flooring systems	7
L4	Influence of rheological phenomena on steel-concrete composite structures.	2
L5	Numerical modeling principles for selected steel-concrete composite structures.	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Design of selected fragments of a multi-story building with steel structure combined with reinforced concrete slab, loads, structural statics, verification of bending and shear load bearing capacity in ultimate and serviceability limit states.	15

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

7 TEACHING TOOLS

N1 Lectures

N2 Design exercises

N3 Consultation

N4 Teaching materials

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	2
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	2
Developing results	14
Preparing of reports, projects presentations, discussion	2
numerical model of steel-concrete composite structures	8
Total number of hours devoted to the subject	**58**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Design exercises

F2 Oral exam

Summary grade

D1 Weighted average of formulating grades

Tadeusz Kosciuszko Cracow University of Technology

Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering — Study profile: general academic

Study form: full-time — Field of study code: BUD

Study cycle: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Matematyka w inżynierii lądowej
Course name in English	Mathematics in Civil Engineering
Course code	WIL BUD oIIS C1 23/24
Course category	Major subjects
No. of ECTS points	2.00
Semester	1

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

Semester	Lecture	Class exercise	Laboratory	Laboratory Computer	Design exercise	Seminar
1	20	0	0	10	0	0

3 COURSE OBJECTIVES

Objective 1 Familiarizing students with selected problems of mathematical statistics and their application in the construction industry

Objective 2 Familiarizing students with selected elements of functional analysis, variational calculus, function approximation and partial differential equations.

Objective 3 Familiarizing students with selected advanced calculation methods of deterministic and stochastic types.

Objective 4 Preparing students for research work and student participation in research.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 The course is a continuation and development of the subject Applied mathematics and numerical methods, implemented during the first cycle of Civil Engineering bachelor studies. The student should have a basic knowledge of algebra (vector and matrix calculus), numerical methods and should know the basics of work in modern computing systems.

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the basics of mathematical statistics, such as ways of describing phenomena, random variables, probability distributions, estimators and stochastic hypotheses; and knows how to use this knowledge in construction problems

LO2 Knowledge The student knows the basics of functional and differential analysis, as well as elements of function approximation theory; and knows how to use this knowledge in construction problems.

LO3 Skills The student is able to use basic and advanced computational, deterministic and probabilistic, methods to solve problems of statistics, algebra and differential analysis.

LO4 Social competences The student is able to work on her/his own and in smaller (2-3) teams in the implementation of laboratory projects.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Statistics and its basic concepts. Division: descriptive and mathematical statistics. Basic knowledge of descriptive statistics: description of the structure of phenomena, description of the dynamics of phenomena, description of interdependence.	4
L2	Basics of mathematical statistics. Random variable and its types and parameters distribution. Random variable distributions.	2
L3	Elements of estimation theory. Types of estimation. Confidence intervals.	2
L4	Hypothesis verification. Stages of verification of hypotheses. Hypotheses and their types, statistics tests.	2
L5	Approximation of a given function in a discrete and continuous manners. Weighted least squares method. Chebyshev polynomials. Spline interpolation. Function orthogonal series.	3
L6	Differential equations: Initial and boundary problems - applications in mechanics. Types of boundary conditions. Types of partial equations and their applications in mechanics. Analytical and numerical methods of solving partial equations.	3

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L7	Fourier series: Development of a given function in a discrete and continuous manners. Application for analytical solution of differential equations. Analysis of beams and plates.	2
L8	Selected modern calculation methods of deterministic and stochastic types. Monte Carlo method. Genetic Algorithms. Neural networks. Inverse problems.	2

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Reminder of the principles of working in Matlab / Octave environment: variable types, mathematical functions, defining arrays and editing their elements, matrix and tensor operations, 2D graphics.	2
K2	Selected applications of mathematical statistics for algebra problems (Monte Carlo integration, principal components analysis).	2
K3	Selected problems of approximation of the function of one variable (weighted least squares method, properties of Chebyshev polynomials).	2
K4	Numerical analysis of problems of transient heat flow and forced vibrations.	2
K5	Application of Fourier series to solve problems of beams and plates.	2

7 TEACHING TOOLS

N1 Lectures

N2 Discussion

N3 Multimedia presentations

N4 Laboratory assignments

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	30
Consultation hours	8
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	3
Preparing of reports, projects presentations, discussion	2
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 #1

F2 Individual project #2

Summary grade

D1 Written lecture test

D2 Weighted average of forming grades

Conditions for passing the course

L1 Attendance at laboratory classes is compulsory; one unjustified absence is allowed; all exercises must be assessed positively

L2 Lecture tests include computational tasks; students have two deadlines

L3 The final grade is a weighted average of D1 and D2 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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Mechanika budowli II
Course name in English	Structural Mechanics II
Course code	WIL BUD oIIS C4 23/24
Course category	Major subjects
No. of ECTS points	3.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 Knowledge of the rules and procedures concerning solving spatial rod structures using the force method and the displacement method and ability to critical assessment of the calculation results.

Objective 2 Knowledge of the rules and procedures concerning solving rod structures subjected to geometric and thermal loads and ability to critical assessment of the calculation results.

Objective 3 Knowledge of the rules and procedures concerning determination of inertia forces generated due to dynamic action in rod structures with limited number of dynamic degrees of freedom and ability to critical assessment of the calculation results.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Knowledge and skills delivered in the subject Structural Mechanics at the first level of Civil Engineering education.

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the rules and procedures concerning solving spatial rod structures (grids, frames) and knows how to use these rules and procedures in engineering practice and scientific work.

LO2 Skills Student is able to solve spatial rod structures (grids, frames).

LO3 Knowledge Student knows the rules and procedures concerning solving rod structures subjected to geometric and thermal loads (using two independent methods) and knows how to use these rules and procedures in engineering practice and scientific work.

LO4 Skills Student is able to solve rod structures subjected to geometric and thermal loads.

LO5 Knowledge Student knows the rules and procedures concerning determination of inertia forces generated due to dynamic action in rod structures with limited number of dynamic degrees of freedom and knows how to use these rules and procedures in engineering practice and scientific work.

LO6 Skills Student is able to determine inertia forces generated due to dynamic action in rod structures with limited number of dynamic degrees of freedom.

LO7 Social competences Student is able to o solve the engineering problem and to critically assess the obtained results. Student is responsible for the reliability of his work and he keeps raising his qualifications.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Spatial rod structures: grids, frames, trusses. Statical indeterminacy of such structures.	2
L2	Solving statically indeterminate rod structures using the force method and the displacement method.	4
L3	Geometric and thermal loads acting on rod structures. Methods an procedures of their including in the process of solving statically indeterminate systems.	4
L4	Rod structures with limited number of dynamic degrees of freedom subjected to dynamic action. Determination of dynamic forces generated during dynamic action.	5

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Solving statically indeterminate rod structure (grid or frame) using the force method.	5
D2	Solving a rod structure subjected to thermal and geometric loads (using Force Method and Displacement Method).	5
D3	Determining amplitudes of inertia forces acting on a rod structure with limited number of dynamic degrees of freedom subjected to harmonic excitation.	5

7 TEACHING TOOLS

N1 Lectures

N2 Projects

N3 Consultations

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	30
Consultation hours	5
Exams and tests during session	5
Hours of autonomous student work	
Preparing for classes, studying literature	30
Developing results	10
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

Summary grade

D1 Written exam

D2 Weighted average of forming grades

Conditions for passing the course

L1 Completion of all learning outcomes

L2 Students who have completed all projects can take the 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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Metody komputerowe w inżynierii lądowej
Course name in English	Computer Methods in Civil Engineering
Course code	WIL BUD oIIS C7 23/24
Course category	Major subjects
No. of ECTS points	2.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 To teach the capabilities and limitations of computational methods, in particular FEM, in an analysis of complex engineering problems

Objective 2 Presentation of mathematical formulations of selected engineering problems to prepare students to the con- duction of scientific research

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic knowledge of FEM, continuum mechanics and Matlab programming

5 LEARNING OUTCOMES

LO1 Knowledge The student knows approximation principles and FEM algorithm for selected (non)linear and (non)stationary problems.

LO2 Skills The student can point out the sources of errors in computer modeling and estimate the accuracy of the employed approximation.

LO3 Skills The student can apply a commercial FEM software to the analysis of selected engineering problems.

LO4 Knowledge The student knows what are some other computational methods.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Selected aspects and applications of FEM	6
L2	Nonlinear FEM computations in civil engineering	5
L3	Basics of other numerical methods	2
L4	Summary	2

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Selected aspects of the FEM algorithm	5
K2	Introduction to a commercial FEM code and its applications	10

7 TEACHING TOOLS

N1 Lectures

N2 Laboratory sessions

N3 Team work

8 STUDENT WORKLOAD

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

9 Methods of grading

Partial grades

F1 Written test

F2 Project

Summary grade

D1 A weighted average of grades earned in the written test and the laboratory sessions

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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Metody probabilistyczne w projektowaniu konstrukcji
Course name in English	Probability-based structural design
Course code	WIL BUD oIIS D5 23/24
Course category	Specialty subjects
No. of ECTS points	1.00
Semester	2

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

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

3 COURSE OBJECTIVES

Objective 1 To acquaint the students with procedures of probability methods of structural design and design assisted by testing. Knowledge and skills preparing students to participate in scientic research.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Fundamentals of Design and Reliability

5 LEARNING OUTCOMES

LO1 Knowledge Student knows the rules of probability-based design and design assisted by testing.

LO2 Knowledge Student knows the basis of statistical data and understands the probabilistic background of EN 1990 and EN 1991.

LO3 Skills Student uses probabilistic methods and test results in structural reliability analysis.

LO4 Social competences Student is prepared to work independently and cooperate in a team, describes the results of his work in a communicative way, is responsible for the results of his work and their interpretation.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Analysis of random structural loads and resistances.	5
D2	Probabilistic methods in structural design. Utilization of test results in analysis of building structures.	10

7 TEACHING TOOLS

N1 Individual project

N2 Discussion

N3 Consultations

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	15
Consultation hours	2
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	6
Examination	2
Total number of hours devoted to the subject	**30**
Total number of ECTS points	1.00

9 Methods of grading

Partial grades

F1 Individual project

Summary grade

D1 Oral examination

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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Oszacowania kosztowe w inżynierii lądowej
Course name in English	Cost Estimates in Civil Engineering
Course code	WIL BUD oIIS D4 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 To educate students on development of cost estimates and analyses for design works and construction works in various phases of construction project.

Objective 2 To provide knowledge related to cost estimates and analyses in the whole life cycle of construction object.

Objective 3 To enable students to acquire the competencies of individual and team-based development of cost estimates and analyses for design works and construction works in various phases of construction project. To prepare students (at a basic level) for conducting research on the issues related to cost estimates and analyses in various phases of construction project.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Fulfillment of the requirements according to the regulations at Cracow University of Technology. Fulfillment of formalities and procedures at Faculty of Civil Engineering, Cracow University of Technology.

5 LEARNING OUTCOMES

LO1 Knowledge of the cost estimates and analyses of design works and construction works for various kinds of construction objects.

LO2 Skills Ability to develop cost estimates and analyses of design works.

LO3 Skills Ability to develop cost estimates and analyses of construction works.

LO4 Social competences Ability to work individually and in team while solving problems related to cost estimates and analyses of design works and construction works. Ability to work individually and in team during research.

6 COURSE CONTENT

Laboratory computer		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
K1	Cost estimates and analyses for selected cases of design works and construction works. Construction project budget estimates.	7
K2	Investor's cost estimates for selected cases. Bidding estimates for selected cases.	8

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Methods on cost estimation of design works for buildings and civil engineering objects.	4
L2	Initial cost estimates - budget of construction project.	4
L3	Investor's cost estimates.	2
L4	Bidding cost estimates. Development of bidding offers.	2
L5	Cost estimates of additional works, cost estimates for alterations, cost estimates provided after completion of construction works.	3

7 TEACHING TOOLS

N1 Computer laboratories

N2 Lectures, multimedia presentations

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	30
Consultation hours	2
Exams and tests during session	4
Hours of autonomous student work	
Preparing for classes, studying literature	5
Developing results	10
Preparing of reports, projects presentations, discussion	5
Total number of hours devoted to the subject	**56**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Grade on computer laboratory classes.

F2 Grades on individual and/or team assignments.

Summary grade

D1 Final test.

Conditions for passing the course

L1 Completion of given tasks and assignments within the deadlines. Positive grade on fnal test.

L2 Presence during classes (frequency min. 80%)

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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Podstawy projektowania i niezawodności
Course name in English	Fundamentals of Design and Reliability
Course code	WIL BUD oIIS C6 23/24
Course category	Major subjects
No. of ECTS points	1.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 The aim of course is to acquaint the students with the theoretical basis of structural design according to European Standards. It prepares students to participate in scientic research.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Strength of Materials, Structural Mechanics

5 LEARNING OUTCOMES

LO1 Knowledge Student is able to explain concepts of probability theory and statistics used in the structural reliability.

LO2 Knowledge Student is able to define probabilistic methods used in structural reliability analysis.

LO3 Skills Student is able to calculate reliability measures for simple examples of building structures.

LO4 Knowledge Student knows the theoretical basis of structural design according to European Standards.

LO5 Social competences Student is prepared to work independently and cooperate in a team, describes the results of his work in a communicative way, is responsible for the results of his work and their interpretation.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Concepts of reliability theory and engineering, probabilistic methods in structural reliability, partial factor method.	6
L2	Sources of uncertainties in the building process, realiability management, human errors.	4
L3	Structural reliability according to EN 1990	5

7 TEACHING TOOLS

N1 Lectures

N2 Examples

N3 Discussion

N4 Consultations

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	15
Consultation hours	2
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	11
Developing results	0
Preparing of reports, projects presentations, discussion	0
Examination	2
Total number of hours devoted to the subject	**30**
Total number of ECTS points	1.00

9 Methods of grading

Summary grade

D1 Written examination

Tadeusz Kosciuszko Cracow University of Technology

Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering

Study profile: general academic

Study form: full-time

Field of study code: BUD

Study cycle: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Przetargi, negocjacje, umowy w budownictwie
Course name in English	Tenders, Negotations and Contracts in Civil Engineering
Course code	WIL BUD oIIS D11 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	2

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

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

3 COURSE OBJECTIVES

Objective 1 To familiarize students with the principles of constructing contracts and the consequences of contract clauses.

Objective 2 Presentation of tender procedures and negotiation methods.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the basic legal regulations regarding works contracts.

LO2 Knowledge The student knows the basic types of tender procedures.

LO3 Skills The student is able to choose the type of contract to suit the situation in which construction works are undertaken.

LO4 Social competences The student can work as part of a tender committee or negotiating team.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Division of works contracts due to the principle of determining the price for the subject of the contract	2
L2	The structure of construction contracts	4
L3	Pre-contractual procedure	1
L4	Tender - types and procedures	4
L5	Negotiating construction contracts	2
L6	Special types of contracts in construction	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Preparation of the tender notice and documentation	8
D2	Preparation of a construction works contract	7

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	30
Consultation hours	2
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	10
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**54**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Team project

F2 Passing lectures

Summary grade

D1 Average from lectures (60%) and projects (40%)

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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Przygotowanie pracy dyplomowej
Course name in English	Preparation of Diploma Project
Course code	WIL BUD oIIS E3 23/24
Course category	Subjects Related to Diploma Projects
No. of ECTS points	16.00
Semester	3

2 No. of class hours

Semester	No. of class hours
3	10.00

3 COURSE OBJECTIVES

Objective 1 Strengthening the ability to obtain and use scientific and technical information in scientific work, originating from both domestic and foreign sources.

Objective 2 Expanding knowledge of construction, in particular in the field of issues related to the specialty in which the student prepares his master's thesis.

Objective 3 Acquisition and/or improvement of skills in using appropriate software and/or research equipment in scientific work.

Objective 4 Acquisition and demonstration of the ability to work independently on a specific study, project or research task related to the scientific activity of the university, which is the subject of the master's thesis.

Objective 5 Acquisition and demonstration of skills to analyze the results obtained and their critical assessment as well as to present the solution of a specific study, design or research task being the subject of the master's thesis in the form of a written scientific essay.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 The student should possess learning outcomes in terms of knowledge, skills and competences, specified in the second cycle study program of the given specialization, sufficient to prepare the master's thesis.

5 LEARNING OUTCOMES

LO1 Social competences The student is responsible for the reliability of the results of his work and their interpretation.

LO2 Social competences The student is aware of the need to raise professional competences, independently supplements and broadens knowledge of issues related to the subject of the thesis.

LO3 Social competences The student is aware of the application of the principles of respect for copyright and intellectual property protection.

LO4 Social competences The student is able to work independently, and in the case of participation in scientific research conducted at the University, also cooperate in a team on the assigned task.

LO5 Skills The student is able to use appropriate literature, standards, Internet resources as well as computer methods, techniques and programs to solve a specific study, design or research task being the subject of the master's thesis.

LO6 Skills The student is able to define the purpose and scope of the master's thesis, review the current thematic literature, solve the problem that is the subject of the thesis, analyze the results obtained and make a critical assessment, formulate conclusions.

LO7 Skills The student is able to present the issues constituting the subject of the diploma in the form of a written scientific essay meeting the substantive and editorial requirements specified for master's theses.

LO8 Knowledge The student has expanded knowledge of issues related to the subject of the thesis.

6 COURSE CONTENT

Praca dyplomowa

No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
PD1	Specifying the topic, purpose, scope and methods of preparing the thesis.	1
PD2	Analysis, discussion and verification of proposed solutions and obtained results.	5
PD3	Determining the final form of the diploma thesis. Substantive and editorial control of the presented work.	4

7 TEACHING TOOLS

N1 Discussion

N2 Consultations

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	0
Consultation hours	10
Exams and tests during session	0
Hours of autonomous student work	
Preparing for classes, studying literature	120
Developing results	200
Preparing of reports, projects presentations, discussion	140
Total number of hours devoted to the subject	**470**
Total number of ECTS points	16.00

9 Methods of grading

Summary grade

D1 Assessment of the diploma thesis submitted.

D2 Assessment of the student's commitment, reliability, systematicity and independence during the preparation of the diploma thesis

Conditions for passing the course

L1 Obtaining a positive assessment of the diploma thesis submitted.

L2 Acceptance of the anti-plagiarism report on the submitted work by the supervisor.

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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Techniki negocjacji
Course name in English	Negotiation techniques
Course code	WIL BUD oIIS A4 23/24
Course category	General subjects
No. of ECTS points	2.00
Semester	3

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

Semester	Lecture	Class exercise	Laboratory	Laboratory Computer	Design exercise	Seminar
3	9	0	0	0	0	0

3 COURSE OBJECTIVES

Objective 1 Knowledge on basic mechanisms of societal life, on the influence of societal processes and laws on individual's behavior in different groups and societies. Knowledge on different types of conflicts and negotiation techniques.

Objective 2 Acquiring the skill of negotiations and the resolving of different types of conflicts in societal groups.

Objective 3 Acquiring the competences required for team work.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 None

5 LEARNING OUTCOMES

LO1 Knowledge Student knows basic techniques of negotiations and conflicts solution.

LO2 Skills Student can plan and carry out negotiations using the proper method and techniques.

LO3 Skills Student can effectively search for information, interpret it and draw conclusions. Student can communicate using different techniques in professional and public environment.

LO4 Social competences Student can effectively resolve conflicts and reach agreement.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Conflicts - structure and types of conflicts; interpersonal, societal and organizational causes of conflicts.	2
L2	Basic principles and types of negotiations; strategies and tactics of negotiations.	2
L3	Negotiations planning, the phases of negotiations; the roles in negotiation team.	2
L4	Emotions in negotiations, principles and techniques of social influences.	1
L5	Many-sided negotiations.	1
L6	Mediations, the role of mediator in negotiations.	1

7 TEACHING TOOLS

N1 Lectures

N2 Multimedia presentations

N3 Group work

N4 Discussion

8 STUDENT WORKLOAD

Activity form	Number of hours of activity
Hours realized in contact with the teacher	
Hours resulting from the study plan	9
Consultation hours	9
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	15
Developing results	0
Preparing of reports, projects presentations, discussion	25
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Practical exercise

F2 Individual project

F3 Group project

Summary grade

D1 Weighted average of the marks

Conditions for passing the course

L1 Obtaining a positive summative grade

Assessment of activity without teacher participation

B1 Individual project

B2 Group project

B3 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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Technologia prefabrykacji betonowej
Course name in English	Technology of Prefabrication
Course code	WIL BUD oIIS D7 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	2

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

Semester	Lecture	Class exercise	Laboratory	Laboratory Computer	Design exercise	Seminar
2	0	10	10	0	10	0

3 COURSE OBJECTIVES

Objective 1 To familiarize students with possibilities and technologies of craftsman and industrialized prefabricated units assembly.

Objective 2 To familiarize students with prefabricated units assortment (both of contemporary and historical systems).

Objective 3 To familiarize students with chosen technologies and processes of precast concrete systems production and on-site erection.

Objective 4 To show future designers the possibilities given by prefabrication industry to replace typical in situ reinforced concrete structures and some steel structure types by precast concrete systems.

Objective 5 To familiarize students with concrete types characteristic of prefabrication industry, and with designing and preparing concrete mix of chosen types.

Objective 6 To familiarize students with EU conformity system of concrete products and to show examples of quality control of chosen precast concrete products.

Objective 7 To familiarize students with chosen aspects of research program design and conduction on the example of composition design and quality control of concrete for precast industry

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 None (only knowledge from the courses finalized in the 1-st level of education is required)

5 LEARNING OUTCOMES

LO1 Knowledge Student knows main assumptions of quality control system and methods of testing quality of typical precast units.

LO2 Knowledge Student knows precast concrete assortment, chosen technologies of precast concrete systems erection process, and chosen aspects concerning quality control of precast units.

LO3 Knowledge Student knows chosen production technologies used in contemporary precast industry and their advantages and disadvantages.

LO4 Skills Student can design exemplary production line in prefabrication plant and to design productivity on each work-stand.

LO5 Skills Student can design work of assembly staff and to complete a set of means of production (here: machines and appliances) in a way enabling efficient organization of exemplary precast concrete unit production.

LO6 Knowledge Student knows basic and special types of concrete used in precast industry and their special features, advantages, disadvantages and usage.

LO7 Skills Student can properly proceed with chosen concrete types used in precast industry (some items of laboratory design).

LO8 Skills Student can properly proceed with basic test of quality control of typical prefabricated units.

6 COURSE CONTENT

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Introduction (basic terms and definitions, history of prefabrication, types of structures, units and technologies).	1

Class exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C2	Prefabrication of large-size units: wall structures and systems.	1
C3	Prefabrication of large-size units: floor systems.	1
C4	Prefabrication of large-size units: skeletal structures.	2
C5	Prefabrication of large-size units: elements and systems for road construction.	1
C6	Prefabrication of large-size units: systems and units for infrastructure.	1
C7	Prefabrication of small-size units: vibropressing (technology and units).	1
C8	Prefabrication of small-size units: AAC (technology and units).	1
C9	Basics of quality control and conformity system in prefabrication.	1

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Safety precautions in concrete laboratory. Introduction (concrete types used in precast industry, their special properties, advantages, disadvantages and usage). Chosen aspects of research program design.	1
L2	Wet Vibrated Concrete	1
L3	Concrete compaction methods (vibropressing, vibrating table, poker vibration).	1
L4	Lightweight concrete (of structural and open structure types).	2
L5	Self-Compacting Concrete	2
L6	Hardening acceleration methods (admixtures and steam curing at atmospheric pressure)	1
L7	Quality control of precast units (dimension tolerance and load capacity tests)	1
L8	Strength testing of produced concrete	1

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
D1	Introduction. Common data for design exercise. Description of technology and production line organization in precast plant. Design of production line productivity.	1
D2	Concrete compaction techniques.	2
D3	Formworks and forming process of precast units.	2
D4	Strength acceleration techniques in precast plants.	2
D5	Main assembly department and rules of fresh concrete and reinforcement production organization.	2
D6	Storage department (rules for: storage yards design, methodology of refining processes of constituent materials and for inner transport organization).	1

7 TEACHING TOOLS

N1 Auditory meetings

N2 Consultations

N3 Multimedia Presentations

N4 Laboratory meetings

N5 Discussion

N6 e-learning platform of CUT

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	3
Exams and tests during session	3
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	2
Preparing of reports, projects presentations, discussion	8
Total number of hours devoted to the subject	**56**
Total number of ECTS points	2.00

9 Methods of grading

Two-part final test. 1-st part concerns to 3.0 grade, the 2-nd part - to the higher grade. The test is divided into blocks. Each block consist of knowledge or skills described by one or two Education Effects ("EK" in Polish). Defined below weights are to be treated approximately (as a magnitude indicator only) due to the need to adapt to the current learning method (on-line / hybrid/ stationary), e.g. in on-line mode e-learning tests results are of higher importance than in case of stationary learning mode. The same concerns to passing percentage. Here the test type (essay/ on-line test) and number of questions is decisive.

Partial grades

F1 Final test

F2 Individual design exercise

F3 Laboratory reports

F4 short tests on e-learning platform (after given topic completion)

Summary grade

D1 weighed average calculated from individual grades

Conditions for passing the course

L1 laboratory report [weigh depending on meeting mode: mark passed/failed up to 10%]

L2 Individual design exercise (LO4 and 5) [weigh 20%]

L3 Partial tests on e - learning platform (if valid: depending on meeting mode) [weigh up to 15%]

L4 Final test [weigh: up to 100%]

Assessment of activity without teacher participation

B1 Design exercise

B2 Final Test

B3 short test on e-learning platform after each topic completion (alternative for on-line mode)

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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Teoria sprężystości i plastyczności
Course name in English	Theory of Elasticity and Plasticity
Course code	WIL BUD oIIS C5 23/24
Course category	Major subjects
No. of ECTS points	3.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 Introduction of the basic notions of Continuum Mechanics connected with material and spatial description of motion of a continuum concerning kinematics and dynamics of deformable solids as well as constitutive relations. Formulation of a boundary value problem of non-linear theory of elasticity and specification of conditions enabling linearization of the theory.

Objective 2 Presentation of a boundary value problem of linear theory of elasticity and of chosen methods of solving it

- based both on local as well as on global (variational) formulation referring to the Finite Element Method.

Objective 3 Presentation of chosen problems of the linear theory of elasticity and of the methods of finding the solution.

Objective 4 Presentation of basic concepts of the theory of plasticity. Analysis of chosen problems of plastic bearing capacity of structural elements and structural systems.

Objective 5 Preparation of a student for performance of scientific and research tasks.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic skills in calculus - finding derivatives of a single- and multivariable function, definite and indefinite integrals, curvilinear integrals and multiple integrals.

2 Basic skills in matrix calculus - matrix addition, subtraction and multiplication, calculation of determinants, solving the eigenproblem.

3 Knowledge on classical principles of dynamics of a material points and rigid body.

5 LEARNING OUTCOMES

LO1 Knowledge Student formulates the boundary value problem of non-linear theory of elasticity both in material and in spatial description, defines and explains the physical sense of various measures of deformation and stress, which are used in this formulation.

LO2 Skills For a given deformation in each description student determines appropriate measures of de- formation and stress.

LO3 Knowledge Student formulates the boundary value problem of linear theory of elasticity, understands the ma- thematical structure of obtained system of equations and explains chosen strict and approximate methods of solving it.

LO4 Skills Student uses classical results of linear theory of elasticity in modeling and solving the problems of deformation of deformable solids.

LO5 Knowledge Student defines basic notions of theory of plasticity.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Eigenvalue problem for a 3x3 and 2x2 symmetric matrix and its application to the deformation gradient	2
D2	Material and spatial description of deformation. Displacement vector, actual configuration, deformation gradient, deformation tensors, strain tensors, change of length, area and volume after deformation.	3
D3	Polar decomposition of the deformation gradient.	2

D4	Determining body forces and surface tractions for given deformation or given stress state.	2

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D5	Solving the problems of plane elastic structures with the use of Finite Difference Method.	2
D6	Bearing capacity of cross-sections subject to chosen load cases.	2
D7	Determining the plastic bearing capacity of a structural system.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction to Continuum Mechanics. Characterization of elastic, plastic and rheological phenomena. Introduction to kinematics - displacement, velocity, acceleration vector, Material and spatial description of motion.	2
L2	Kinematics of deformable solids - deformation gradient and its polar decomposition, stretch tensors, rotation tensor, deformation tensors, strain tensors in material and spatial description. Geometric linearizaton, small strain and small rotation tensors. Interpretation of components of strain tensor and of small strain tensor. Change of length of a material fiber, area of a material surface and volume of a body after deformation.	6
L3	Mass, mass density, conservation of mass. Body forces, surface tractions and stress. Stress vector. Tetrahedron conditions. Tensorial measures of stress state. Laws of motion for deformable solids, equations of motion in material and spatial description.	5
L4	Constitutive relations and postulates concerning formulation of those relations. Elastic material, hyperelastic material. Isotropy, anisotropy, homogeneity, inhomogeneity. Isotropic hyperelastic material. Hooke's material.	2
L5	Linear theory of elasticity. Lame displacement equations, Beltrami-Michell stress compatibility equations. Plane stress and plane strain states. Plane stress and plane strain states. Airy stress function. Levy theorem.	5
L6	Examples of solution of chosen boundary value problems of linear theory of elasticity.	4
L7	Variational methods in theory of elasticity. Principle of Virtual Displacements, Lagrange theorem, Principle of Virtual Forces, Castigliano theorem. Betti-Maxwell reciprocal theorem. Galerkin method in application to variational formulation - Finite Element Method.	3
L8	Chosen features of plastic deformation. Chosen propositions of a yield condition. Yield surface. Active and passive processes, Hencky-Ilyushin theory. Prandtl-Reuss and Levy-Mises theory.	3

7 TEACHING TOOLS

N4 Lectures

N5 Design classes

N6 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	45
Consultation hours	6
Exams and tests during session	4
Hours of autonomous student work	
Preparing for classes, studying literature	6
Developing results	4
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**75**
Total number of ECTS points	3.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Oral answers

Summary grade

D1 Written test

Conditions for passing the course

L1 All learning outcomes must be marked positive

L2 All given projects must be completed - its content must be done in a correct way and student must answer correctly few questions concerning the project.

Tadeusz Kosciuszko Cracow University of Technology

Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering — Study profile: general academic

Study form: full-time — Field of study code: BUD

Study cycle: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Wybrane elementy budownictwa przemysłowego
Course name in English	Selected Industrial Structures
Course code	WIL BUD oIIS D10 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	2

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

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

3 COURSE OBJECTIVES

Objective 1 Familiarize students with the principles of design and construction of special industrial structures and significant differences in loads and requirements compared to building design.

Objective 2 Familiarize students with the method of taking into account soil and vibro-isolation in the calculation of

dynamic loaded structures and an indication of the differences in relation to the design of structures loaded only statically.

Objective 3 Familiarize students with the principles of design (calculation and construction) of block type and frame type foundations loaded with machines of various types.

Objective 4 Development of the student's teamwork skills.

Objective 5 Preparing students for scientific work.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic knowledge of Theoretical Mechanics, Strength of Materials, Concrete Structures

5 LEARNING OUTCOMES

LO1 Knowledge The student describes and explains the principles of designing support structures for machines: frame type foundations, block type foundations, floors loaded by machines.

LO2 Knowledge The student explains the differences in the design principles of dynamically and statically loaded structures and describes the possible problems arising from the lack of proper consideration of dynamic loads in the design.

LO3 Skills The Student is able to design a block type foundation and a frame type foundation loaded with a machine and determine the parameters characterizing the soil under the foundation.

LO4 Skills The student can choose the appropriate vibroisolation system.

LO5 Skills The student can indicate the directions of scientific research in the field of design and operation of industrial structures.

LO6 Social competences The student cooperates in a team and presents the results of the team's work.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Individual project: design of block type foundation for rotating machine or reciprocating machine. Static and dynamic analysis. Structural drawing.	15

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	The specificity of industrial structures. Foundations and support structures for machines, floors loaded by machines. Types of machines and support structures. Types of static and dynamic loads acting on industrial structures. Codes and limit states.	2

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L2	Soil under foundations. Modeling of the support of the dynamically loaded structures modeling of the soil, soil spring coefficients, determination of coefficients (tests, calculations), application in FEM models. Vibroisolation systems - types, calculations. Vibration impact on the environment. Spread of vibrations in the ground.	3
L3	Block type foundations for rotating machines and reciprocating machines. Design assumptions, analysis of technical documentation, load specification, theoretical basis of calculations, computer modeling, construction requirements and technology of implementation.	3
L4	Frame type foundations for turbosets, floors loaded by machines. Design assumptions, analysis of technical documentation, load specification, theoretical basis of calculations, computer modeling, construction requirements and technology of implementation.	4
L5	Block type foundations for impact machines. Design assumptions, analysis of technical documentation, load specification, theoretical basis of calculations, computer modeling, construction requirements and technology of implementation.	3

7 TEACHING TOOLS

N1 Design projects

N2 Lectures

N3 Consultations

N4 Discussion

N5 Multimedia presentations

N6 Work in groups

N7 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	30
Consultation hours	2
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	7
Developing results	0
Preparing of reports, projects presentations, discussion	9
Total number of hours devoted to the subject	**50**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Assignments

Summary grade

D1 Short tests

D2 Final test

Conditions for passing the course

L1 Weighted average of points earned in F1, D1

Assessment of activity without teacher participation

B1 Individual project

B2 Test

Tadeusz Kosciuszko Cracow University of Technology

Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering — Study profile: general academic

Study form: full-time — Field of study code: BUD

Study cycle: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Wytrzymałość materiałów II
Course name in English	Strength of Materials II
Course code	WIL BUD oIIS C2 23/24
Course category	Major subjects
No. of ECTS points	2.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 To familiarize the students with the nonlinear problems of the strength of materials (nonlinear geometry of structures, bending-assisted compression)

Objective 2 To familiarize the students with current trends in the strength of materials (elements of the plasticity theory

and limit states , rheology, fatigue, fracture mechanics and continuous damage mechanics) beeing base for future scientific work.

Objective 3 To familiarize the students with possibilities of computer program usage for numerical calculus

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Strength of Materials 1st, theoretical mechanics

5 LEARNING OUTCOMES

LO1 Knowledge Students have basic knowledge of geometric and physical nonlinearity of structures.

LO2 Knowledge Students have basic knowledge of material damage.

LO3 Skills Students can carry out the numerical calculation using computer programs of general purpose

LO4 Social competences Student can formulate tasks and independently or in group work on them.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Introduction. Theoretical strength.	3
L2	Rheology.	2
L3	Fracture Mechanics.	4
L4	Fatigue. Mechanics of cracks growth.	4
L5	Continuum Damage Mechanics.	2

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Bending-assisted compression.	3
L2	Beams on elastic foundation.	4
L3	Composed and composite beam.	2
L4	Limit state of beam, elastic-plastic boundary.	2
L5	Curved beams. Stress concentrations, Kirschs problem.	4

7 TEACHING TOOLS

N1 Lectures

N2 Laboratories

N3 Design classes

N4 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	30
Consultation hours	2
Exams and tests during session	3
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	5
Preparing of reports, projects presentations, discussion	10
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Individual project

F2 Laboratory exercise report

F3 Test

Summary grade

D1 Weighted average of forming grades

Conditions for passing the course

L1 active attend all compulsory activities

L2 fulfil all home assignments

L3 pass written verifications of their knowledge during the semester

L4 pass final examination

Tadeusz Kosciuszko Cracow University of Technology

Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering — Study profile: general academic

Study form: full-time — Field of study code: BUD

Study cycle: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Zaawansowane materiały konstrukcyjne
Course name in English	Advanced Structural Materials
Course code	WIL BUD oIIS C3 23/24
Course category	Major subjects
No. of ECTS points	2.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 Objective 1: To make students understand the fundamental relationships between composition, structure, manufacturing processes and properties of modern structural materials.

Objective 2 Objective 2: To introduce the issues related to the properties modification of the modern materials. Presentation of the scientific approach to modifying the properties of construction materials.

Objective 3 Objective 3: To acquaint students with selected modern construction materials both with mineral and organic skeleton.

Objective 4 Objective 4: To acquaint students with advanced techniques of construction materials testing and properties evaluation using standard methods and advanced scientific ones.

Objective 5 Objective 5: Data collection, analysis of test results; formulating conclusions and preparing a report. Learning the principles of experimental scientific work. Acquisition of teamwork skills.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Building Materials course credit

2 Building Chemistry course credit

3 Concrete Technology course credit

5 LEARNING OUTCOMES

LO1 Skills Application of Knowledge: Student explains the basic relationships between manufacture technology, structure and properties of modern construction materials;

LO2 Knowledge Student identifies and describes the main directions of construction materials modification;

LO3 Knowledge Student enumerates the basic properties of structural materials and describes the methods of mechanical and physical properties determination. The student describes the principles of structural and microstructural materials testing methods both standard and scientific ones;

LO4 Social competences Practical skills: Teamwork skills.

LO5 Skills Practical skills: Observation, handling equipment, reporting, oral and written communication skills necessary for scientific work.

6 COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Types of engineering materials: metals and alloys, ceramics and glasses, polymers, composite materials. Relation and interaction between the manufacturing process, structure and properties.	3
L2	Crystal structure of metals and phase diagrams of alloy systems. Structural steels: Fe-C system, structural steel components, examples of steel products, influence of alloys elements on the properties of steel. Steels for the reinforced and prestressed concrete. The role of heat treatment in steel production.	3
L3	Composite materials with mineral and organic matrices. Reinforcement mechanisms in composite materials. Fibre reinforced concretes as an example of composite material. Types of fibres and their nature.	3

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L4	Properties and application of concretes with special aggregates type (LWC, HWC). The properties and characteristic features of high performance cementitious materials (HPC, UHPC and RPC).	3
L5	Geopolimer binders, application, properties and characteristic features.	1
L6	Ceramics, advanced ceramics and glasses: manufacturing process, classification, properties.	2

Laboratory		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Determination of modulus of elasticity and dynamic modulus of elasticity of structural materials.	2
L2	The heat treatment of steels as an example of process-structure-properties relationship	2
L3	The role of admixtures in new generation cement concretes (SCC)	2
L4	Properties and application of concrete with special aggregates type (LWAC)	2
L5	Toughness index determination of brittle materials modified with fibrous inclusion (RPC, FRC)	2
L6	Structure and microstructure observation of structural materials - the application scanning electron microscope	2
L7	High performance concrete - from composition towards performance	3

7 TEACHING TOOLS

N1 Lectures

N2 Laboratory classes

N3 Multimedia presentations

N4 Handouts

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	3
Exams and tests during session	4
Hours of autonomous student work	
Preparing for classes, studying literature	8
Developing results	5
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/ Final test

F2 Written report from laboratory

Summary grade

D1 Weighted average of the marks / Mean of all marks

Conditions for passing the course

L1 Active participation in classes

L2 Written report preparation

L3 Positive results of final 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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Zarządzanie firmą budowlaną
Course name in English	Construction Company Management
Course code	WIL BUD oIIS D3 23/24
Course category	Specialty subjects
No. of ECTS points	2.00
Semester	1

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

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

3 COURSE OBJECTIVES

Objective 1 To introduce students to the basic issues and problems in management of construction company.

Objective 2 To introduce students to the models of construction company development and methods of diagnosing the development of a construction company

Objective 3 Introduction to scientific research.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the functions of management of construction company.

LO2 Knowledge The student knows the basic models of management of construction company development.

LO3 Skills The student is able to diagnose the development of a construction company using various methods.

LO4 Social competences The student formulates and communicates opinions on management.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Analysis of a construction company in individual development phases, life cycle analysis. Application of the checklist method in construction.	8
D2	Analysis of growth phases and crisis in a construction company based on L. Greiner's development model. Application of J. Leppard's method for diagnosis of construction company development. Formulating the construction company's operating strategy.	7

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Basic concepts of management of a construction company.	4
L2	Construction company development management, basic company development models and development diagnosis methods.	3
L3	Personnel management: recruitment, motivation, control, human resource management.	4
L4	Construction market research and analysis. Business plan.	4

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	30
Consultation hours	4
Exams and tests during session	2
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	10
Preparing of reports, projects presentations, discussion	0
Total number of hours devoted to the subject	**56**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Team project

F2 Passing lectures

Summary grade

D1 Average from lectures (60%) and projects (40%)

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: 2st

Specialty: Structural Design and Management in Civil Engineering (profile: Construction Technology and Management),Structural Design and Management in Civil Engineering (profile: Structural Design)

1 COURSE INFORMATION

Course name	Zarządzanie przedsięwzięciami budowlanymi
Course name in English	Management of Building Projects
Course code	WIL BUD oIIS C10 23/24
Course category	Major subjects
No. of ECTS points	2.00
Semester	3

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

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

3 COURSE OBJECTIVES

Objective 1 To familiarize students with the general problems of construction project management. To discuss issues related to processes of construction project management.

Objective 2 To prepare students to solve basic problems in the field on construction project management. To present

selected methods of analysis applied in construction project management. To prepare students for taking part in research (at a basic level) on problem within the field of construction project management.

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

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

5 LEARNING OUTCOMES

LO1 Knowledge Student has a general knowledge about construction project management.

LO2 Knowledge Student knows selected methods of analysis applied in construction project management problems.

LO3 Skills Student is able to define correctly and solve simple problems within the field of construction project management. Student is able to use selected methods applied for analyses of simple problems in the field of construction project management.

LO4 Social competences Student is able to work individually or in team on problems in the field of construction project management.

6 COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Time-cost trade-off analysis for an exemplary model of construction project.	5
D2	Development and elaboration of a cash-flow financial analysis for given model of a construction project.	5
D3	Application of Earned Value analysis for cost and progress monitoring for given model of a construction project.	5

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Characteristics of a construction project; determinants of success in managing construction projects. Multidimensionality of construction project management - different aspects of managing construction projects.	3
L2	Organizational models and schemes applied for construction projects. Relationships between the participants of construction project regarding the chosen organizational model.	3
L3	Processes related to construction project management. Analyses carried out in different phases of construction project regarding key management processes.	3

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L4	Budget of a construction project. Construction projects procurement.	2
L5	Monitoring cost and progress of construction projects. Earned Value Management for construction projects.	2
L6	Selected problems of modern technologies applied for management of construction projects.	2

7 TEACHING TOOLS

N1 Lectures, presentations, discussion

N2 Design exercises

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	30
Consultation hours	0
Exams and tests during session	4
Hours of autonomous student work	
Preparing for classes, studying literature	10
Developing results	10
Preparing of reports, projects presentations, discussion	6
Total number of hours devoted to the subject	**60**
Total number of ECTS points	2.00

9 Methods of grading

Partial grades

F1 Completion of design exercises

F2 Individual and/or team assignments

Summary grade

D1 Final exam

Conditions for passing the course

L1 Completion of all design exercises within given deadlines and according to requirements specified for each of the assignments and tasks.

L2 Positive anal exam grade.