SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Study programme

Civil Engineering

Faculty:	Faculty of Civil and Environmental Engineering
Level of study:	second cycle (post-engineering degree)
Education profile:	General academic
Form of study:	full-time studies
Academic year:	2025/26

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Basic information

Faculty name:	Faculty of Civil and Environmental Engineering
Major name:	Civil Engineering
Level of study:	second cycle (post-engineering degree)
Profile of study:	General academic
Form of study:	full-time studies
Duration of studies (number of semesters):	3
Number of ECTS required to complete the studies:	90
The number of ECTS points a student obtains during classes conducted with the direct participation of academic teachers or other persons conducting classes:	45
Professional title awarded to graduates:	magister inżynier
ISCED code:	0732
Language of study:	english

Assigning the major to the fields and disciplines to which the learning outcomes relate

Civil engineering, surveying and transportation	100%

Major characteristics

Major characteristics

Education in the field of Civil Engineering, through the appropriate selection of curriculum content, enables all students of second-cycle studies to acquire knowledge, skills and social competences necessary in professional work in the construction industry in the field of decision-making, design, implementation of investments and operation of equipment and facilities. In addition, each student can further develop their interests by choosing subjects within the electives. Education provides:

• acquiring extended knowledge and skills in the field of designing equipment, facilities and works in the construction industry and managing executive works, as well as to implement the formulation and testing of hypotheses of simple research problems; acquiring the ability to use modern methods and techniques of data analysis, the use of spatial information systems and computer programs supporting design;

• preparing the graduate to work in independent positions and to work in a team in executive companies, design offices and in industry units of state and local government administration;

• preparing a graduate of second-cycle studies to conduct scientific research and study at third-cycle studies at a doctoral school.

Learning objectives

A graduate's diploma in Civil Engineering of the second degree studies confirms obtaining qualifications defined by means of directional learning outcomes in the category of knowledge, skills and competences, which entitle to undergo professional practice in order to obtain a complex qualification - construction qualifications awarded by the Polish Chamber of Civil Engineers (PIIB). After completing appropriate internships, graduates of the field of Civil Engineering can apply for licenses to manage construction works and design without restrictions in the following specialties: structural engineering construction, bridge, road, railway in the field of railway construction, hydrotechnical and demolition. In addition, to manage construction works and to design to a limited extent in the installation specialty in the field of networks, installations and heating, ventilation, gas, water supply and sewage systems and to design to a limited extent in the architectural specialty.

Education concept

The concept of education in the field of Civil Engineerin assumes that the learning outcomes achieved during the implementation of the study program will enable the preparation of professional staff with competences provided for the field of study, taking into account the requirements of the Polish Qualifications Framework in the field of technical sciences. In addition, it takes into account the needs of the economy and the requirements of the labor market through constant cooperation with external stakeholders in the field of improving and changing teaching content as well as engineering and research activities. The concept of education assumes the creation of a student-friendly field of study, giving them full satisfaction from learning and creating conditions for students to participate in the cultural and scientific life of the academic environment.

Description of work placement (if provided for in the study programme)

Graduate profile

After completing the second-cycle studies, the graduate obtains the professional title of Master of Science. The graduate has extensive knowledge and skills in the field of: construction of housing, municipal, hydrotechnical, industrial and communication facilities; designing basic objects and building elements; construction technology and organization; managing teams and a construction company; production, selection and use of building materials. The graduate is prepared to: manage construction works; participation in the design; construction supervision and continuous self-education and professional development. He is prepared to: work in executive companies; construction supervision; building materials industry; and state and local government administration units related to construction. Graduates are prepared to undertake third-cycle and postgraduate studies.

The field of study was created in connection with the Construction Law Act, required to obtain independent technical functions in the Civil Engineering.

Learning outcomes

Knowledge

Code	Content	PRK
CE_K4_W01_inz	The graduate knows and understands in an extended scope issues from selected areas of mathematics, physics and chemistry, required to solve complex issues in the Civil Engineering.	P7S_WG
CE_K4_W02_inz	The graduate knows and understands the basics of continuum mechanics to an in-depth degree. He knows the principles of analysis of statics, stability and dynamics of complex 1D, 2D and 3D structures.	P7S_WG
CE_K4_W03_inz	The graduate knows and understands in an extended scope the issues of strength of materials with a continuous and fragmented structure as well as modeling of materials and structural systems, has knowledge of the basics of FEM and engineering calculations in the field of linear and non-linear models.	P7S_WG
CE_K4_W04_inz	The graduate knows and understands building materials properties and the principles of industrial production and the technology of manufacturing products and building elements.	P7S_WG
CE_K4_W05_inz	The graduate knows and understands the theoretical basis of structure analysis and optimization to an in-depth degree and knows the principles of analysis, construction and dimensioning of elements of complex building structures: metal, reinforced concrete, composite, wooden, masonry and earth.	P7S_WG
CE_K4_W06_inz	The graduate knows and understands to an in-depth degree the principles of analysis, design, construction, technology, implementation and operation of selected buildings and the principles of foundation of complex buildings and soil reinforcement.	P7S_WG
CE_K4_W07_inz	The graduate knows and understands the principles of creating quality management procedures, has knowledge about the cost effectiveness and time of implementation of construction projects in conditions of risk and uncertainty, knows and understands the principles of sustainable development and the basics of spatial planning and the impact of construction investments on the environment.	P7S_WG
CE_K4_W08_inz	The graduate knows and understands the rules of applying legal regulations in the construction industry, standards and guidelines for the design, implementation and operation of buildings.	P7S_WK
CE_K4_W09_inz	The graduate knows and understands the principles of running a business in the construction industry, understands the principles and basics of financial management of enterprises.	P7S_WK
CE_K4_W10_inz	The graduate knows and understands the concepts and principles of intellectual property protection, with particular emphasis on copyright.	P7S_WK
CE_K4_W11_inz	The graduate knows and understands modern information and communication technologies.	P7S_WK

Skills

Code	Content	PRK
CE_K4_U01_inz	The graduate is able to classify complex building objects and assess, calculate and list complex impacts on these objects.	P7S_UW
CE_K4_U02_inz	The graduate is able to prepare elements of project documentation in the environment of advanced CAD programs and BIM technology.	P7S_UW

Code	Content	PRK
CE_K4_U03_inz	The graduate is able to perform a classic static, dynamic and stability analysis of bar structures (trusses, frames, tendons), surface structures (shields, plates, membranes and shells).	P7S_UW
CE_K4_U04_inz	The graduate is able to define a computational model in the FEM environment and perform advanced linear analysis of complex building structures and non-linear structures at the basic level, as well as critically evaluate the results of numerical analysis.	P7S_UW
CE_K4_U05_inz	The graduate is able to choose the methods (analytical, experimental, numerical) used to solve complex engineering problems and is able to design and dimension elements and complex metal, reinforced concrete, composite, wooden, masonry and earth structures.	P7S_UW
CE_K4_U06_inz	The graduate is able to determine the geotechnical parameters of the subsoil and design the foundation of a building in various ground conditions.	P7S_UW
CE_K4_U07_inz	The graduate is able to use specialized tools to search for useful information, communication and software supporting the work of the designer and organizer of construction processes.	P7S_UW
CE_K4_U08_inz	The graduate is able to draw up, update and monitor the schedule of a construction project as a function of time and costs, as well as assess the risks in the implementation of construction projects, apply the relevant provisions of occupational health and safety as well as fire protection and environmental protection.	P7S_UW
CE_K4_U09_inz	The graduate is able to plan and carry out quality assessment studies of construction materials and products used and to assess their selected properties, is able to prepare and analyze the energy balance of buildings.	P7S_UW
CE_K4_U10_inz	The graduate is able to plan and carry out preliminary research work leading to the solution of engineering, technological and organizational problems appearing in thefield of Civil Engineering.	P7S_UW
CE_K4_U11	The graduate is able to use library and Internet databases in an advanced way and to use appropriate information technologies to obtain and process information.	P7S_UK
CE_K4_U12	The graduate is able to skillfully present issues related to construction in the form of oral presentations or supported by multimedia presentations.	P7S_UK
CE_K4_U13	The graduate is able to prepare various types of written works on issues related to construction.	P7S_UK
CE_K4_U14	The graduate is able to use a foreign language to the extent that allows the use of professional literature and communication at the B2+ level of the Common European Framework of Reference for Languages.	P7S_UK
CE_K4_U15	The graduate is able to cooperate and lead a team.	P7S_UO
CE_K4_U16	The graduate is able to plan continuous training and professional or scientific development and direct others in this area.	P7S_UU

Social competence

Code	Content	PRK
CE_K4_K01	The graduate is ready to use new technological solutions to improve the quality and safety in the construction industry, is aware of the need to constantly improve professional and personal competences and understands the need to use the latest knowledge in the field of construction in solving research and practical problems	P7S_KK
CE_K4_K02	The graduate is ready to act consciously and understands the non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for decisions made.	P7S_KO
CE_K4_K03	The graduate is ready to set priorities for activities and responsibility in engineering activities, including the reliability of presenting the results of their own and others' work.	P7S_KO

Code	Content	PRK
CE_K4_K04	The graduate is ready to act properly and is aware of the social, professional and ethical responsibility for the safety of his own work and that of the team.	P7S_KR
CE_K4_K05	The graduate is ready to correctly identify and resolve dilemmas related to the practice of the profession.	P7S_KR

Study plan

Semester 1

Subject	Number of hours	ECTS points	Form of verification	Mandatory
OHS training	OHS training: 4	0	Pass	Obligatory subjects
Foreign language/elective	Auditorium exercises: 45	4	Pass with grade	Mandatory group
Foreign language/elective	Auditorium exercises: 45	4	Pass with grade	Elective subjects
Mathematics	Lecture: 15 Auditorium exercises: 30	3	Exam	Obligatory subjects
Theory of elasticity and plasticity	Lecture: 30	3	Exam	Obligatory subjects
Structural mechanics	Lecture: 15 Project exercises: 30	3	Exam	Obligatory subjects
Geotechnical engineering in urban and transportation infrastructure	Lecture: 15 Project exercises: 30	3	Exam	Obligatory subjects
Hydraulic structures	Lecture: 15 Project exercises: 30	3	Pass with grade	Obligatory subjects
Environmental Hazard Assessment	Lecture: 15 Auditorium exercises: 30	3	Pass with grade	Obligatory subjects
Optional subject (2 subjects), specjalization: Engineering Infrastructure	Lecture: 30 Project exercises: 60	8	Pass with grade	Mandatory group
Students choose 2 subjects per semester (open list)				
Monitoring of civil engineering structures	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Irrigation systems and land management	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Natural and manmade hazards	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects

Subject	Number of hours	ECTS points	Form of verification	Mandatory
Waste disposal and land reclamation (civil/environemntal engineering in waste management)	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Safety and reliability assessment of structures in civil engineering	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Small bridges and culverts- hydroelectric small power plants	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Pumping, dewatering and sewage systems in urban areas	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Ground improvement methods	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Dynamics of thin plates	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Fundamental of structural mechanics	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Bridge engineering	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Circular Economy and a Sustainable Urban Environment	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Sum	**394**	**30**		

Semester 2

Subject	Number of hours	ECTS points	Form of verification	Mandatory
Computational methods (FEM, FDM and others)	Lecture: 15 Project exercises: 30	3	Pass with grade	Obligatory subjects
Complex steel structures	Lecture: 15 Project exercises: 30	3	Exam	Obligatory subjects
Complex concrete structures	Lecture: 15 Project exercises: 30	3	Exam	Obligatory subjects

Subject	Number of hours	ECTS points	Form of verification	Mandatory
Advanced foundation engineering	Lecture: 15 Project exercises: 30	3	Exam	Obligatory subjects
Construction process management	Lecture: 15 Laboratory exercises: 30	2	Pass with grade	Obligatory subjects
BIM in civil engineering	Lecture: 15 Laboratory exercises: 30	2	Pass with grade	Obligatory subjects
Construction law and investment processes regulations	Lecture: 20	1	Pass with grade	Obligatory subjects
Timber structures	Lecture: 15 Project exercises: 15	2	Pass with grade	Obligatory subjects
Diploma seminar I	Auditorium exercises: 15	2	Pass with grade	Obligatory subjects
Intellectual property management	Lecture: 10	1	Pass with grade	Obligatory subjects
Optional subject (2 subjects), specjalization: Engineering Infrastructure	Lecture: 30 Project exercises: 60	8	Pass with grade	Mandatory group
Students choose 2 subjects per semester (open list)				
Monitoring of civil engineering structures	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Irrigation systems and land management	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Natural and manmade hazards	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Waste disposal and land reclamation (civil/environemntal engineering in waste management)	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Safety and reliability assessment of structures in civil engineering	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Small bridges and culverts- hydroelectric small power plants	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Pumping, dewatering and sewage systems in urban areas	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects

Subject	Number of hours	ECTS points	Form of verification	Mandatory
Ground improvement methods	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Dynamics of thin plates	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Bridge engineering	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Fundamental of structural mechanics	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Circular Economy and a Sustainable Urban Environment	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Sum	**435**	**30**		

Semester 3

Subject	Number of hours	ECTS points	Form of verification	Mandatory
Diploma seminar II	Auditorium exercises: 45	2	Pass with grade	Obligatory subjects
Optional subject (2 subjects), specjalization: Engineering Infrastructure	Lecture: 30 Project exercises: 60	8	Pass with grade	Mandatory group
Students choose 2 subjects per semester (open list)				
Monitoring of civil engineering structures	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Irrigation systems and land management	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Natural and manmade hazards	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Waste disposal and land reclamation (civil/environemntal engineering in waste management)	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects

Subject	Number of hours	ECTS points	Form of verification	Mandatory
Safety and reliability assessment of structures in civil engineering	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Small bridges and culverts- hydroelectric small power plants	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Pumping, dewatering and sewage systems in urban areas	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Ground improvement methods	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Dynamics of thin plates	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Bridge engineering	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Fundamental of structural mechanics	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Circular Economy and a Sustainable Urban Environment	Lecture: 15 Project exercises: 30	4	Pass with grade	Elective subjects
Thesis	Diploma thesis: 0	20	Exam	Mandatory group
Thesis	Diploma thesis: 0	20	Exam	Elective subjects
Sum	**135**	**30**		

Opis przypisanych do przedmiotów efektów uczenia się oraz treści programowe zapewniające uzyskanie tych efektów

Subject name:		Mathematics	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	the methods of formulating boundary and initial-boundary value problems for linear partial differential equations of the first and second order.	CE_K4_W01_inz, CE_K4_W02_inz
	W2	the Laplace operator calculus for solving the Cauchy problem for linear ordinary differential equations with constant coefficients.	CE_K4_W01_inz, CE_K4_W03_inz
Skills: (In terms of skills, the graduate can)	U1	typical problems formulated for mathematical physics equations using the method of separation of variables and the method of characteristics.	CE_K4_U01_inz, CE_K4_U03_inz
	U2	expand a square-integrable function into a Fourier trigonometric series and determine the best mean square approximation of such a function in a given subspace of the L2 space.	CE_K4_U04_inz, CE_K4_U05_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	enhance professional and personal competencies and take responsibility in engineering activities.	CE_K4_K01, CE_K4_K03
Course content ensuring the achievement of learning outcomes:		Scalar product and norm in L2 space. Least squares approximation of integrable functions with square (projection onto subspace). Fourier series. Expanding functions into their Fourier trigonometric series. Fourier's integral theorem. Fourier transformation. Laplace transformation. Laplace operator calculus. Application of the Laplace operator calculus to solve the Cauchy problem for ordinary differential equations with constant coefficients and systems of such equations. First-order partial differential equations. Method of characteristics for first-order equations. Classification of second-order equations. Method of characteristics for second-order equations. Wave equation, d'Alembert formula. Heat conduction problem - separation of variables method.	
Examination methods:		Written exam, Written credit	

Subject name:		Theory of elasticity and plasticity	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	the basic relationships that exist between loads and deformations.	CE_K4_W02_inz, CE_K4_W03_inz
	W2	the basic laws and problems of the theory of elasticity and plasticity.	CE_K4_W02_inz, CE_K4_W03_inz
Skills: (In terms of skills, the graduate can)	U1	methods and models he or she has learned - if necessary appropriately modifying them - to analyze and design engineering.	CE_K4_U05_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	represent appropriate ethical attitudes, for example, a sense of responsibility for the obtained results and understands the need for lifelong learning.	CE_K4_K01
Course content ensuring the achievement of learning outcomes:		Vectors and tensors. Analysis on tensor fields. Lagrange and Euler's description. Green's and Almansi's strain tensors. Physical interpretation of strain tensor coordinates. Principal deformations. Compatibility equations of deformations. Euler-Cauchy stress principle. Euler-Cauchy stress tensor. Principal stresses, largest tangential stresses. Pioli-Kirchhoff stress tensors. Principles of conservation: mass, momentum, angular momentum, energy. Constitutive equations of elasticity theory. Boundary and initial problem in linear elasticity theory. Flat state of stress and strain. Special problems of the theory of elasticity. Airy's stress function. Elastoplastic material and its models. Ideal plasticity and plasticity with amplification. Condition of plasticity. Criteria of loading and unloading, Drucker's postulate. Associated law of flow. The theory of small elastic-plastic deformations and the theory of plastic flow.	
Examination methods:		Test (written or computer based)	

Subject name:		Structural mechanics	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	the basic assumptions and basic formulae of the slope-deflection method	CE_K4_W01_inz, CE_K4_W02_inz
	W2	the basic concepts, assumptions and governing equations of vibration theory of linearly elastic beams	CE_K4_W01_inz, CE_K4_W02_inz
	W3	the basic concepts, assumptions and governing equations of vibration theory of thin linearly elastic plates having either homogeneous or periodically micro-heterogeneous structure	CE_K4_W01_inz, CE_K4_W02_inz
Skills: (In terms of skills, the graduate can)	U1	apply the slope-deflection method to determine and investigate internal forces in statically and geometrically indeterminate beams and frames being under statical, thermal and kinematic loadings	CE_K4_U03_inz
	U2	apply the slope-deflection method to determine and investigate critical forces in beams and frames	CE_K4_U03_inz
	U3	calculate and analyse free and forces vibrations of linearly elastic beams and thin linearly elastic plates	CE_K4_U03_inz
	U4	interpret and estimate critically the obtained theoretical and computational results and formulate pertinent conclusions as well as identify sources of errors	CE_K4_U05_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	represent appropriate ethical attitudes and work effectively in the team	CE_K4_K04
Course content ensuring the achievement of learning outcomes:		Foundations of the slope-deflection method and application of this method to solving beams and frames being under statical, thermal and kinematic loads. Analysis of stability of beams and bar systems applying the slope-deflection method. Free and forced vibrations and dynamical internal forces in linearly elastic, isotropic beams. Dynamic problems for thin, lineraly elastic, isotropic, rectangular plates. Dynamic problems for thin, lineraly elastic, rectangular plates with periodically micro-heterogeneous structure in planes parallel to the plate midplane. alculations of reactions and internal forces in statically and geometrically indeterminate frames being under statical, thermal and kinematic loadings - application of the slope-deflection method. Determination of critical forces in symmetrical slidable frames subjected to symmetrical loadings - applications of the slope-deflection method. Determination and analysis of free and forced vibrations of beams, analysis of internal dynamical forces. Determination of free vibrations of isotropic, rectangular, simply supported plate with non-zero initial conditions, analysis of internal dynamical forces.	
Examination methods:		Written exam, Project, Assessment of activity during classes	

Subject name:		Geotechnical engineering in urban and transportation infrastructure	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	principles and ranges of rock classification, rock mass quality indicators and their strength and deformation parameters	CE_K4_W03_inz
	W2	rules for dimensioning excavation walls, including reinforced earth structures	CE_K4_W06_inz
	W3	methods for determining ground deformations caused by tunnel construction	CE_K4_W05_inz
Skills: (In terms of skills, the graduate can)	U1	determine the loads acting on the roof and walls of the tunnels	CE_K4_U01_inz, CE_K4_U15
	U2	design a reinforced soil wall and is able to select soil parameters relating to the initial state and to the state of destruction	CE_K4_U05_inz, CE_K4_U06_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	applying new technological solutions to improve the quality of safety in construction and setting priorities in engineering activities	CE_K4_K01, CE_K4_K03
Course content ensuring the achievement of learning outcomes:		State of stress and strain in the rock and soil medium. Similarities and differences in approach to the description of issues in the field of rock mechanics and soil mechanics. Description of the rocks and rock massif. Indicators that quantify the quality of the rock mass. Typical analysis engineering problems in the rock medium. Strength criteria for rocks and soils strong. Anisotropy of rocks in the description of stiffness and strength. Consideration of discontinuities in description of the behavior of the rock medium. Laboratory and field tests of properties mechanical rocks. Tunnel construction methods. Determination of loads transferred to the housing tunnel. Determination of displacements caused by the construction of tunnels. Soil project reinforced. Project in the field of calculating the loads on the walls and ceiling of the tunnel. Scope projectcalculation of ground deformations caused by the construction of the tunnel.	
Examination methods:		Oral exam, Project	

Subject name:		Hydraulic structures	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	how to design a dam spillway and understands the principles and technologies used in civil engineering.	CE_K4_W05_inz, CE_K4_W08_inz
Skills: (In terms of skills, the graduate can)	U1	characterize hydraulic structures considering their construction, purpose and working conditions, and to elaborate the dam spillway project	CE_K4_U10_inz, CE_K4_U13
	U2	use selected computer programs, prepare a well-documented engineering study in English and make tables and drawings	CE_K4_U07_inz, CE_K4_U10_inz, CE_K4_U13
Social competences: (Within the scope of competence, the graduate is ready to)	K1	implement the project using the achievements of science and technology, acting in a creative and entrepreneurial manner	CE_K4_K02
Course content ensuring the achievement of learning outcomes:		Water management structures. Types and tasks of reservoirs. Historical patterns in hydraulic constructions. Functional and constructional elements of hydraulic structures. Participation of reservoirs in water management. Hydraulic calculations of hydraulic structures inlets. Spillway inlets types. Energy dissipation devices. Drainage channels. Local scouring downstream hydraulic structures. Analysis of field situation and hydrological and hydraulic conditions of the area. Selection of damming section. Characteristic cross-sections and profiles of the stream and valley. Selection of the type of the spillway structure. Selection of inlet type. Design of inlet dimensions. Calculation of the water surface level within the collecting channel. Determination of characteristic damming levels. Analysis of conditions of water discharge from the inlet part of the discharge. Hydraulic calculations of the energy dissipation devices. Selection of type and calculation of energy dissipation devices dimensions. Dimensioning of the outlet channel. Structural drawings of the spillway.	
Examination methods:		Written credit, Project	

Subject name:		Environmental Hazard Assessment	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	elements of Environmental Risk Assessment.	CE_K4_W04_inz
	W2	the scientific method and be able to analyze hazardous events objectively.	CE_K4_W08_inz
Skills: (In terms of skills, the graduate can)	U1	to learn principles of relate to hazards.	CE_K4_U12
	U2	participate as a team member conducting human health and ecological risk assessment upon its completion.	CE_K4_U15
Social competences: (Within the scope of competence, the graduate is ready to)	K1	act consciously and understands the non-technical aspects and effects of engineering activities, including its environmental impact and related responsibility for decisions taken.	CE_K4_K05
Course content ensuring the achievement of learning outcomes:		Introduction: Environmental Contaminants, Sources of Environmental hazards, Environmental and ecological risks, Risk assessment in different disciplines. Elements of Environmental Risk Assessment: Hazard identification, Fate and behaviour of toxics and persistent substances in the environment. Hazard assessment and consequences of waste management. Hazard of everyday products: EcoDesign, how to avoid environmental hazard of everyday products? Hazardous of construction materials. Application: Case studies on risk assessment and management for Hazardous chemical storage, Chemical industries, Tanneries, Textile industries, Mineral processing and Petrochemical plants, Hazardous waste disposal facilities, Nuclear power plants, Contaminated site remediation, Case histories on Bhopal, Chernobyl, Seveso etc. Improving skills by conducting discussions and student projects using modern methods of permanent learning and management - Mind mapping (creating mind maps), case model - Rich Picture technique. The use of methods allowing for a wider view of the problem, starting a team discussion, presenting the problem situation from different perspectives.	
Examination methods:		Assessment of speeches during classes, Project, Case	

Subject name:		Computational methods (FEM, FDM and others)	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	basic and advanced methods of solving differential equations and problems described with their application (iterative methods, FDM, fundamentals of FEM)	CE_K4_W01_inz, CE_K4_W03_inz
	W2	models of elements of building constructions (beam, bar, shield)	CE_K4_W03_inz, CE_K4_W05_inz
	W3	principles of element analysis basing on the chosen model	CE_K4_W05_inz, CE_K4_W06_inz
Skills: (In terms of skills, the graduate can)	U1	operate in the MATHEMATICA environment	CE_K4_U07_inz
	U2	program medium advanced calculations in the MATHEMATICA environment with use of FEM and FDM	CE_K4_U04_inz, CE_K4_U05_inz, CE_K4_U07_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	responsibly and reliably present results of work completed by him/her as well as his/her team	CE_K4_K03
Course content ensuring the achievement of learning outcomes:		Iterative methods of solving differential equations of first and higher orders (Euler's method, Heun's method, method of fourth order). Finite Difference Method with application in structural mechanics (deflection of beams, heat conduction in shields). Finite Element Method for structural mechanics (forces and displacements in frames and grates, heat conduction in shields). Bases of the MATHEMATICA environment (fundamental commands, conditional and loop instructions), practical application of the MATHEMATICA for solving differential equations with use of the methods presented on the lecture (iterative methods, FDM) and for solving the problems of structural mechanics with use of FEM.	
Examination methods:		Written credit, Project	

Subject name:		Complex steel structures	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	the basic principles of designing cubature and special metal structures	CE_K4_W02_inz, CE_K4_W03_inz, CE_K4_W05_inz, CE_K4_W08_inz
	W2	the principles of designing flexible connections.	CE_K4_W03_inz, CE_K4_W04_inz, CE_K4_W05_inz, CE_K4_W08_inz
Skills: (In terms of skills, the graduate can)	U1	design the skeleton of a steel structure of a multi-storey building	CE_K4_U01_inz, CE_K4_U02_inz, CE_K4_U03_inz, CE_K4_U04_inz, CE_K4_U05_inz, CE_K4_U14
Social competences: (Within the scope of competence, the graduate is ready to)	K1	apply new technological solutions and set priorities for actions	CE_K4_K01, CE_K4_K02, CE_K4_K03, CE_K4_K04, CE_K4_K05
Course content ensuring the achievement of learning outcomes:		Principles of designing industrial halls, including crane beams. General outline of designing large-span halls for various purposes in full-wall, lattice spatial systems. Principles of constructing tower and mast type buildings, including chimneys. Design of the skeleton of a multi-storey building.	
Examination methods:		Oral exam, Project	

Subject name:		Complex concrete structures	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	legal regulations, standards, guidelines for the design and operation of buildings	CE_K4_W05_inz
	W2	the principles of constructing and dimensioning elements of building structures: metal, reinforced concrete , insulated, wooden, masonry and earth.	CE_K4_W06_inz
Skills: (In terms of skills, the graduate can)	U1	assess and compare impacts on buildings	CE_K4_U01_inz, CE_K4_U15
	U2	perform static analysis of member structures	CE_K4_U03_inz, CE_K4_U05_inz
	U3	design and dimension selected elements and simple structures: metal, reinforced concrete, combined, wooden, masonry and earth	CE_K4_U02_inz, CE_K4_U09_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	act consciously and prioritize activities and engineering responsibility	CE_K4_K02, CE_K4_K03
Course content ensuring the achievement of learning outcomes:		Basic principles of designing prefabricated structures. Composite structures, bending and shear load capacity. Basic information about prestressed structures – idea, historical outline, prestressed concrete and cable concrete. Properties of concrete and prestressing steel. Making prestressed concrete elements using the long track method. Cable concrete - construction of prestressing tendons, anchorages and cable channels, compression technology and protection of tendons against corrosion. Stresses in concrete caused by compression. Compression force, compression losses: losses due to elastic deformation of concrete, losses caused by friction of the cable against the walls of the channel, slippage of tendons in the anchorage, relaxation of the prestressing steel, delayed losses. Limit state of the load-bearing capacity of prestressed elements. Shear, major tensile stresses and bevel scratches. Serviceability limit state - scratching in normal cross-sections, scratch width limits and other requirements, drawing force and drawing moment, calculation of crack width, deflection of prestressed elements. Anchorage zone. Design due to stress conditions. Examples of prestressed structures, prestressed halls and buildings, prestressed beams and girders, roof and prestressed concrete slabs. Tank compression, winding compression, segment compression. Reinforced concrete and prestressed tanks and silos – general characteristics of structures and loads. The subject of the exercises is the design of a prestressed floor girder combined with a reinforced concrete slab.	
Examination methods:		Written credit, Project	

Subject name:		Advanced foundation engineering	ECTS: 3
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	the principles of advanced foundation engineering	CE_K4_W08_inz
	W2	the principles of Geotechnical design according Eurocode 7	CE_K4_W06_inz
Skills: (In terms of skills, the graduate can)	U1	assess ULS and SLS of spread and deep foundations	CE_K4_U06_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	critically evaluate his/her professional knowledge and consult experts in the difficult conditions solving geotechnical problems on his/her own	CE_K4_K03
Course content ensuring the achievement of learning outcomes:		Lectures and laboratories are given to the students for understanding of the information regarding to geotechnical design in advanced foundation engineering, design of spread and deep foundations according to Eurocode 7 using Ultimate Limit States and Serviceability Limit States as well as ground improvement.	
Examination methods:		Test (written or computer based), Project	

Subject name:		Construction process management	ECTS: 2
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	the topic of cost and time efficiency of construction projects under conditions of risk and uncertainty	CE_K4_W07_inz
	W2	the application of standards and guidelines for the management of construction projects	CE_K4_W08_inz
	W3	understands how to use MS Project to update the schedule and control the progress of work on site as a function of time and cost	CE_K4_W09_inz
Skills: (In terms of skills, the graduate can)	U1	apply selected computer programs to assist in the management of a construction project	CE_K4_U07_inz
	U2	use a network schedule for the implementation of a selected construction project	CE_K4_U08_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	correctly select calculation methods for planning and optimization of construction works	CE_K4_K03, CE_K4_K04, CE_K4_K05
Course content ensuring the achievement of learning outcomes:		Optimization methods in construction. Basic concepts and techniques. Linear programming. The transportation problem. Dynamic programming. Alignment of the employment graph. Serialization of tasks. Jonhson and Lomnicky algorithm. On-site cost management. Earned Value method. Types of projects from the point of view of their impact on the environment. Environmental impact assessment procedure. The role of the local spatial development plan. Decision on environmental conditions of consent to the project. Environmental impact report. Transportation issue - solving the task manually and in Excel. Alignment of the employment graph by analytical and graphical methods. Serialization of tasks. Manual solution of the Jonhson algorithm and computer solution of the Lomnicky algorithm. Network schedule for the implementation of an economic building. Tracking and control of project implementation. Financial schedule. Analysis of material and financial progress by the Earned Value method. Project made in MS Project program.	
Examination methods:		Written credit, Report	

Subject name:		BIM in civil engineering	ECTS: 2
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	the objectives of BIM (Building Information Modelling) used in the construction industry	CE_K4_W07_inz
	W2	the main benefits and limitations of using BIM methodology in the construction projects implementation	CE_K4_W07_inz
Skills: (In terms of skills, the graduate can)	U1	build a multidimensional BIM model of a building object	CE_K4_U02_inz
	U2	think interdisciplinarily in a creative way implementing knowledge from different disciplines within the the field of technical sciences	CE_K4_U07_inz, CE_K4_U11
Social competences: (Within the scope of competence, the graduate is ready to)	K1	recognition of the practical knowledge of experts in the problems arising in the discipline of Civil Engineering and Transportation	CE_K4_K01
Course content ensuring the achievement of learning outcomes:		Introduction to BIM, Basic terminology of BIM, BIM vs. CAD, BIM models, features, Overview of BIM software, IFC format, Classification in construction, BIM model - rules of correct construction, BIM on construction site, Impact of BIM on the investment process and its participants, Inter-industry coordination in BIM, Analysis of case studies implemented using BIM technology, Standards and legislation - Poland and Europe. Basic information about Revit. Revit interface. Saving a new architectural project. Basic drawing settings. Modeling a residential building: defining the structural grid (horizontal and vertical structural axes with descriptions); defining levels on elevations; creating walls foundation walls, footings; successive learning of keyboard shortcuts; creating waterproofing and thermal insulation; learning about the material library; exterior and interior walls (load-bearing and partition walls); rim and sub-beams; combining materials and finishing with wall materials; introduction to the use of families; ceilings, floors and floor finishes; carpentry (windows and doors); use of built-in families of inserted structural elements; stairs and handrails; adding floors; ceilings and roofs; solid method and pull-out method; Project documentation: dimensioning, projections, cross sections, elevations of the object, statement, sheets. Families of elements. Management of families and editing of families.	
Examination methods:		Written credit, Project	

Subject name:		Construction law and investment processes regulations	ECTS: 1
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	the basics of the legal system in Poland and selected elements from the Constitution of the Republic of Poland and has a basic knowledge of the relationship between national law and EU law.	CE_K4_W08_inz, CE_K4_W10_inz
	W2	the basic rights and obligations of participants in the investment process	CE_K4_W07_inz, CE_K4_W09_inz
Skills: (In terms of skills, the graduate can)	U1	apply legal regulations in the field of construction.	CE_K4_U08_inz
	U2	plan, organize and control the schedule for the implementation of a construction project using an appropriate computer program.	CE_K4_U08_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	assess the risks and consequences of wrong decisions determining priorities for the implementation of the task.	CE_K4_K02
Course content ensuring the achievement of learning outcomes:		Course content Subject's learning outcomes Activities 1. Basic knowledge of the legal system in Poland; Basic knowledge of the relationship between domestic law and European Union law (regulations, decisions and directives of the European Union); Selected issues of the Construction Law; Selected issues of the Water Law; Selected issues of the Geological and Mining Law; Ways of searching for up-to-date information on legal acts (Internet System of Legal Acts, EUR-lex). Basics of planning, organization and control of the course of the investment process in construction, rights and obligations of the various participants in this process, the role of construction supervision. Drawing up and interpreting schedules for the implementation of construction works, as well as preparing cost estimates for the implementation of these works using computer software used in construction practice.	
Examination methods:		Written credit, Presentation	

Subject name:		Timber structures	ECTS: 2
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	analysis, design and construction in the field of traditional timber construction and modern	CE_K4_W05_inz
Skills: (In terms of skills, the graduate can)	U1	design a simple timber-framed building timber frame and dimension its elements	CE_K4_U05_inz
Social competences: (Within the scope of competence, the graduate is ready to)	K1	act consciously and recognise the importance of knowledge in solving cognitive and practical problems in the field of timber construction	CE_K4_K05
Course content ensuring the achievement of learning outcomes:		History of timber construction. Characteristics material. Wood as a raw material. Wood as a construction material. Wood in modern contemporary construction. Design of wooden elements. Design of a simple timber-framed building.	
Examination methods:		Test (written or computer based), Project, Presentation, Assessment of activity during classes	

Subject name:		Diploma seminar I	ECTS: 2
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	course of the exam and a list of possible questions exams at the Faculty of Civil and Engineering Environment at the Warsaw University of Life Sciences in the field of Civil Engineering. Student also learns how to do correctly multimedia presentation, learns the techniques of presentations and becomes proficient in public occurrence.	CE_K4_W06_inz
Skills: (In terms of skills, the graduate can)	U1	prepare in Engish well documented engineering study and has oral presentation skills	CE_K4_U12
	U2	obtain information in the field of civil engineering from literature, databases and other sources, make their interpretation and critical evaluation, draw conclusions and form reasoned opinions	CE_K4_U11
Social competences: (Within the scope of competence, the graduate is ready to)	K1	describing the results of own work, formulating opinions on issues in the field of civil engineering, presenting the diploma thesis	CE_K4_K02, CE_K4_K03
Course content ensuring the achievement of learning outcomes:		The student becomes familiar with the course of the exam and list of possible exam questions at the Faculty of Civil and Environmental Engineering at the Warsaw University of Life Sciences majoring in Civil Engineering. The student finds out also how to do a presentation correctly multimedia, learns presentation techniques and becomes proficient in public speaking. During the course, the student presents the assumptions and preliminary results of the diploma thesis. In addition, the student takes an active part in discussions about the work of other seminar participants.	
Examination methods:		Assessment of speeches during classes	

Subject name:		Intellectual property management	ECTS: 1
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	basic concepts and principles of intellectual property protection	CE_K4_W10_inz
	W2	the essence and role of intellectual property protection	CE_K4_W10_inz
	W3	types of industrial property objects, the possibility of using industrial property bases and the essence of copyright law	CE_K4_W10_inz, CE_K4_W11_inz
	W4	selected institutions and organizations dealing with the protection of intellectual property in Poland, the European Union and worldwide	CE_K4_W10_inz
	W5	modern information and communication technologies supporting the protection of intellectual property	CE_K4_W11_inz
Skills: (In terms of skills, the graduate can)	U1	independently plan and implement their own learning and determine the direction of further education	CE_K4_U16
	U2	integrate information obtained from various sources, interpret and critically analyze it	CE_K4_U11
	U3	appropriately apply standards and laws in the field of protection of intellectual property in the construction industry	CE_K4_U11
Social competences: (Within the scope of competence, the graduate is ready to)	K1	further training in intellectual property protection due to changing regulations	CE_K4_K03
	K2	recognize the importance of social, ethical and professional responsibility for non-compliance with intellectual property protection laws	CE_K4_K03, CE_K4_K04, CE_K4_K05
Course content ensuring the achievement of learning outcomes:		Genesis of the development of intellectual property protection in the world and in Poland. Principles of the system of intellectual property protection. Importance of intellectual property protection for entrepreneurs and consumers. International and EU organizations in the field of intellectual property protection. Company secrecy as the simplest form of intellectual property protection. Competencies and activities of the Patent Office of the Republic of Poland in the field of industrial property protection. Trademark - conditions for obtaining the right of protection. Industrial design. Geographical indications. The essence of an invention. Principles of granting a patent. Types of patents. Utility model. Topographies of integrated circuits. The essence and types of licenses granted. The role of patent attorneys. Protection of copyright in Poland. Protection of related rights in Poland. Protection of image. Consequences of infringement of intellectual property rights.	
Examination methods:		Test (written or computer based)	

Subject name:		Diploma seminar II	ECTS: 2
Effects:		The content of the effect assigned to the subject:	Directional effect reference:
Knowledge: (In terms of knowledge, the graduate knows and understands)	W1	how to do correctly multimedia presentation, learns the techniques of presentations and becomes proficient in public occurrence, how to responsibly and reliably analyze and evaluate the obtained results	CE_K4_W06_inz
Skills: (In terms of skills, the graduate can)	U1	describe the results of his own work, formulate conclusions and opinions about environmental engineering, is communicative in media presentations, can use selected programs computer for creating presentations multimedia	CE_K4_U12, CE_K4_U13
	U2	responsibly and reliably analyze and evaluate the obtained results of own and third-party work	CE_K4_U13
	U3	share knowledge and information with the public in the field of civil engineering in general understandable	CE_K4_U16
Social competences: (Within the scope of competence, the graduate is ready to)	K1	describing the results of own work, formulating conclusions and opinions on issues in the field of civil engineering, writing and presenting the diploma thesis	CE_K4_K02, CE_K4_K03
Course content ensuring the achievement of learning outcomes:		The student finds out also how to do a presentation correctly multimedia, learns presentation techniques and becomes proficient in public speaking. During the course, the student presents the assumptions and results of the diploma thesis. In addition, the student takes an active part in discussions about the work of other participants seminar to gain preparatory skills to answer questions about working on exam.	
Examination methods:		Assessment of speeches during classes	

Programme indicators

Name	Value
Potwierdzenie – na podstawie planu studiów, że student realizuje zajęcia z dziedziny nauk humanistycznych i/lub społecznych, którym przypisano nie mniej niż 5 punktów ECTS	5
Potwierdzenie – na podstawie planu studiów, że student ma możliwość wyboru zajęć, którym łącznie przypisano liczbę punktów ECTS nie niższą niż 30% ECTS określonych dla programu tych studiów	48/90 (53.33%)
Potwierdzenie, że program studiów o profilu ogólnoakademickim obejmuje zajęcia związane z prowadzoną w uczelni działalnością naukową, w wymiarze większym niż 50% liczby punktów ECTS, określonej dla programu tych studiów	55/90 (61.11%)
Potwierdzenie, że liczba punktów ECTS uzyskanych w programie studiów poprzez realizację zajęć z wykorzystaniem metod i technik kształcenia na odległość jest nie wyższa niż 75% ogólnej liczby punktów ECTS w programie studiów o profilu ogólnoakademickim	0/90 (0%)
Liczba godzin w programie	964