

SUBJECT	ECTS	WINTER SEMESTER	SUMMER SEMESTER
DEPARTMENT OF BUILDING STRUCTURES AND ARCHITECTURE			
Concrete Structures I	6	W	
(prof. dr hab. inż. Viktor Tur, mgr inż. Julita Krassowska)	FCEE-		
Required knowledge: The students should have passed the subjects: Concrete Technology, Strenght of Materials			
Description:			
General principles of design of reinforced concrete structures. Properties of concrete and reinforcing steel. Interaction between steel and concrete. Durability aspects of structural concrete. Survey of dimensioning methods in design of RC structures. Basis of design of flexural members with an arbitrary cross-section, general and simplified apprach. Application of solutions for flexurale members with rectangular and T-sections. Design for flexurale members for shear according to truss model. Design for members under eccentric compression and tension. Design of structural members for local compression, punching and torsion. Control of serviceability limits states of RC members for cracking and deflections.Detailing of RC beams and plates. Design and detailing of RC frames, monolithic and precast concrete. Rules of design and detailing for concrete foundation. Constructions: continuous and isolated pads.			
Skills: Basic knowledge in the scope of design, dimensioning and detailing of reinforced concrete structures.			
Minimum number of students needed for a group class to convene: 4			
Concrete Structures II (for students after Concrete Structures I)	6		S
(prof. dr hab. inż. Viktor Tur)	FCEE-		
Required knowledge: The students must have passed the subjects: Concrete Structures I, Concrete Technology, Strength of Materials			
Description:			
Prestressed concrete structures, materials and techniques used in prestressed concrete. Principles od design of prestressed concrete structures according to linear stress method and ultimate limit state method. Two way slabs with rectangular shape, design and detailing rules. Flat slabs with capitals, rules of design and detailing. Flat slabs without capitals (slab and columns structures), static analysis nad design for flexure and punching. Ribbed slabs, structural solutions and detailing. Reinforced cooncrete stairs, design and detailing. Dilatations in structural concrete structures. Water tanks and silos, principles of static analysis and detailing of cross-sections.			
Skills: Knowledge of basic principles and rules of design and detailing of prestressed and reinforced concrete structures.			
Minimum number of students needed for a group class to convene: 4			
Designing of steel structures according to Eurocode 3	6	W	
(dr hab. inż. Mirosław Broniewicz, prof. PB)	FCEE-		
Required knowledge: The students should have passed the subjects: Strength of Materials			
Description:			

Introduction. Properties of Structural Steel, I. S. Rolled Sections, I. S. Specifications. Design Approach. Factor of Safety, Permissible and Working Stresses, Elastic Method, Plastic Method, Introduction to Limit States of Design. Connections. Type of Connections, Riveted, Bolted and Welded Connections, Strength, Efficiency and Design of Joints, Modes of Failure of a Riveted Joint, Advantages and Disadvantages of Welded Joints, Design of Fillet and Butt Welds, Design of Eccentric Connections. Tension Members. Net Sectional Area, Permissible Stress, Design of Axially Loaded Tension Member, Design of Member Subjected to Axial Tension and Bending. Compression Members. Modes of Failure of a Column, Buckling Failure: Euler's Theory.

Skills: Ability to utilize a systems approach to design and operational performance, ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams.

Minimum number of students needed for a group class to convene: 4

Prestressed concrete structures	6		S
<i>(dr hab.inż. Marta Kosior-Kazberuk, Mgr inż. Julita Krassowska)</i>	FCEE-		

Required knowledge: The students should have passed the subjects: Concrete Structures I, Concrete Structures II, Concrete Technology

Description:

Idea of prestressed structures. Properties of concrete for prestressed structures and prestressing reinforcement. Technology of prestressed concrete (pre-tensioned and post-tensioned prestressed concrete). Grout. Losses of prestress. Effects of prestressing on concrete elements and structures, design of prestressing. Limitation of stress due to service load, limiting zone for the location of the tendon. Action stages of prestressed structures. Cross-section forming. Crack resistance. Limiting zone for the location of the tendons. Limiting zone for the pressure line. Structural analysis of segmentally constructed prestressed structures. Ultimate resistance of elements subjected to axial force bending moment and shear. Analysis of the anchorage zone. Reinforcement of the anchorage zone. Serviceability Limit State. Limitation of stress. Crack control. Deflection control. Examples of civil engineering prestressed structures.

Skills: Proficiency in principle of prestressed concrete, behaviour of prestressed concrete structures.

Minimum number of students needed for a group class to convene: 4

Timber structures	6	W	
<i>(Dr inż. Barbara Sadowska-Buraczewska, Mgr inż. Julita Krassowska)</i>	FCEE-		

Required knowledge: The students should have passed the subjects: Strength of Materials

Description:

Subject description: Materials and their mechanical properties. Classes of use structures, loadings and time of lasting. Bearing capacities under compression, tension and bending, serviceability limit states. Combined state of stressing. Connections in timber structures. Deformability of dowel fasteners and yield modes of fasteners. Composite timber beams. Plane timber frames. Plane timber arches. Light wood-frame buildings. Spatial timber structures. Life time engineering of timber structures.

Design of timber roof structure according to requirements of EC5 and PN-B-30150:2000.

Skills: General characteristics of wood and wooden structures

Minimum number of students needed for a group class to convene: 9

Durability and safety of structures	3		S
<i>(dr inż. Aleksander Wawrusiewicz)</i>	FCEE-		

Required knowledge: Building materials

Subject Description:

Corrosion of concrete structures: state of concrete structures, factors creating decrease of durability of exploited structures, mechanism of decrease of durability of concrete, methods evaluating state of concrete, mechanism, describing corrosion of reinforcing steel, methods evaluating state of reinforcing steel, need of complex diagnostic, fundamentals of Multi Mapping method. Corrosion of steel structures. Biodegradation of timber structures. Safety of large engineering project like: bridges, toll buildings, dams, nuclear power stations, see platforms, stadiums, municipality buildings etc.

Skills: Basic knowledge in the range of life time engineering and safety of structures

Minimum number of students needed for a group class to convene: 9

Composite structures	5		S
<i>(dr inż. Agnieszka Jabłońska-Krysiewicz)</i>	FCEE-		

Required knowledge:

Subject Description: Characteristics and requirements of materials used in structures and. Design of floor slab with profiled steel profile. Design of composite beam including: stage of realization, load analysis, check of stability, load bearing capacity over the B-supports under combined bending and shear, serviceability limit state, load bearing capacity of beam in the stage of realization, load bearing capacity of the shear studs, deflection of the composite steel-structure beam, stress analysis and evaluation.

Skills: Students can characterize and design basic composite steel and concrete structures.

Minimum number of students needed for a group class to convene: 9

Flexible connections in steel structures	6	W	
<i>(dr inż. Ireneusz Ligocki)</i>	FCEE-		

Required knowledge:

Subject Description: Information about connections. Flexible connections. Experimental researches. Global analysis and classifications of joints. Modelling of the beam - to - column joints. Structural joints connecting H or I sections (Column bases). Hollow sections joints.

Skills:

- student describes in details different joints and forms of their failure under the loading
- student makes decomposition of choosen joints on basic elements, evaluates their designed resistance and stiffness
- evaluates the flexibility of the whole joint (resistance and stiffness) and estimate their final parameters.

Minimum number of students needed for a group class to convene: 9

Landscape Architecture Planning with Design	4	W	
<i>(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)</i>	FCEE-		

Required knowledge: The students should have passed the subjects: Art

Description:

Landscape Planning with Design responds to the growing demand for professionals with design skills and planning knowledge. These are needed for the development and application of strategies, policies and plans to create successful environments, in both urban and rural settings, for the benefit of current and future generations. On the course you will consider the physical, natural and socio-cultural factors that help to shape landscapes over time, studying the different values (scenic and aesthetic, recreational, experiential, environmental and economic) that are attached to landscapes and inform their future planning and development. There is a particular emphasis on sustainable landscapes. You will develop your individual planning and creative skills, an appreciation of design at all scales through studio-based projects.

Skills: The course adopts a student-centered approach, encouraging students to develop independence in their learning, and is studied primarily as an art and design-based discipline within a broad social and environmental context. It aims to nurture creative, technically competent landscape designers.

Minimum number of students needed for a group class to convene: 4

Integrated design 2 – a public park/ a public market square in small town with elements of vegetation	4	W	
<i>(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)</i>	FCEE-		
Required knowledge: -			
Description: The concept and design of modernisation of public park or market square – problems of urban landscape The project contain tasks: 1. Analysis of the site based on available historical materials, environmental and planning. 2. The conception of modernisation of market square or public park. 3. The project of portion of the garden 4. Landscaping details and elements, (pavement, architectural furniture, lights, a list of proposed plants). 5. The project (concept) of cubic design in the space of market square. Project's problems are discussed every week on classes, students take part in enclosures based on tasks problems. Enclosures are discussed. Students prepare cumulative project , which contains all tasks drawings.			
Skills: Student: - is designing elements of the municipal space so as the square, - get abilities of solving design problems connected with the forming of the municipal landscape - the ability of using the knowledge in the scope of stories and diversities of the cultural landscape in action associated with his forming and the protection - predicts the evaluation of suggested answers by a computer program - spatial in the prospect of the time - prepared design study is presenting display boards and the model in the form - every time in the clear way acting in the team, in which he is able to perform different roles - is drawing up the program of using the designed space, is considering variant uses - is explaining the influence to the realization of suggested solutions by a computer program - spatial to the quality of the space			
Minimum number of students needed for a group class to convene: 4			
Integrated design 4 – Establishment of Landscape in the open area	4		S
<i>(dr inż. arch. Dorota Gawryluk)</i>	FCEE-		
Required knowledge: -			
Description: The concept and design of public park in river Biała valley – problems of landscape in open area. Project contain tasks: 1. Composition of the whole establishment. 2. Analysis of the site based on available historical materials, environmental and planning, 3. The ability to analyze the viewing area. 4. The composition of the park (selected part). 5. The scale of detail in the park. Project's problems are discussed every week on classes, students take part in enclosures based on tasks problems. Enclosures are discussed. Students prepare cumulative project , which contains all tasks drawings.			

Skills: Student: - is designing elements of the park space located in town, - get abilities of solving design problems connected with the forming of the municipal landscape - the ability of using the knowledge in the scope of history of the cultural landscape - predicts the evaluation of suggested answers by a computer program - spatial in the prospect of the time -prepared design study is presenting display boards and the model in the form - every time in the clear way acting in the team, in which he is able to perform different roles - is drawing up the program of using the designed space, is considering variant uses - is explaining the influence to the realization of suggested solutions by a computer program - spatial to the quality of the space.			
Minimum number of students needed for a group class to convene: 4			
Free hand-drawing II	4		S
(dr inż. arch. Sławomir Wojtkiewicz)	FCEE-		
Required knowledge: Basic knowledge in the free hand drawing methods			
Subject Description: Advanced skills and techniques in representational drawing. Subjects include the human figure, architectural interiors and exteriors, landscapes and cityscapes. Black and white media. Drawings, paintings and sketches of isometric and perspective. Study of the human figure using wet and dry free hand-drawing techniques.			
Skills: The knowledge in the fundamental area of free hand-drawing techniques. The knowledge about free hand-drawing useful in design approach specially in architecture and landscape architecture.			
Minimum number of students needed for a group class to convene: 4			
Free hand-drawing I	4		S
(dr inż. arch. Sławomir Wojtkiewicz)	FCEE-		
Required knowledge: The students should have passed the subjects: free hand drawing I			
Subject Description: Basic skills and techniques in representational drawing. Subjects include the human figure, architectural interiors and exteriors, landscapes and cityscapes. Black and white media.			
Skills: Students acquire basic knowledge about free hand-drawing techniques.			
Minimum number of students needed for a group class to convene: 4			
Landscape architecture design II	5	W	
(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)	FCEE-		
Required knowledge: The students should have passed the subjects: design landscape architecture II			
Description: Covers human, social, technical, and aesthetic factors related to space and form. Design problems range from those of the immediate environment of the individual to that of small social groups. Design approach on the landscape architecture fields in urban context. Design methods with cultural and historical context of city center. The physical and biological properties of sites, the contextual environmental systems that influence them, and the opportunities and constraints these factors afford site-based projects are what we will investigate in this course. We will then apply this knowledge to sites in the field through a series of quantitative and qualitative exercises.			
Skills: Students will develop an understanding of context as a composition of networked environmental relationships within which all sites operate. Students will learn to analyze sites by taking quantitative and qualitative site data, drawing evaluative conclusions, and communicating findings graphically, verbally, and in writing.			
Minimum number of students needed for a group class to convene: 4			
Principles of landscape design	4		S

(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)		FCEE-	
Required knowledge: The students should have passed the subjects: Principles of landscape design			
Description: Introduction to design as a conceptual discipline directed at the analysis, interpretation, synthesis, and transformation of the physical environment. Exercises are aimed at developing an understanding of the issues, elements, and processes of environmental design. This course with an investigation of the variety of methods used in landscape architectural and urban design research and practice. The format of the course combines weekly lecture and applied research projects.			
Skills: Students will develop of methods and techniques design approach			
Minimum number of students needed for a group class to convene: 4			
Computer Applications in Landscape Architecture	4		S
(dr inż. arch. Sławomir Wojtkiewicz)	FCEE-		
Required knowledge: The students should have passed the subjects: Computer Applications in Landscape Architecture			
Description: Designed to develop a working knowledge of various computer software applications with emphasis on Autocad, Archicad, Artlantis. Explores other applications relative to land-use planning and the profession of landscape architecture.			
Skills: Students will develop computer graphic/cad skills and integrate them into the profession of landscape architecture.			
Minimum number of students needed for a group class to convene: 4			
Universal design - disabled persons in the urban environment	4	W	
(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)	FCEE-		
Required knowledge:-			
Subject Description: The exercises includes analysis of the fragment of the chosen urban and architectural area consisting in determining it's availability by disabled persons with different moving problems (walking with the bullet, on a wheelchair, with cart with the child and unseeing persons). Preparing the study indexing analysed area.			
Skills: Student understands motor restrictions resulting from different forms of disability, He defines problems in public space concerning disabled people. Student understands a social significance of public spaces availabilities for disabled persons. Student is suggesting solutions of public space adaptation for the purposes of disabled persons.			
Minimum number of students needed for a group class to convene: 4			
Universal design - optimization of the public utility buildings' availability	4	W	
(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)	FCEE-		
Required knowledge:-			
Subject Description: The exercises includes analysis of the chosen building and its external and internal area consisting in determining it's availability by disabled persons with different moving problems (walking with the bullet, on a wheelchair, with cart with the child and unseeing persons). Preparing the study indexing analysed boulding area.			
Skills:			

Student understands motor restrictions resulting from different forms of disability, He defines problems in buildings concerning disabled people. Student understands a social significance of buildings' public spaces availabilities for disabled persons. Student is suggesting solutions of building adaptation for the purposes of disabled persons.

Minimum number of students needed for a group class to convene: 4

Design of landscape architecture objects - town's market square	4	W	
<i>(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)</i>	FCEE-		

Required knowledge:-

Subject Description:

Learning of principles of designing landscape architecture objects in the built environment - of urban square / town's market square. Analysing the cultural context and functional-programme of designed space and stocktaking and the evaluation existing state of developing. Designing of equipping the square (the pavements and architectural details) and the seasonal and permanent flora.

Skills:

Student is analyzing historical and contemporary architecture of market squares seeking urban squares of artistic inspirations. The student performs stocktaking of the study area (flora, building development, urban planning substance). The student is carrying out the technical design of architectural details. The student executes the conceptual plan of the town's square.

Minimum number of students needed for a group class to convene: 4

Design of landscape architecture objects - city center square	4	W	
<i>(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)</i>	FCEE-		

Required knowledge:-

Subject Description:

Learning of principles of designing landscape architecture objects in the built environment - of city center square. Analyzing the cultural context and functional-programme of designed space and stocktaking and the evaluation existing state of developing. Designing of equipping the city center square (the pavements and architectural details, architectural furniture) and the seasonal and permanent flora.

Skills:

Student is analyzing historical and contemporary architecture of city center squares seeking urban squares of artistic inspirations. The student performs stocktaking of the study area (flora, building development, urban planning substance). The student is carrying out the technical design of architectural details, architectural furniture. The student prepares the conceptual plan of the city center square.

Minimum number of students needed for a group class to convene: 4

Forming of the city landscape	4		S
<i>(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)</i>	FCEE-		

Required knowledge: history of architecture, history of town planing, history and the theory of the space forming

Subject Description:

Analysing the urban-architectural space under the angle of the forming of areas green at urban structures (of silhouettes, predominant features, accents). Indexation of the examined municipal structure in the aspect of the composition and the spatial order.

Skills:

Student prepares urban planning stocktaking of the chosen part of the city. Student is drafting the indexation of the landscape of the analysed part of the city (panoramas views, internal views of urban spaces in the city). Student is assessing the cultural value of objects located in analysed area (analysed views). Student is suggesting solutions of the improvement in the panorama of the city.

Minimum number of students needed for a group class to convene: 4

Forming of the village areas landscape	4	W	
<i>(dr inż. arch Dorota Gawryluk, dr inż. arch. Maciej Kłopotowski)</i>	FCEE-		

Required knowledge: history and the theory of the space forming

Subject Description:

Analysing the village's space under the angle of the forming of the green areas at the panorama given to the village (of silhouettes, predominant features, accents). Indexation of the examined country areas in the aspect of the composition and the spatial order.

Skills:

Student prepares urban planning stocktaking of the chosen part of the village Student is drafting the indexation of the landscape of the analysed part of the village (panoramas views, internal views of streets, market squares, country homestead in the village). Student is assessing the cultural value of objects located in analysed area (analysed views). Student is suggesting solutions of the improvement in the panorama and internal views of the village.

Minimum number of students needed for a group class to convene: 4

Urban planning	4	W	
<i>(dr inż. arch. Maciej Kłopotowski, dr inż. arch. Sławomir Wojtkiewicz, mgr inż. arch. Wojciech Matys)</i>	FCEE-		

Required knowledge: history and the theory of the space forming

Subject Description:

Information about principles of the location, spatial requirements, communications connections, requirements connected with the technical infrastructure and: of functional, building and structural solutions, moreover potential functional analysis of architectural objects and connecting it with character of greenery.

Skills:

Student knows the typology and principles of locating residential buildings and principles of the design of areas for housing multi-occupied building development. Student is drawing up the functional and spatial program of the housing estate. Student is drafting design drawing up the complex of detached houses in the urban planning scale. Student performs the layout and the drafted design study illustrating the model.

Minimum number of students needed for a group class to convene: 4

Rural planning	4	W	
<i>(dr inż. arch. Maciej Kłopotowski, dr inż. arch. Sławomir Wojtkiewicz, mgr inż. arch. Wojciech Matys)</i>	FCEE-		

Required knowledge: history and the theory of the space forming

Subject Description:

Types of the country settlement in Poland. Cultural character of region in the process of planning the forming of the landscape of the village. Designing the settlement development taking the cultural aspect into account and the landscape and contemporary programme-spatial scope.

Skills:

Student knows the typology country settlement in Poland (Podlasie). Student is drawing up the functional and spatial program of the village center. Student is drawing stylistic recommendations for objects up on the area provided with the study. Student is drafting design drawing up the complex of country homesteads. Student performs the layout and the drafted design study illustrating the model.

Minimum number of students needed for a group class to convene: 4

Multidisciplinary desing. Small architecture object in public space	5		S
(dr inż. arch Dorota Gawryluk)	FCEE-		

Required knowledge:

Subject Description: Students participate in workshops. They work in small, inetrnational and multidisciplinary ansambles represanting architecture, landscape architecture, civil engineering, environmental engineering and others. One person in team represents one disciplin. Team design small architecture object located in public area. Conditions of designef object location: European city, specific climate, purpose use of the object, accessibility for the disabled people, analysis of the context of the location and heritage values.

Students cooperate in ansamble in the time of preparing project. Each student is responsible for her/his part of project. Student has to provide terms of his fields of activity to colleagues from team and accept the terms of other disciplines of the project. Students prepare drawings and 3D-model of designed object

Skills:

Student works in multidisciplinary team of designers. Student gains the ability to cooperate, provides guidelines for the project in accordance with his discipline, accepts in his project the guidelines of other disciplines. Student works in international group uesting English to communicate.

Minimum number of students needed for a group class to convene:

History of town planning	4	W	
(dr inż. arch Dorota Gawryluk)	FCEE-		

Required knowledge:

Subject Description: .

The course provides knowledge of history of town planning from the ancient ages till the end of 19th century. This course explores folloowing issues: the influence of ancient urban layouts on the current shape of cities, the development of medieval cities, the ideal Renaissance city, Baroque palace and garden premises, classicism in the city space, industrial city of the 19th century. Student learns about the conditions for the development of choosen cities from Europe and other continents, he learns the relationship between cultures in the world.

Skills:

Student understands the development and growing of cities throughout history. The student recognizes the value of cultural heritage of historical cities.

Minimum number of students needed for a group class to convene:

Regional architecture of Poland (Podlaskie Voivodeship)	4		S
(dr inż. arch Dorota Gawryluk)	FCEE-		

Required knowledge:

Subject Description: .

The course provides knowledge of history of regional architecture, urbanism, village architecture especially on the exaple of Podlaskie Voivodeship area. This course explores folloowing issues connected with area of north eastern Poland: miedieval towns, baroque ansambles and residential cities (Białystok, Choroszcz, Tykocin, Bielsk Podlaski), industrial complexes from 19th century, villages of area of Bielsk and Hajnowka (so-called "trail of open shutters"), History of architecture and urbandevelopment of Białystok.

Skills:

The student knows the historical heritage of Podlasie. The student knows about the rich history of the region in which he studied, understands its roots and links with European culture.

Minimum number of students needed for a group class to convene:

Complex metal structures	6		S
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(Dr inż Ireneusz Ligocki)	FCEE-
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Required knowledge: General building. Structural mechanics. Strength of materials, Basis of steel structure design.

Description of the topic:

1. Steel chimneys. Types and technical solutions. Loads. The calculation of the shank and anchorages. 2. Basics of joint flexibilities. Component method. Stiffness and strength. 3. Roofs with a large span. Structural roofs. Geometric shaping. Rules for calculating internal forces. Technical solutions. 4. Suspension and string structures. Types of constructions. Technical solutions. Basics of calculations.

Skills:

Student has knowledge about selected technical solutions of complex steel constructions and their execution, principles of designing selected complex structures with particular consideration of the chimney design and the selected flexible connection and has the ability to effectively apply standards and design recommendations.

The minimum number of students needed to call the group:

DEPARTMENT OF GEOTECHNICS AND STRUCTURAL MECHANICS

Theoretical mechanics	4		S
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(dr inż. Joanna Krętowska)	FCEE-
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Required knowledge:

Description:

Statics general notions and principles. Force system resultants. Static equilibrium. Centre of figure and solid. Types of rod structures. Statically determinate and over-rigid structures. Reactive forces and moments of beam and frame structures. Internal forces diagrams beams, frames and arches. Structural analysis of planar trusses. Static and kinetic friction, belt friction.

Skills: Student becomes familiar with statics general notions and principles. Student knows how identify statically determinate and over-rigid structures. Student can calculate reactions for beams and frames. Student determines forces in planar trusses and draws internal forces diagrams for plane bar structures. Student becomes familiar with the way of determination the center of figure and solid (columns), can design the cross-section, calculate the stress and draw stress diagrams.

Minimum number of students needed for a group class to convene: **5**

Strength of materials	6	W	
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(dr inż. Joanna Krętowska, dr inż. Jarosław Malesza)	FCEE-
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Required knowledge: The students should have passed the subjects: Theoretical mechanics

Description:

Definitions of stress and strain. Stress and strain components. Moment of inertia of an area. Parallel axis theorem. Principal axes and principal moment of inertia. Stress, strain, and deformation of axially loaded bars. Statically indeterminate problems. Analysis of torsion of circular bars. Shear stress distribution. Internal forces diagrams for beams, frames and arches. Bending and transverse shear stress. Normal and shear stress distribution. Elastic curve of neutral axis of the beam. Evaluation of beam deflection and slope: Double integration method, Conjugate Beam method. Application of energy theorems for computing deflections in beams. Combined loading. Eccentrically loaded short columns. Core section. Column buckling Laboratory: tensile test, impact test, hardness tests, buckling test, strain measurement module test.

Skills: Students get theoretical basis of the strength of materials which enable to solve basic engineering problems. Students can calculate the displacement and slope for simple beams. Student can identify the strength cases (axially loaded bar, torsion, shearing, bending, buckling, combined loading and eccentrically loaded short columns), can design the cross-section, calculate the stress and draw stress diagrams.			
Minimum number of students needed for a group class to convene: 9			
Structural mechanics	6	W	
<i>(dr inż. Michał Baszeń, mgr inż. Sandra Młonek, mgr inż. Monika Mackiewicz)</i>	FCEE-		
Required knowledge: The students should have passed the subjects: Theoretical mechanics, Strength of materials			
Description: Subject description: Statically determinate structures - internal forces, influence lines. Maxwell-Betti law of reciprocal displacements . Virtual work principle. Displacements of statically determinate structures. Static analysis of statically indeterminate structures - Force Method, Direct Displacement Method, Moment Distribution Method. Influence lines of internal forces in statically indeterminate structures. The stability of bar systems. Calculation of critical force. Second order effects. Skills: Ability to calculate statically indeterminate structure using Force Method and Direct Displacement Method, ability to calculate internal forces and displacement using influence lines.			
Minimum number of students needed for a group class to convene: 9			
Basis of mechanics of building structures	5	W	
<i>(dr inż. Adam Walendziuk)</i>	FCEE-00099		
Required knowledge: The students should have passed the subjects: Theoretical mechanics, Strength of materials, Structural mechanics			
Description: Fundamentals of static analysis of determinate and indeterminate spatial structures, properties and behavior of spatial structures, general relationships between forces and displacements, matrix formulation of the displacement method, analysis of 3-D frames by force and displacement method, 3-D trusses, arches. Skills: Student has knowledge of the mechanics of simple spatial structures, determines the distributions of internal forces in 3-D structures, chooses the efficient method for the analysis of the problem, checks the validity of analysis, knows the methods of analysis of arches.			
Minimum number of students needed for a group class to convene: 4			
Hydraulics and hydrology	3		S
<i>(dr hab. inż. Zenon Szypcio, prof. PB, dr inż. Katarzyna Dołżyk-Szypcio)</i>	FCEE-		
Required knowledge: The students should have passed the subjects: Mathematics, Physics			
Description: Physical and mechanical properties of liquids. Elements of hydrostatics. Fluid pressure on the vertical, inclined and curved walls. Basic concepts of liquid hydrodynamics. Bernoulli equation for ideal and real fluids flow. Steady flow in open channels. Erosion control. Groundwater flow. Bridges' and culverts' light. Watercourse and catchment. Catchment water balance. Fundamentals of hydrometry and hydrography. Water management. Protection against flooding. Skills: Student identifies the impact of the liquid on the buildings or their parts; describes the basic laws of motion of the liquid in the pipes in closed and open channels; recognizes the basic issues of hydrology and water management; calculates the fluid pressure on the vertical and inclined walls; constructs lines of pressure and energy to the movement of the liquid in the pipe; designs drainage for small buildings; designs trapezoidal channel for given discharge.			

Minimum number of students needed for a group class to convene: 4			
Soil mechanics	5	W	
(prof. Katarzyna Zabielska-Adamska, dr inż. Katarzyna Dołżyk-Szypcio)	FCEE-		
Required knowledge: The students should have passed the subjects: Mathematics, Theoretical mechanics, Strength of materials			
Description: Soil science elements. Gravimetric and volumetric relationships. Physical parameters of soils. Soil classification. Laboratory and in-situ tests. Permeability. Effective and total stress. Strength of soils. Stress-strain behaviour. Stress distribution in the soil subbase. Consolidation. Freeze elevation and breakthroughs. Slope Stability. Soil compaction. The stresses in the subsoil and the settlement of the building. Soil pressure and passive pressure.			
Skills: Recognition of subsoil for design of foundation. Identification of physical and mechanical parameters of soils.			
Minimum number of students needed for a group class to convene: 3 (laboratory)			
Foundation	6		S
(dr hab. inż. Zenon Szypcio, prof. PB, dr inż. Katarzyna Dołżyk-Szypcio, mgr inż. Iwona Chmielewska)	FCEE-		
Required knowledge: The students should have passed the subjects: Soil mechanics, Strength of materials, Structural mechanics, Concrete structures			
Description: Classification of foundations. Shallow foundations: pad footings, strip foundations, mat and plate foundations. Control of groundwater. Excavations. Pile foundations. Gravity and embedded walls. Soil improvement: replacement, preloading, vertical drains, stone columns, jet grouting, dynamic replacement. Reinforced soil, soil nails and anchors.			
Skills: Student selects the type of foundation, depending on the type of structure and soil-water condition; selects optimal methods of soil and foundation improvement; describes special geotechnical technologies; designs pad footings and retaining wall.			
Minimum number of students needed for a group class to convene: 4			
Underground Structures	6		S
(prof. Katarzyna Zabielska-Adamska)	FCEE-		
Required knowledge: The students should have passed the subjects: General building, Soil mechanics, Foundation, Concrete structures, Metal structures			
Description: Classification of underground structures and their usable functions. Types of excavations. Characteristic of selected structures among them city subway systems and railroad and highway tunnels. General building requirements for tunnels. Loadings on floor, walls and underlay of casing. Deep excavations and casing. The basic technologies of constructing of the tunnels. Microtunnelling.			
Skills: Knowledge in the scope of design, dimensioning and detailing of underground structures			
Minimum number of students needed for a group class to convene: 1			
Diagnostics of exploited building structures	5		S
(Janusz Krentowski, PhD, Eng.Krzysztof Czech, PhD, Eng.)	FCEE-		
Required knowledge: The students should have completed the courses: Theoretical Mechanics, Strength of Materials, Structural Mechanics			

Subject description: During the lectures and laboratories, students are acquainted with the methodology of the condition of exploited building structures subjected to static and dynamic loads. An important aspect is the ability of identification of physical and mechanical properties of embedded materials, deteriorating with time in variable conditions. On the basis of the results of destructive and nondestructive tests, students learn the methods of analysis of effort states of the building structural elements.

Lectures: Methodology for assessing the condition of the structure. Registration and credibility of test results. Methods of obtaining materials for research. Diagnostics of stress and strains of building structures and structural elements. Static and dynamic loads.

Basic issues of vibroacoustics. Selected vibroacoustic signal estimators. Propagation of waves in the ground. Traffic-related vibrations. Impact of vibrations on buildings and human beings. Basics of modal analysis of building structures. Minimizing the impact of vibrations on the environment.

Laboratories: Determination of the actual strength, elasticity and plasticity of the structural material obtained from exploited building facilities, especially after a catastrophe or working in a failure condition. Measurement of Young's and Kirchhoff modulus of structural materials. Assessment of multidirectional displacements of structural elements or building facilities.

Cutting-edge measuring equipment for the static and dynamic diagnosis and evaluation of vibrations on buildings and their users. Measurements of vibration using a laser vibrometer and the latest generation of MEMS transmitters with wireless signal transmission (WiFi). Introduction to the operational and experimental modal analysis of structures (using an impact hammer and a modal exciter).

Skills: Getting to know the methodology of diagnostics of exploited buildings and engineering constructions. Education skills: proper conduction of static and dynamic measurements in building structures, as well as digital processing and analysis of registered parameters in terms of assessing the safety of buildings and their users.

Minimum number of students needed for a group class to convene: 3

DEPARTMENT OF SPATIAL ECONOMY AND ENERGY-EFFICIENT CONSTRUCTION

Mathematics III – Statistics	6	W	
<i>(dr hab. Edwin Koźniewski)</i>	FCEE-		

Required knowledge: The students should have passed the subjects: Mathematics

Description:

Probability. Random variables and their probability distributions (random variables, discrete and continuous random variables, function of random variables). Moments of random variables (expected value, variance standard deviation, quintile of order p). Two-dimensional random variables (moments, independent random variables). Some special distributions. Sample moments and their distributions (chi-square, t- and F-distribution). The theory of point estimation (unbiased estimation, the method of moments, maximum likelihood estimation). Theory of testing of hypothesis (the Chi-square test, t-test, F-test, confidence estimation, the regression model).

Skills: Application of statistical methods in engineering.

Minimum number of students needed for a group class to convene: 4

Descriptive Geometry I	4	W	
<i>(dr hab. Edwin Koźniewski, dr inż. Marcin Orłowski)</i>	FCEE-		

Required knowledge: The students should have passed the subjects:

Description:

Basic concepts of projective geometry (vanishing elements). Projection. Parallel projection and invariants. Theorem of node of three planes and intersection of simple solid figures in visual frame representation. Pohlke' theorem and axonometry. Kinds of axonometry (isometry (orthogonal), military, cavalry, semiorthogonal, orthogonal). Axonometric images (representation) of simple figures and its shadows for convergent (central) and parallel lights. Basic constructions in axonometry: common points of lines and planes. Thrown, mutual and own shadows (central and parallel). Orthographic projection onto two (or more) projection surfaces (Monge orthographic projection). Multiview orthographic projection of solid figures and its shadows. Intersection of two and more solid figures in frame representation, tower roof (intersection of two pyramids or pyramid and prism). Auxiliary views (auxiliary projection surface, transformations and its application). Geometry of roofs, revolution and revolved section. Roofs with constraints – Monge projection and axonometry. CAD programs and classic descriptive geometry.

Skills: Remind of known and knowledge of new geometric transformations and kinds of projections have in civil engineering employment and its properties in context of newest utilization of software. Education of spatial imagination and take possession of abilities of graphic creation engineering documentation part.

Minimum number of students needed for a group class to convene: 4

Descriptive Geometry II	4		S
<i>(dr hab. Edwin Koźniewski, dr inż. Marcin Orłowski)</i>	FCEE-		

Required knowledge: The students should have passed the subjects:

Description:

Dandelin' theorem - cone and cylinder sections. Homology and central collineation. Pascal theorem. Construction of conics. Intersections of cone and cylinder in Monge projection. Shaping of certain rectilinear surfaces. Vaults and curvilinear roofs. Central projection and its invariants. Three-point perspective. Elementary plane figures and solid objects in central projection (perspective projection of geometric body). Basic constructions (parallelism, perpendicularity, revolved section, measuring point of line). Applicable (vertical) perspective. Indirect perspective - vanishing point and background point method. Earth work design - design of roads and sports ground, fill and cut. Heights of points, azimuths and angles of height. Construction of shadows in vertical perspective. Direct methods in vertical perspective. Perspective of interiors and its reflections in plane mirrors. Application of grid methods. CAD programs and classic descriptive geometry.

Skills: Remind of known and knowledge of new geometric transformations and kinds of projections have in civil engineering employment and its properties in context of newest utilization of software. Education of spatial imagination and take possession of abilities of graphic creation engineering documentation part.

Minimum number of students needed for a group class to convene: 4

Building physics	6		S
<i>(dr inż. Beata Sadowska, dr inż. Adam Świącicki)</i>	FCEE-		

Required knowledge: selected areas of physics, architecture, principles of construction.

Subject Description: Principles of heat transfer through the building envelope. Requirements of thermal protection of buildings. Air filtration through building envelopes. Thermal comfort of rooms. Thermal balance of heated buildings. Energetical evaluation of heated buildings. Energy characteristics of heated buildings. Moisture in building materials and building elements. Principles of design and execution of external building elements to avoid excessive moisture content.

Basic information of building acoustics. Acoustical protection of rooms. Acoustical properties of building elements.

Basic information of light technics. Characteristics of daylight and artificial light. Determination of coefficient of daylight by different types of lighting.

Skills: Knowledge of heat and mass transfer principles, transmission of sound and light and principles of building design with respect to requirements of thermal, moisture and sound protection.

Minimum number of students needed for a group class to convene: 6

Rational use of energy in buildings	6		S
<i>(dr inż. Beata Sadowska, dr inż. Adam Świącicki)</i>	FCEE-		

Required knowledge: selected areas of physics, architecture, principles of construction			
Subject Description: Calculations of seasonal energy requirements for heating of building in standard heating season. Thermal balance and participation of different components depending upon building geometry and technical condition. The possibilities of influencing thermal balance components by rational use of energy in building. The effectiveness of rational use of energy for heating and ventilation depending upon kind of heat source, energy medium and heating system.			
Skills: Ability of different ways of rational use of energy in building.			
Minimum number of students needed for a group class to convene: 6			
Thermal diagnostics and thermomodernization	6	W	
(dr inż. Beata Sadowska)	FCEE-		
Required knowledge:			
Subject Description:			
Thermomodernization - rules for planning and carrying out of the investment. Thermal balance and participation of individual components depending upon building geometry and technical condition. Calculation of energy use for space heating and cooling (ISO 13790) and the possibilities of influencing thermal balance components by rational use of energy in building. The analysis of the energy performance of buildings on the basis of EU indicators, EK and EP. Determination of optimum thickness of thermal insulation. Economic efficiency of thermomodernization. Thermal comfort of rooms and rational use of energy in buildings. Modern methods of thermal diagnosis of new buildings. The modernization of central heating installation and ventilation for the improving the energy performance of building and the thermal comfort of rooms. The modernization of heat sources with using unconventional and renewable energy.			
Skills:			
Student has knowledge regarding:			
- rules for selecting an effective source of heat and the optimum thickness of thermal insulation, - rules for determining the basic indicators describing the energy characteristics, - knowledge of the relationship between thermal comfort of rooms and the energy characteristics of the building. - student can determine the optimum thickness of thermal insulation and can use energy indicators.			
Minimum number of students needed for a group class to convene:			
Engineering geodesy	3	W	
(dr inż. Waldemar Łupiński)	FCEE-		
Required knowledge: The basics of mathematics and geography at the secondary school level			
Subject Description: Areas of interest geodesy as a science. Systems of reference geodetic measurements. Coordinate systems used in geodesy. Elements of coordinates. The role and the division of geodetic networks. Methods and equipment for measuring angular and linear. Measurement methods situational. Methods and equipment for measuring altitude. Maps situational-height and their use for environmental engineering. Calculation methods associated with situational-elevation maps. Maps for design purposes. Methods staking situational and height. Geodetic measurements related to the implementation and operation of utilities. Geodetic records of public utilities - design principles and main tasks. Measurements of displacements and deformations and constructions. General principles of GPS measurements			
Minimum number of students needed for a group class to convene: 3			
Land surveying and photogrammetry	4		S
(dr inż. Waldemar Łupiński)	FCEE-		
Required knowledge: The basics of mathematics and geography at the secondary school level			

Subject Description: Land surveying as a science. Systems of reference geodetic measurements. Coordinate systems used in geodesy. Elements of coordinates. The role and the division of geodetic networks. Methods and equipment for measuring angular and linear. Measurement methods situational. Methods and equipment for measuring altitude. Situational-height maps and their use for environmental engineering. Calculation methods associated with situational-elevation maps. Maps for design purposes. Methods staking situational and height. Geodetic measurements related to the implementation and operation of utilities. Geodetic records of public utilities - design principles and main tasks. Photogrammetry: methods, equipment, possibility of use in environmental engineering. Measurements of displacements and deformations and constructions. General principles of GPS measurements			
Minimum number of students needed for a group class to convene: 3			
Geodesy and photogrammetry	4		S
(dr inż. Waldemar Łupiński)	FCEE- 00134		
Required knowledge: The basics of mathematics and geography at the secondary school level			
Subject Description: Geodesy as a science. Systems of reference geodetic measurements. Coordinate systems used in geodesy. Elements of coordinates. The role and the division of geodetic networks. Methods and equipment for measuring angular and linear. Measurement methods situational. Methods and equipment for measuring altitude. Situational-height maps and their use for environmental engineering. Calculation methods associated with situational-elevation maps. Maps for design purposes. Methods staking situational and height. Geodetic measurements related to the implementation and operation of utilities. Geodetic records of public utilities - design principles and main tasks. Photogrammetry: methods, equipment, possibility of use in environmental engineering. Measurements of displacements and deformations and constructions. General principles of GPS measurements			
Minimum number of students needed for a group class to convene: 3			
Environmental Management System	6	W	-
(dr hab. inż. E. Broniewicz)	FCEE-00121		
Required knowledge:			
Description: The aim is to gain by students the theoretical and practical knowledge of environmental management system according to PN-EN ISO 14001. Characteristics of modern management systems according to international standards ISO. Elements of an environmental management system in accordance with the requirements of ISO 14001. Identification of environmental aspects as a basic element of the planning of the environmental management system. Rules for the implementation of the environmental management system in organizations. Procedures for environmental management system audit according to ISO 19011. System documentation. Costs and benefits related to the implementation and operation of the environmental management system. The procedure for certification of the environmental management system. Methods and indicators to assess the environmental performance of investment and operational activities.			
Skills: gaining knowledge about the environmental management system ISO 14001 and acquire the skills to elaborate an environmental management system documentation, mainly - environmental management programme.			
References:			
1. PN-EN ISO 14001:20105 Environmental management systems - General guidelines on principles, systems and support techniques			
2. PN-ISO 14004:2015 Environmental management systems - Requirements with guidance for use			
3. PN-EN ISO 19011:2012 Guidelines on Quality and/or Environmental Management Systems Auditing			
Minimum number of students needed for a group class to convene: 4			
DEPARTMENT OF CONSTRUCTION AND ROAD ENGINEERING			
Concrete technology	4	W	
(dr inż. Dorota Małaszkiwicz)	FCEE-		
Required knowledge:			
Description:			

Lecture: Mineral binders. Water for concrete. Aggregates for concrete. Mineral additions and chemical admixtures. Cement paste. Mortars. Concrete: classification, proportioning, properties and testing of technical properties according to EN 206-1. Goods produced from pastes, mortars and concrete.

Laboratory: Aggregate for concrete. Hydraulic binders (cements). Concrete proportioning using paste method. Testing properties of fresh and hardened concrete.

Skills: Classification of concrete, technical properties of components, properties of concrete mixture and hardened concrete, concrete mixture proportioning, testing of concrete application of concrete.

Minimum number of students needed for a group class to convene: 9

Road building engineering	3		S
<i>(dr inż. Marta Wasilewska)</i>	FCEE-		

Required knowledge: The students should have passed the subjects: Roads I

Description:

Road pavements. Materials using in road building. Technology of rolling, sub-base building and road materials production. Designing of the mineral-asphalt mixes. Technology building road pavements. Activities: Designing of a mineral-asphalt mix by border curves method. Designing of an asphalt quantity by analytic and mechanical methods.

Skills: Acquainting students with the organization of earthworks, technology production of road materials and road pavements.

Minimum number of students needed for a group class to convene: 4

Basis of road traffic engineering	4	W	
<i>(dr inż. Robert Ziolkowski)</i>	FCEE-		

Required knowledge: The students should have passed the subjects: -

Description: Characteristic of road users. Traffic research, measurements and analyses. Traffic flow characteristics. Methods of traffic conditions evaluation - level of service determination. Traffic management and traffic calming – objectives and measures. Road signs. Pedestrian and bicycle traffic. Road safety - problems and needs of improvement.

Skills: Acquired knowledge of research and analyses of road traffic. Ability of assessment of traffic condition. Acquired knowledge of problems concerning traffic safety.

Minimum number of students needed for a group class to convene: 4

Exploitation of buildings	2		S
<i>(dr inż. Dorota Małaszkiwicz)</i>	FCEE-		

Required knowledge: Construction materials; General building engineering

Subject Description:

Legal acts and regulations considering exploitation of buildings; documentation produced during life of a building (Book of building); rules of periodical inspections, types of repairs; causes of defects and failures, moisture sources in buildings, types of hydroinsulations, methods of drying wet elements in buildings.

Skills: Students define a cycle of life of a building and its durability in material and economical aspects; understand regulations considering maintenance of a building; students are able to evaluate technical conditions of elements of a building and repair needs, students are able to analyze causes of defects and failure and propose methods of repairs.

Minimum number of students needed for a group class to convene: 9

Technology of building products	3	W	
<i>(dr inż. Małgorzata Lelusz)</i>	FCEE-		

Required knowledge:-

Subject Description:

Technology of building ceramics production. Technology of autoclaved aerated concrete (AAC) production. Technology of sand lime bricks production.

Skills: Student describes in details the stages of the production process. Student identifies devices and machines in the production process. Student is able to use the web and other databases.

Minimum number of students needed for a group class to convene:			
Special concretes and recycling of concrete structures	5		S
<i>(dr inż. Dorota Małaszkiwicz)</i>	FCEE-		
Required knowledge:			
Subject Description: Classification, properties, specific ingredients, testing methods, proportioning and production methods of special concretes: High Performance Concrete, High Strength Concrete, Self Compacting Concrete, architectural concrete, Reactive Powder Concrete, Fiber Reinforced Concrete Education of skills to select special concrete constituents and calculate special concrete mix proportions Production, classification and properties of recycled aggregate. Basic technical processes of recycled aggregate concrete (RAC) production. Skills: Student identifies technological requirements and processes in production of concretes for special applications; qualitatively and quantitatively selects constituents for selected special concretes; evaluates technical properties of selected special concretes; describes technological processes of RAC production; identifies machines and devices for RAC production.			
Minimum number of students needed for a group class to convene: 9			
Monolithic construction	6		S
<i>(dr inż. Edyta Pawluczuk)</i>	FCEE-		
Required knowledge:			
Subject Description: Features of the monolithic building construction. Modern systems of formwork (e.g. lost formwork, climbing formwork systems ACS). Concreting monolithic structures (concreting and consolidation methods). Distant and close transport of concrete mixture. Concrete care in different climatic conditions. Recycling of concrete and concrete mixture. Skills: Student that passed the module: - designs and analyses the compound process of monolithic work - selects optimal formwork to the forming of chosen concrete elements - characteristic of modern technologies and devices for the completion of the monolithic construction - analyses the effectiveness: the cost and the time of work by variant sets of machines and formwork - predicts possibilities of later recycling of monolithic structures in the aspect of the protection of the natural environment			
Minimum number of students needed for a group class to convene: 4			
Organization of construction works I	6		S
<i>(dr inż. Jerzy Obolewicz)</i>	FCEE-		
Required knowledge: Basic building, Technology of construction work			
Subject Description: Organization in construction process. Methods of organization in works. Planning in building process works. Schedule of constructions works. Constructions site. Skills: Student can: - describe the organization of works - identify the supplies of process - prepare schedule for building process - count the supplies of constructions process - work with the use of internet supplies organize on building work			
Minimum number of students needed for a group class to convene:			
Organization of construction works II	6	W	

(dr inż. Jerzy Obolewicz)		FCEE-	
Required knowledge: Technology of construction work, Organization of construction works I			
Subject Description: The organization of processes in building enterprises. Process's management. Creating in management project. The optimization of supplies in management the project. Management quality and technology. The management the protection of environment and the sedate development. The management the chain of deliveries. Changes management.			
Skills: Student: - identifies building process - building team creates to management with project - optimizes supplies in management project - works out the records of management the project - knows the of management the project			
Minimum number of students needed for a group class to convene:			
Road earthworks and drainage	5		S
(dr inż. Robert Ziółkowski)	FCEE-		
Required knowledge: Basic knowledge in terms of Roads vertical and horizontal alignment			
Subject Description Lectures: Soil as the construction material. Road surface earthworks. Requirements and realization of excavation and embankment construction works. Roadway construction machines. Requirements for soil compaction - technics and evaluation. Calculation of earthwork volumes - mass diagram characteristic. Roadway drainage - types and characteristics of surface and subsurface drainage facilities. Design of surface water drainage and maintenance issues. Skills: Student knows the principles of calculation, evaluation and realization of road earthworks; knows the principles of designing, construction, and operation of the basic road drainage facilities.			
Minimum number of students needed for a group class to convene: 4			
Civil engineering materials	4		S
(dr inż Beata Backiel-Brzozowska)	FCEE-		
Content: Legal regulations related to standardization and assessment of civil engineering materials. Principal properties of civil engineering materials. Classification, properties and range of materials and products from natural stone, ceramics, metal, wood, glass, asphalt and plastics. Standard methods for testing the technical properties of materials. Durability and sustainability. Environmental profiles and criteria for assessment of civil engineering materials. Aims and objectives: Developing knowledge about legal regulations related to civil engineering materials, their classification and technical properties. Developing skills for determining the properties of materials using standard methods.			
Minimum number of students needed for a group class to convene: 3			
Protection against dampness and corrosion	6	W	
(dr inż. Beata Backiel-Brzozowska)	FCEE-		
Required knowledge: Building chemistry, Building materials, Concrete technology, Building structures			
Subject Description: Corrosion processes of building materials in various environments. Corrosion diagnostics and protection of building structures against corrosion. Causes and effects of dampness of building structures and damp proofing. Skills: Educating of the ability to understand corrosion processes and to identify environmental and material corrosion threats in civil structures. Consolidating and widening of the knowledge about effective methods of materials and structures protection against dampness and corrosion. Developing competencies to perform laboratory and in situ tests in the areas of corrosion diagnostics and moisture assessment of building materials and elements.			
Minimum number of students needed for a group class to convene: 3			

Diploma orientation seminar	1		S
	FCEE-00102		
Required knowledge:			
Subject Description: Familiarizing with the technics of preparation of the final project. Basic rules of preparation tehcnical presentation in relation to the engineering problem. Acquiring the knowledge in the range of modern applications in road engineering and ability of their applications. Preparation and execution of laboratory tasks in range of analyzing task. Skills: Fundamental knowledge related to final project preparation. Practical ability of planning and executing of technical engineering problem.			
Minimum number of students needed for a group class to convene:			
Final project for bachelor degree	15		S
	FCEE-00103		
Required knowledge:			
Subject Description: . Student is obliged to study in Bialystok University of Technology the whole academic year. Students should have basic knowledge in the field of mathematics, basics of building, concrete technology, concrete and bridge structures, basics of mechanics of building structures, road engineering, building exploitation, fundamentals of computer science. Skills: Familiarizing student with the methodology of solving engineer problems. Developing skills of appropriate choice and use of literature references and use of scientic and technical data bases. Training the ability of analyzing the literature to identify the possible solutions of the problem stated in the engineer project. Achieving skills of preparing plan and schedule of the process of the given task realization. Improving skills of analyzing the solving problem and formulating final conclusions.			
Minimum number of students needed for a group class to convene:			