Faculty: Civil Engineering; Course of studies: Civil Engineering Cycle: Bachelor Course offer for Summer semester

Lp.	Course Code	Course	Hours	Sem	ECTS	Syllabus
1	1080-BU000-ISA-0411	Building Materials I	45 h (15 h Workshop 30 Laboratory)	2	4	(Name of course: Building Materials I)
2	1080-BU000-ISA-0302	Descriptive Geometry II	30 h (15 h Lecture 15 h Project)	2	2	(Name of course: Descriptive Geometry II)
3	1080-BU000-ISA-0306	Informatics I	30 h (30 h Workshop)	2	3	(Name of course: Informatics I)
4	1080-BU000-ISA-0352	Surveying	30 h (15 h Workshop 15 h Laboratory)	2	3	(Name of course: Surveying II)
5	1080-BU000-ISA-0304	Technical Drawing II	30 h (30 h Project)	2	2	(Name of course: Technical Drawing II)
6	1080-BU000-ISA-0401	Theoretical Mechanics	75 h (30 h Lecture 30 h Workshop 15 h Project)	2	7	(Name of course: Theoretical Mechanics)
7	1080-BU000-ISA-0353	Engineering Geology	45 h (15 h Lecture 15 h Workshop 15 h Laboratory)	4	3	(<mark>Name of course:</mark> Engineering Geology)
8	1080-BU000-ISA-0422	Fundamentals of Building II	45 h (15 h Lecture 30 h Project)	4	4	(Name of course: Fundamentals of Building II)
9	1180-BU000-ISA-9206	HC – Decision Making and Negotiation Theory	15 h Lecture	4	1	(Name of course: Decision Making and Negotiation Theory)
10	1080-BU000-ISA-0307	Informatics II	30 h (30 h Workshop)	4	2	(Name of course: Informatics II)
11	1080-BU000-ISA-0403	Strength of Materials II	90 h (45 h Lecture 15 h Workshop 15 h Laboratory 15 h Project)	4	7	(<mark>Name of course:</mark> Strength of Materials II)
12	1080-BU000-ISA-0431	Technology and Organization of Building Works I	60 h Lecture	4	4	(Name of course: Technology and Organization of Building Works I)
13	1080-BU000-ISA-0471	Timber Structures	30 h (15 h Lecture 15 h Project)	4	2	(<mark>Name of course:</mark> Timber Structures I)

14	1080-BU000-ISA-0442	Transportation Engineering II	45 h (45 h Project)	4	3	(Name of course: Transportation Engineering II)
15	1080-BU000-ISA-0434	Basics of Organization and Management Construction	60 h (30 h Lecture 15 h Workshop 15 h Project)	6	5	(Name of course: Basics of Organization and Management Construction)
16	1080-BU000-ISA-0613	Basics of Underground Structures	30 h (15 h Lecture 15 h Project)	6	2	(Name of course: Basics of Underground Structures)
17	1080-BU000-ISA-0452	Concrete Structures II	60 h (30 h Lecture 15 h Laboratory 15 h Project)	6	5	(<mark>Name of course:</mark> Concrete Structures II)
18	1080-BU000-ISA-0350	HC – Fire Safety	15 h Lecture	6	1	(Name of course: Fire Safety)
19	1080-BU000-ISA-0616	Fundamentals of Bridge Engineering	60 h (30 h Lecture 30 h Project)	6	3	(Name of course: Fundamentals of Bridge Engineering)
20	1080-BU000-ISA-0405	Mechanics of Structures II	60 h (30 h Lecture 15 h Workshop 15 h Project)	6	5	(Name of course: Mechanics of <mark>Structures 2</mark>)
21	1080-BU000-ISA-0622	Metal Structures II	60 h (30 h Lecture 30 h Project)	6	5	(<mark>Name of course:</mark> Metal Structures II)
22	1080-BU000-ISA-0482	Soil Mechanics and Geotechnical Engineering II	75 h (30 h Lecture 15 h Laboratory 30 h Project)	6	5	(Name of course: Soil Mechanics and Geotechnical Engineering II)

Name of course: Building Materials I

Coordinator of course: Piotr Woyciechowski, Dr hab. inż. Prof. PW

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Code of course: 1080-BU000-ISA-0411

Nominal semester: 2 / AY 2024/2025

Number of ECTS credits: 4

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 15h
- Laboratory 30h
- Computer lessons 30h

Preliminary requirements:

Fundamental knowledge on mathematic, physic and chemistry (including Building Chemistry).

Limit of students: 15

Purpose of course:

Recognition of processes taking place in building materials; knowledge about scope of use and quality control of building materials and building products.

Contents of education:

Basic information about standards and law regulations in the field of building materials in Poland and EU. Classification of building materials. Properties and quality control of materials and building products. Certification of building materials. Declaration of conformity. Testing methods. Durability of building materials. Stone. Ceramic. Wood. Asphalt and hydro insulators. Materials for thermo and acoustic insulation. Metals. Plastics. Testing methods and evaluation of building products performance: physical properties (structure description, influence of temperature and moisture content on the material properties), mechanical properties (strength characteristic, hardness), and technological features (for asphalts and paints). Testing of technical properties of products made of glass, ceramic, wood, stone ? shape and dimensions, defects, load capacity, special properties. Rules of drawing up documentation of laboratory tests.

Methods of evaluation:

Lectures: written and oral exam (Building materials 1 and 2) after 3ed semester. Laboratory: drawing up documentation of each test, colloquia.

Exam: no

Literature:

Mamlouk M., Zaniewski J.: Materials for Civil and Construction Engineers or other equivalent books Instructions for laboratory works (internal edition of KIMB) Standards and Instructions (EN, ASTM, ACI).

Effects of education

General academic profile - knowledge

Charakterystyka W1

The graduates have knowledge of classification and properties used for characterization of their usability; have basic konwledge of properties, production and application of building ceramics, timber, stone, glass, bituminous materials, metals. Verification: Quiz. Field of study related learning outcomes: K1_W08

Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka U1

The graduates can describe suitability and usability and can identify building materials such as: timber, ceramics, bituminous materials, metals, stone, glass, on the basis of standards nad procedures and laboratory tests.

Verification: Valuation of correctness of laboratory tests reports.

Field of study related learning outcomes: K1_U15, K1_U12, K1_U21

Area of study related learning outcomes: III.P6S_UW.o, P6U_U, I.P6S_UW.o

Charakterystyka U2

The graduate is able to work on laboratory task in team and to present its results communicatively and in accordance with standard rules for specified tests. Verification: Assessment of the commitment and efficiency of the team members in carrying out research; monitoring whether all members of the research team have demonstrated proficiency in all aspects of team report.

Field of study related learning outcomes: K1_U23 Area of study related learning outcomes: P6U_U, I.P6S_UO

General academic profile - social competences

Charakterystyka K1

Understands the importance of and can apply the principles of sustainable development in the design and selection of building materials. Is sensitive to the preservation of natural mineral resources.

Verification: Quiz.

Field of study related learning outcomes: K1_K05, K1_K06 Area of study related learning outcomes: P6U_K, I.P6S_KO

Name of course: Descriptive Geometry II

Coordinator of course: dr hab. inż. Grzegorz Dzierżanowski

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0302

Nominal semester: 2 / AY 2024/2025

Number of ECTS credits: 2

Language of course: english

Form of didactic studies and number of hours per semester:

- Project type of course 15h
- Lecture 15h

Preliminary requirements:

Skills achieved in the course of Descriptive Geometry I, particularly the ability to apply the principles and fundamental constructions of the orthogonal projections method.

Limit of students: -

Purpose of course:

Skills achieved in the course of Descriptive Geometry I, particularly the ability to apply the principles and fundamental constructions of the orthogonal projections method.

Contents of education:

Affinity. Ellipse as image of a circle under an affinity. Surfaces of revolution represented by the Monge's method. Intersection of these surfaces by straight lines and planes. Classification of conic sections. Three projections of a cone, cylinder and sphere with parts removed by projecting planes. Developments of conical and cylindrical surfaces; geodesics on these surfaces. Intersection of surfaces of revolution: cutting-plane and cutting-sphere methods. Reducibility of intersection line of two second-order surfaces. Application of the intersection line reducibility to geometrical constructing of cylindrical vaults and conical connections and transitions. Ruled surfaces. Constructions and classification. Applications in architecture, building or engineering. Map projection: ground plane, mark. Image of points, straight lines and planes - modulus, gradation, slope. Rabatment. Parallelism and perpendicularity. Intersection of simple geometric objects. Topographic surfaces. Application for a geometrical design of a road. Orthogonal axonometric projection: isometric drawing; image of a sphere. Pictorial drawings.

Methods of evaluation:

Attendance at classes: 10 points [10%]. Tutorial: four projects, two tests - (4x5 + 2x30) points [80%]. Lectures: one test - 10 points [10%]

Exam: no

Literature:

[1] Łapińska C.: Descriptive Geometry, Oficyna Wydawnicza PW, Warszawa 2016. [2] Bieliński A.: Geometria wykreślna, Oficyna Wydawnicza PW, Warszawa 2015. [3] French Th. E.: Graphic Science and Design, Mc GRAW-HILL Book Company, Inc. [4] French Th. E., Vierck Ch. J.: Graphic Science Mc GRAW-HILL Book Company, Inc. [5] Przewłocki S.: Geometria wykreślna w budownictwie, Arkady Warszawa 1997. [6] Ryan D. L.: CAD/CAE Descriptive Geometry CRC Press, Inc. 1992. [7] Standiford K., Standiford D.: An Integrated Approach Using AutoCAD. [7] Woolf S.: An Elementary Course in Descriptive Geometry, Barnes & Noble. [8] Łapińska C. : Descriptive Geometry II - Lectures and Exercises, script available for students in electronic form on PELE.

Effects of education

General academic profile - knowledge

Charakterystyka W1

After completing the course the graduate knows properties of surfaces of revolution, especially cones, spheres and cylinders. Verification: Written tests, self-study problems Field of study related learning outcomes: K1_W01, K1_W02 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

Charakterystyka W2

The graduate has knowledge about ruled surfaces applied in engineering practice. Verification: Written tests, self-study problems. Field of study related learning outcomes: K1_W01, K1_W02 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

Charakterystyka W3

The graduate knows the principle and properties of map (topographic) projection. Verification: Written tests, self-study problems Field of study related learning outcomes: K1_W01, K1_W02 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka U1

After completing the course the graduate is able to analyze and represent surfaces of revolution as well as their sections (conics) and intersections, and can apply the skills in the design of vaults and connections.

Verification: Written tests, self-study problems

Field of study related learning outcomes: K1_U09

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

Charakterystyka U2

The graduate knows how to apply the topographic projection to engineering practice (design of scarps of embankment or excavation).

Verification: Writte tests, self-study problems

Field of study related learning outcomes: K1_U09

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

After completing the course the graduate is able to perform individual and team work. Verification: Evaluation of solutions to self-study problems and in-class activity. Field of study related learning outcomes: K1_K01 Area of study related learning outcomes: P6U_K, I.P6S_KR

Charakterystyka K2

After completing the course the graduate is trained to handle his/her projects within deadline and present them in due form.

Verification: Evaluation of the timely submission of solutions to self-study problems.

Field of study related learning outcomes: K1_K01

Area of study related learning outcomes: P6U_K, I.P6S_KR

Name of course: Informatics I

Coordinator of course: Sławomir Czarnecki, PhD

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0306

Nominal semester: 2 / AY 2024/2025

Number of ECTS credits: 3

Language of course: english

Form of didactic studies and number of hours per semester:

• Computer lessons 30h

Preliminary requirements:

The course assumes no prior knowledge of programming.

Limit of students: no limitations

Purpose of course:

An ability to write simple structural programs with own or ready functions. During the course, especially in the second half of the semester, the content of some laboratory tasks is closely linked with the use of the Excel and writing macros in this system and in graphical system AutoCad (on one of the last classes) . After completing the course, the student should be able to propose a sequence of instructions correctly defining the scheme of a simple program that uses its own and developed by other persons algorithms, functions or procedures. Students should be able to implement formulated in this manner tasks in the selected language programming, assess their accuracy, critically to assess the numerical results, as well as delete noticed errors in them.

Contents of education:

Basics of structured programming. Getting to know the graphical user interface, editing, compiling and running programs, semantics types of fundamental and complex variables, declarations and definitions of variables, the scope of validity and lifetime of variables, covering the names, the basic operations of input and output, arithmetic and logical operators, the assignment operator, conditional expressions, priority, and communications operators, Boolean expressions, control statements, tables one- and two-dimensional arrays, functions, passing arguments to a function, passing one-dimensional arrays to functions, returning the result of the function. Applications: summing up the series, vector-matrix algebra, etc.

Methods of evaluation:

Evaluation and course credits depend on the number of points obtained from two main tests and few short tests. Main tests last about 1 hour (60 minutes) and rely on the implementation of two tasks (simple problems) on the workstations. The term of the repeat test (during the session and only for those students who have not acquired sufficient to offset the number of points) is the last class. At the colloquium covering all the material from semester no one can not get a higher assessment of the evaluation than sufficient.

Exam: no

Literature:

1. Czarnecki S.: Exercise materials available on https://www.dropbox.com/sh/8tbyl6hzfrc2l2e/cgBXbbU1JD 2. Friedman F., Koffmann E., Problem Solving, Abstraction, and Design Using C++, Addison-Wesley,1994

Effects of education

General academic profile - knowledge

Charakterystyka K1_W07

The students know the basics of structured programming and the semantics of a selected structured programming language. Verification: Final tests Field of study related learning outcomes: K1_W07 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka K1_U06

The students are able to independently propose a sequence of instructions that correctly define the scheme of the program, using its own and developed by other people algorithms, ready-made subroutines, functions or procedures. They can interpret the obtained results. Verification: Final tests, individual conversations with students during classes during breaks and during consultations

Field of study related learning outcomes: K1_U06

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

Charakterystyka K1_U20

They can implement a task formulated in this way in a selected programming language and are able to independently test their own and other people's programs, assess their correctness, critically respond to numerical results, and remove errors noticed in them. Verification: Final tests, individual conversations with students during classes during breaks and during consultations

Field of study related learning outcomes: K1_U20 Area of study related learning outcomes: P6U U, I.P6S UU

General academic profile - social competences

Charakterystyka K1_K02

The students can work independently and cooperate in a team on a designated task, set priorities for the implementation of tasks.

Verification: Avoiding situations in which, during tests, students try to copy the results of test tasks from other students

Field of study related learning outcomes: K1_K02

Area of study related learning outcomes: P6U_K, I.P6S_KR

Name of course: Surveying II

Coordinator of course: Jerzy Durlej M.Sc.

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0352

Nominal semester: 2 / AY 2024/2025

Number of ECTS credits: 3

Language of course: english

Form of didactic studies and number of hours per semester:

- Exercise type of course 15h
- Laboratory 15h

Preliminary requirements:

Surveying I course credit.

Limit of students: none

Purpose of course:

The aim of this course is to develop student's ability to execute fundamental surveying duties on construction site.

Contents of education:

Theory of Errors in Surveying. Methods of Area Calculations. Setting out of route (both horizontal and vertical curves). Direct Levelling. Trigonometric Levelling. Reference Surface for Levelling. Benchmark levelling. Implementation Control Networks. Implementation measurements.

Methods of evaluation:

During the semester student takes two tests covering entire scope of material presented during classes and labs. Student executes projects and assignments. The final exam consist of both theoretical questions and calculation-like questions. Additionally, an oral exam may be conducted.

Exam: yes

Literature:

 Jack McCormac - Surveying, 5th edition; [2] John Muskett - Site Surveying, 2nd edition;
 Wiliam Irvine and Finlay Maclennan - Surveying for construction, 5th edition; [4] Alfred Leick - GPS Satellite Surveying, 3rd edition; [5] Adam and Sabina Lyszkowicz - Surveying;
 Hycner R., Dobrowolska-Wesolowska M. - Geodesy, Surveying and Professional Ethics.

Notes:

Attendance Class - mandatory Lab - mandatory Absences during measurement practices must be made up for during consultation hours. Four absences will result in failure to pass the course.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Knows the fundamental surveying measurement techniques as well as adequate computations.

Verification: Two written tests covering entire scope of material presented on classes and labs and assessment of individual projects and assignments. The final exam. Additionally, an oral exam can be carried out.

Field of study related learning outcomes: K1_W02, K1_W03 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka U1

Is able to perform measurements of angles both horizontal and vertical, distances. Is able to run benchmark levelling and trigonometric levelling.

Verification: Field measurement practice.

Field of study related learning outcomes: K1_U20, K1_U08, K1_U09 Area of study related learning outcomes: I.P6S_UU, P6U_U, I.P6S_UW.o, III.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

Is able to work as part of surveying team and/or on his/her own. Verification: Assessment of individual and/or team projects. Field of study related learning outcomes: K1_K02 Area of study related learning outcomes: P6U_K, I.P6S_KR

Name of course: Technical Drawing II

Coordinator of course: Dr inż. arch. Anna Tofiluk, Adrian Górecki

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0304

Nominal semester: 2 / AY 2024/2025

Number of ECTS credits: 2

Language of course: english

Form of didactic studies and number of hours per semester:

• Project type of course 30h

Preliminary requirements:

Subject is run with an assumption of students having knowledge from "Technical Drawing I" course.

Limit of students: 30

Purpose of course:

Extended knowledge and practical skills of technical drawing and modelling using computer techniques (CAD).

Contents of education:

During the classes students are required to prepare "simplified" technical building plans of a detached house based on the individual starting data for each student.

Methods of evaluation:

To complete the course students must obtain positive grades in all design projects, technical lettering exercises and the final test.

Exam: no

Literature:

[1] Polish and European Standards and regulations; [2] E.Neufert. "Architect's data"; [3]
Technical drawing textbooks like for example A. Tofiluk, J. Mazur "Dokumentacja budowlana
1. Rysunek budowlany"; [4] S. Kubba "Blueprint Reading: Construction Drawings for the Building Trades"; [5] David L. Goetsch "Technical drawing"; [6] Autocad textbooks.

Website of the course:

http://www.il.pw.edu.pl/index.php/struktura/instytut-in%C5%BCynierii-budowlanej/zbo

Effects of education

General academic profile - knowledge

Charakterystyka W1

Student shoud be familiar with appropriate conventions and standards in producing and interpretig technical drawings. Students is familiar with using AutoCad software. Student knows basic building rules and regulations (necessary to complete building documentation of detached house). Students is familiar with basic building materials and technology. Verification:

Field of study related learning outcomes: K1_W02, K1_W14, K1_W07 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka U1

Student is able to prepare (using AutoCad) and interpret technical building drawings. Student is also able to interpret other (different specialities') technical drawings. The student is able to find, choose and collect building information using appropriate means, such as libraries and the internet.

Verification:

Field of study related learning outcomes: K1_U09, K1_U21

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

Student is able to work alone and independently.

Verification:

Field of study related learning outcomes: K1_K01, K1_K07

Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KK

Name of course: Theoretical Mechanics

Coordinator of course: Magdalena Ataman, PhD

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0401

Nominal semester: 2 / AY 2024/2025

Number of ECTS credits: 7

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 30h
- Exercise type of course 30h
- Project type of course 15h

Preliminary requirements:

Good understanding of mathematics and physics, especially mechanics, lecturing at a secondary school. Extended A-level (GCSE) examination in mathematics. Good understanding of mathematics lecturing during the first semester course. In particular, basic knowledge on: Linear algebra and vector calculus: matrices, determinants, vectors, fields, gradient of a field etc. Analytical geometry. Differentiation and integration. Ordinary differential equations of the second order.

Limit of students: no limit

Purpose of course:

Understanding of fundamental concepts and governing principles of Newtonian mechanics and Lagrangian mechanics. Skill in formulating the analytical description of mechanis of the physical bodies, engineering structures and machines being modeled as the constrained systems of particles and/or rigid bodies. Ability to solve the resulting equations of motion or statical equilibrium.

Contents of education:

The concepts basic to mechanics: space, time, mass, force, a particle, a rigid body, motion, and their use for mathematical modelling of physical and engineering problems. Kinematics of a particle (point), a rigid body, and a constrained system of particles and/or rigid bodies with a special focus on a plane motion. Newton's laws. Force systems: equivalence and reduction. Constraints and reactive forces. Work of a single force and a force system, potential energy. Mass moments of inertia, centre of mass. Momentum and energy equations of motion Impact and impulsive motion. Rudiments of statics: Equilibrium conditions in two-and three dimensions, Stability. Structures: beams, frames, and trusses. Rudiments of Lagrange's mechanics: Principle of virtual work, D'Alembert?s principle, and Lagrange's equations. Vibration of a single DOF systems.

Methods of evaluation:

Assessment of class is on the basis of six tests arranged at regular intervals of two weeks and an application-driven homework assignment. The full marks are allocated as follows: 60 marks for the tests and 3 marks for a homework assignment. There are six tests of 10 marks per each. Each test should take about 1 hour. No student is under the obligation to pass separately in each test. Every student will have the chance to retake an arbitrarily chosen test (just a single one of the six) at a special supplementary final attempt to be held at the end of the semester. The final assessment will be in favour of the student. homework assignment. Students who pass the class are eligible to sit the written exam during the suitable session. Time for examination: 120 minutes. Students securing the grade 4.5 or 5.0 for the class are granted omission of the written exam. Students who pass the written exam are eligible to appear at an oral exam shortly after the written part. An oral exam should assess the theoretical knowledge and critical thinking that students have acquired during the course. It is obligatory to pass the oral exam. Overall grade: classes and exam are weighted 4/7 : 3/7.

Exam: yes

Literature:

[1] Meriam & Kraige, Engineering mechanics. statics vol. 1, dynamics vol. 2., Wiley and Sons, 2003; [2] Hibbeller, Engineering mechanics: statics & dynamics, Prentice Hall, 1995;
[3] Bedford & Fowler, Engineering mechanics, statics vol. 1, dynamics vol. 2., Addison-Wesley, 1999; [4] Beer & Johnston, Vector mechanics for engineers: statics & dynamics, McGrawHill, 2004; [5] Harrison & Nettleton, Principles of engineerig mechanics, Second edition, Edward Arnold, 1994; [6] Jong & Rogers, Engineering mechanics, Statics & dynamics, Saunders College Publ., 1991; [7] Shelley J.F.: Theoretical Mechanics, statics vol. 1, dynamics vol. 2. McGraw-Hill, 1980; [8] Shelley J.F.: Vector mechanics for engineers. Statics, 800 solved problems. Schaum s, 1991; [9] Shelley J.F.: Vector mechanics for engineers. Dynamics, 700 solved problems. Schaum s, 1991; [10] Soutas-Little R., Inman D.J.: Theoretical Mechanics, statics vol. 1, dynamics vol. 2. Prentice Hall, 1999 Marek Rudnicki, Theoretical Mechanics (in preparation).

Effects of education

General academic profile - knowledge

Charakterystyka W1

The graduates have knowledge of mathematics and physics enabling them to describe and understand basic phenomena in the field of civil engineering. Verification: Six written tests, written exam and spoken exam. Field of study related learning outcomes: K1_W01, K1_W04 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

Charakterystyka W4

The graduates have knowledge of engineering mechanics. They have knowledge of the fundamentals of mechanics of bar structures, including their stability and dynamics. Verification: Six written tests, written exam and spoken exam. Field of study related learning outcomes: K1_W01, K1_W04 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka U1

The graduates can apply mathematical methods of algebra and calculus for the analysis of basic physical and technical problems. Verification: Six written test, homework (project), written exam, spoken exam. Field of study related learning outcomes: K1_U01, K1_U05 Area of study related learning outcomes: P6U_U, I.P6S_UW.o

Charakterystyka U5

The graduates have understanding of basic concepts of mechanics and can formulate its basic laws. The graduates have the ability to perform static analysis. The graduates have the ability to perform kinematic and dynamic analysis of a particle and a rigid body. Verification: Six written tests, homework (project), written exam and spoken exam. Field of study related learning outcomes: K1_U01, K1_U05 Area of study related learning outcomes: P6U_U, I.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

The graduates have the ability to understand the importance of responsibility in engineering activity, including accuracy and reliability when presenting and interpreting the results of their own work.

Verification: Homework assignment (project), spoken exam. Field of study related learning outcomes: K1_K01, K1_K02 Area of study related learning outcomes: P6U_K, I.P6S_KR

Charakterystyka K2

The graduates follow the code of professional ethics. Verification: Homework assignment. Field of study related learning outcomes: K1_K07, K1_K02 Area of study related learning outcomes: I.P6S_KK, P6U_K, I.P6S_KR

Charakterystyka K7

The graduates are aware of the recognition of knowledge in solving engineering problems and the need to consult experts in case of difficulties in solving the problem on their own. Verification: Homework assignment (project).

Field of study related learning outcomes: K1_K01

Area of study related learning outcomes: P6U_K, I.P6S_KR

Name of course: Engineering Geology

Coordinator of course: dr Anna Lejzerowicz

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0353

Nominal semester: 4 / AY 2024/2025

Number of ECTS credits: 3

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 15h
- Exercise type of course 15h
- Laboratory 15h

Preliminary requirements:

Basic knowledge of geography.

Limit of students: laboratory 15, tutorials 30

Purpose of course:

The course aims to teach: the genesis of different types of soils and rocks, the foundations of geological processes and the impact of their origin on the geological-engineering conditions of the subsoil. To get familiar with: the general geological processes and the genesis of rocks, the conditions of formation of different geomorphological forms occurring in Poland and their geological structure. Influence of geological processes in terms of foundation structures, evaluation of geotechnical conditions on the basis of the geological structure of the substrate, including its origin and age.

Contents of education:

LECTURES Geological sciences. Engineering geology aims, geological processes and their partition. Internal geological processes and their phenomena. Genesis of the igneous rocks. External geological processes - general characteristics, weathering of the rocks. Engineering-geological conditions on the weathered debris covers. Karst and its results. Glaciers activity, their deposits and geomorphological forms. Engineering-geological conditions on the areas of glacial deposits. Rivers activity – erosion, transport and accumulation. Fluvial deposits and their geomorphological forms. Geological-engineering characteristic of the alluvial deposits. Spatial arrangement of the rocks (tectonics). Engineering-geological conditions due to the tectonics. Acivity of meteoric waters (ablation), the factors influencing its intensity. Engineering-geological characteristics of its deposits. Wind activity; dunes. Engineering-geological characteristics of the eolian deposits (sands and loesses). Destructive activity of the seas and lakes (abrasion). The overgrowing of the lakes and their genetic types. Engineering-geological conditions on the areas of the lake and

swampy accumulation (peatlands/peatbogs). Essential engineering-geological properties of rocks (soils). The landslides (surface mass movements) – their divisions and characteristics of the individual types. Engineering-geological examinations on the areas threaten by the landslides. Essential information concerning the groundwaters and their genesis. Groundwater table and its types. The kinds and types of groundwaters. The saturated and unsaturated zones. Hydrogeological properties of rocks. Physical and chemical properties of the groundwaters. Presentation of groundwater table on the maps. Essential principles of groundwater flow. Darcy's law. Depression cone. Suffosion and clogging (colmatage) processes. PRACTICE part I) Macroscopic properties of minerals. Igneous (magmatic) rocks - rock forming minerals, divisions, properties, occurrence, practical identification. Sedimentary rocks – division (clastic, organic, chemical and mixed type), minerals, properties, occurrence, practical identification. Metamorphic rocks – rock forming minerals, divisions, properties, occurrence, practical identification.; part II) Geological maps - their divisions and principles of use. Geological cross-section based on the uncovered geological map. Geological cross-section on the base of bore holes. Hydrogeological cross-section. Geological-engineering evaluation of the suitability of the specified area for construction purposes.

Methods of evaluation:

test from petrography (practical identification of rocks) - two tests from lectures - test in geological-engineering evaluation of the suitability of the specified area for construction purposes - three projects 1. Laboratory grade = practical identification of rocks (petrography);
2. Tutorial grade = ((average grade of tests*2) + average grade of assignments) / 5; 3. Final grade = (laboratory grade average + (tutorial grade average*2)) / 3

Exam: no

Literature:

[1] Tarbuck E.J. and Lutgens F.K. - Earth: An Introduction to Physical Geology; [2] Bell F.G.
– Engineering Geology; [3] Busch R.M. - Laboratory Manual in Physical Geology; [4] Woods
K.M. - Physical Geology. Laboratory Manual; [5] Blyth F.G.H. and de Freitas M.H. – A
Geology for Engineers; [6] Thompson G.R. and Turk J. - Introduction to Physical Geology; [7]
Licker M.D. - Dictionary of Geology and Mineralogy. [8] Lenczewska-Samotyja E., Łowkis A.,
Zdrojewska N. – Zarys geologii z elementami geologii inżynierskiej i hydrogeologii; [9]
Lenczewska-Samotyja E., Łowkis A. – Przewodnik do ćwiczeń z geologii inżynierskiej i petrografii.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Knows the basic concepts used in geology, the place of engineering geology in the geological sciences, its tasks and relationships with civil engineering. Verification: Knows the basic concepts used in geology, the place of engineering geology in the geological sciences, its tasks and relationships with civil engineering. Field of study related learning outcomes: K1_W12 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

Charakterystyka W2

Knows the external and internal geological processes, factors that cause them and the phenomena resulting from these processes (geomorphological forms, types of sediment and their geological-engineering characteristics). He knows the impact of geological works on constructions and engineering structures. Know the origin of rocks (soils) and its impact on the geological-engineering conditions.

Verification: test from lectures, test from exercises Field of study related learning outcomes: K1_W12 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

Charakterystyka W3

Knows the basic geological-engineering characteristics of rocks (soils) and their importance in the design and examples of the impact on constructions and engineering structures. Verification: test from lectures, test from exercises, test from petrography, drawing of crosssections.

Field of study related learning outcomes: K1_W12 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

Charakterystyka W4

Knows basic information about groundwater (division, genesis of groundwater, groundwater table and its types, unsaturated and saturated zones, the types of waters in these areas, physical and chemical characteristics of groundwater, aggressiveness in relation to the concrete and steel, basic laws of groundwater movement, the cone of depression, scouring and clogging).

Verification: test from lectures, drawing of cross-sections. Field of study related learning outcomes: K1_W12 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

Charakterystyka W5

Knows the hydrogeological characteristics of the rocks, their importance in the design and examples of the impact on constructions and geological-engineering objects. Verification: test from lectures, test from exercises, drawing of cross-sections. Field of study related learning outcomes: K1_W12 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

Charakterystyka W6

Have knowledge about the types, content, use of geological maps, used symbols and explanations. Knows the basic principles of geological-engineering documentation. The current regulations concerning geological-engineering surveys. Verification: test from lectures, drawing of cross-sections. Field of study related learning outcomes: K1_W16 Area of study related learning outcomes: P6U_W, I.P6S_WK

General academic profile - skils

Charakterystyka U1

Have skill of macroscopic identification (with description) of major minerals - in particular the rock-forming minerals.

Verification: test from petrography.

Field of study related learning outcomes: K1_U20 Area of study related learning outcomes: P6U_U, I.P6S_UU

Charakterystyka U2

Have skill of macroscopic identification of igneous, sedimentary and metamorphic rocks and to recognize the environment of rock formation. Verification: test from petrography.

Field of study related learning outcomes: K1_U20

Area of study related learning outcomes: P6U_U, I.P6S_UU

Charakterystyka U3

Have skill to use and read geological maps (including the geological-engineering and hydrogeological), and on this basis preliminary evaluate geological-engineering conditions. Verification: drawing of cross-sections.

Field of study related learning outcomes: K1_U23, K1_U20, K1_U16 Area of study related learning outcomes: P6U_U, I.P6S_UO, I.P6S_UU, I.P6S_UW.o, III.P6S_UW.o

Charakterystyka U4

Have skill to draw geological and hydrogeological cross-sections conditions on the basis of geological drilling.

Verification: test from exercises, drawing of cross-sections.

Field of study related learning outcomes: K1_U23, K1_U20

Area of study related learning outcomes: P6U_U, I.P6S_UO, I.P6S_UU

Charakterystyka U5

Have skill to identify rocks as building substrate and make its geological-engineering evaluation.

Verification: test from petrography, test from exercises, drawing of cross-sections. Field of study related learning outcomes: K1_U23, K1_U20, K1_U16

Area of study related learning outcomes: P6U_U, I.P6S_UO, I.P6S_UU, I.P6S_UW.o, III.P6S_UW.o

Charakterystyka U6

Can determine the degree of complexity of soil conditions and on this basis identify the geotechnical category.

Verification: test from exercises, drawing of cross-sections.

Field of study related learning outcomes: K1_U20, K1_U16

Area of study related learning outcomes: P6U_U, I.P6S_UU, I.P6S_UW.o, III.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

Awareness of the dangers resulting from the physical properties of rocks and soils constituting a potential hazard to the environment.

Verification: test from lectures.

Field of study related learning outcomes: K1_K01, K1_K04, K1_K06, K1_K07 Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KO, I.P6S_KK

Charakterystyka K2

Works independently and in team. Verification: drawing of cross-sections. Field of study related learning outcomes: K1_K07, K1_K01, K1_K04 Area of study related learning outcomes: P6U_K, I.P6S_KK, I.P6S_KR, I.P6

Name of course: Fundamentals of Building II

Coordinator of course: Wojciech Terlikowski dr inż., Ewa Sobczyńska, mgr inż

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0422

Nominal semester: 4 / AY 2024/2025

Number of ECTS credits: 4

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 15h
- Project type of course 30h

Preliminary requirements:

Subject is run with an assumption of students having knowledge from Fundamental of Buildings I.

Limit of students: no limits

Purpose of course:

Student is able to recognize the basic terminology, definitions and standards from Fundamental of Buildings, Basic Load Bearing Systems of constructions and their elements, criteria for their selection, loads working in different building constructions, work of construction systems and their elements, typical technologies used in building, general rules for working and finishing activities as well as the materials provided for these stages.

Contents of education:

Building construction elements- arches, vaults, lintels, cornices, beams, piers, columns, rings. Construction, technological- material solutions. Technological- material solutions of staircase.Technological- material solutions of roofs. Technological- material solutions of roofs, including flat roofs. Roof work- metal sheets and roofing types. Wood work-technological- material solutions. Plasters- types, requirements, technologies. Floors and finishes. Construction designing- requirements for buildings.Technologies. Constructional building solutions. Industry buildings - constructional solutions.Passive, intelligent, alternative buildings.

Methods of evaluation:

During term, students prepare projects : constructional project of the multi-storey building in a typical technology, with architecture and building drawings like cross sections and constructional details. Project should be returned (after min. 3 corrects) no later than on the last meeting before Winter Exams Term. The last mark may be obtained after defense of the perfectly done project. According to the Institute rules, project pass (connected with the defense and getting mark) must be obtained before the next exam zone, sooner than the

term when the classes are run. In justified cases, there is a possibility of work continuation, but no longer till the end of March of this year. Lectures are followed by the written exam after IV term, and oral exam if the person responsible for the subject decide to organize it.

Exam: yes

Literature:

Skrypty, publikacje: [1] Budownictwo ogólne - W. Żenczykowski; [2] Ustroje budowlane - J. Sieczkowski; [3] Prawo budowlane - Ustawa z dnia 07.07.1994r z późniejszymi zmianami; [4] Warunki techniczne jakim powinny odpowiadać budynki i ich usytuowanie - Rozporządzenie Ministra Infrastruktury z dnia 12.04.2002r z późniejszymi zmianami; [5] Normy budowlane i rozporządzenia.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Student knows the basic concepts, definitions, regulations regarding the Fundamental of Buildings, knows the basic requirements for buildings, basic types of buildings, their load bearing systems, structural systems, structural elements and design rules . He knows the effects on the building structure, understands how it works. He knows the basic technologies and building materials and rules for the construction and finishing. He knows the rules for implementing the technical documentation using CAD.

Verification:

Field of study related learning outcomes: K1_W07, K1_W01, K1_W02, K1_W05, K1_W11 Area of study related learning outcomes: I.P6S_WG.o, P6U_W, III.P6S_WG, I.P6S_WK, III.P6S_WK

General academic profile - skils

Charakterystyka U1

Student can apply the basic rules of Fundamental of Buildings, recognize and design basic types of buildings, their load bearing systems, structural systems, structural elements. Student can properly select basic technologies and building materials. He can perform technical drawings of construction of a residential building with architectural details using CAD.

Verification:

Field of study related learning outcomes: K1_U01, K1_U02, K1_U07, K1_U20, K1_U18, K1_U13, K1_U12

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UU

General academic profile - social competences

Charakterystyka K1

Student is able to work independently. Understands the importance of responsibility in engineering activities, including the accuracy of the results of their work and their interpretation. He is able to work independently with literature, is aware of the need for skills development and self-education. Follows the rules of professional ethics. Understands the importance of the principles of sustainable development in construction. Verification:

Field of study related learning outcomes: K1_K07, K1_K08, K1_K01, K1_K02, K1_K03,

K1_K05 Area of study related learning outcomes: P6U_K, I.P6S_KK, I.P6S_KR, I.P6S_KO

Name of course: Decision Making and Negotiation Theory

Coordinator of course: dr Helena Bulińska-Stangrecka

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1180-BU000-ISA-9206

Nominal semester: 4 / AY 2024/2025

Number of ECTS credits: 1

Form of didactic studies and number of hours per semester:

Lecture 15h

Preliminary requirements: None

Limit of students: 50

Purpose of course:

The graduates are introduced to the definitions of conflict and conflict resolutions methods. They learn how to understand emotions that occur in the conflict related situations and how to communicate effectively. The graduates get to know negotiations techniques.

Contents of education:

Modern conflict theories (exp.: Moore, Deutch); workshop on recognizing emotions, dealing with them and defining them; working on emotions and focusing on achieving goals; introducing conflict behavior strategies and negotiation strategies; exercise in pairs.

Methods of evaluation:

Final assessment in writing.

Exam: no

Literature:

[1] Fisher, R., Ury, W. and Patton, B. (1991). Getting to Yes: negotiating Agreement Without Giving In. Second Edition. New York: Penguin Books.

Effects of education

General academic profile - knowledge

Charakterystyka W1

The graduates have knowledge about conflict situations, sources of conflicts, emotions, its' recognition. The graduates learn how to reac in conflict situations, what are possible strategies in conflicts.

Verification:

Field of study related learning outcomes: K1_W15, K1_W14, K1_W11 Area of study related learning outcomes: P6U_W, I.P6S_WG.o, I.P6S_WK, III.P6S_WK General academic profile - skils

Charakterystyka U1

The graduates learn communication in group, learn to recognize and name emotions and deal with them. Students learn technics of communication, which is helpful to achieve goals. Verification:

Field of study related learning outcomes: K1_U24, K1_U20, K1_U19 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UU, I.P6S_UK

General academic profile - social competences

Charakterystyka K1

The graduates can work on an assigned task independently or in a team. Can determine priorities to help achieve their goals. Students are more aware of social processes, dynamic of conflict and can read other's emotions.

Verification:

Field of study related learning outcomes: K1_K03, K1_K07

Area of study related learning outcomes: P6U_K, I.P6S_KO, I.P6S_KK

Name of course: Informatics II

Coordinator of course: Zbigniew Kacprzyk, dr inż.

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0307

Nominal semester: 4 / AY 2024/2025

Number of ECTS credits: 2

Language of course: english

Form of didactic studies and number of hours per semester:

Computer lessons 30h

Preliminary requirements:

The basic skills in CAD systems, e.g. AutoCAD 2D and 3D. The basic skills in civil engineering constructions.

Limit of students: max 30 students in the computer lab.

Purpose of course:

Proficiency in using computer softwares to solve different engineering problems, such as 3D modeling of buildings and civil engineering structures (eg. Autodesk Revit) and structural analysis of simple statical models (Autodesk Robot Structural Analysis). General knowledge about Building Information Modeling, its principles and processes.

Contents of education:

Topics of computer laboratories 1. BIM and parametric modeling. Basics of REVIT. 2. Basic editing commands. 3. Editing views: plans, sections, 3D. 4. Advanced editing commands. 5. Basics of creating a 3D model. 6. External and internal walls. Doors, windows. Three levels: basement, ground floor, attic. 7. Exercise on creating and editing slabs, walls, roofs. 8. Introduction to edition of families. 9. Basics of Robot Structural Analysis. 10. Exercise in modeling 2D model in Robot. Static analysis. 11. Open BIM. IFC. BIM Vision. 12. Schedules and 2D documentation. 13. Teoretical and practical test.

Methods of evaluation:

- 1 practical test, - 1 teoretical test, - 4 check-up exercises.

Exam: no

Literature:

[1] Eric Wing - Autodesk Revit Architecture 2017. No Experience Required, SYBEX, 2016. [2] Podręcznik uzytkownika REVIT 2019 dostępny na stronie firmy Autodesk. [3] Podręcznik użytkownika Robot Structural Analysis 2019 dostępny na stronie firmy Autodesk/ [4] Materiały dydaktyczne przekazane w trakcie zajęć.

Notes:

Attendance in computer labs is mandatory.

Effects of education

General academic profile - knowledge

Charakterystyka [K1_W02]

He knows the rules of descriptive geometry and technical drawing for saving and reading architectural, construction, geodetic and communication drawings and their preparation, including the use of CAD and the BIM process. Has knowledge of computer engineering graphics.

Verification: The theory test Field of study related learning outcomes: K1_W02 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka [K1_U009]

Has skills in the field of information technology, including working in operating systems. He can choose the right IT tools for solving tasks. He can formulate problems so that they can be solved with IT tools. He can use selected computer graphics formats and electronic documentation. Can make and interpret drawings construction, road and architectural in the environment of selected CAD programs and in the BIM and by hand. Can interpret drawings related to construction and related industries, in particular geodetic drawings and maps. Verification: Two tests (3D modeling, automation of engineering calculations), building object design, defense of the building object design.

Field of study related learning outcomes: K1_U09

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

General academic profile - social competences

Charakterystyka [K1_K01]

Understands the importance of responsibility in engineering activities, including being ready to fairly present the results of their work and their interpretation. Verification: Defense of a building object design.

Field of study related learning outcomes: K1_K01

Area of study related learning outcomes: P6U_K, I.P6S_KR

Name of course: Strength of Materials II

Coordinator of course: dr hab. inż. Marcin Gajewski

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0403

Nominal semester: 4 / AY 2024/2025

Number of ECTS credits: 7

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 45h
- Exercise type of course 15h
- Laboratory 15h

Preliminary requirements:

Passing tutorials on Strength of Materials I.

Limit of students: 30

Purpose of course:

Identification and solution of the combined loading problems for solid bars. Understanding the concept of elasto-plastic and plastic work of bar and beam structures. Determination of the limit load for statically determined bar with any type of loading and limit loading for simple statically undetermined beams. Determination of a critical loading value for axially compressed bars – buckling, elastic stability. Identification and solution of specific problems of 2D elasticity in plane stress and plane strain state and simple examples of Kirchhoff's plate bending. Reference of all presented problems to commercial finite element programs – advantages and disadvantages of analytical and numerical problem formulation.

Contents of education:

The problems of biaxial bending, eccentric compression (tension), cross section core, stress distributions under foundations. Determination of normal and shearing stresses for bended elements with combined cross-sections. Composite beams. Joints in structures. The fundamental yield criteria and determination its application range. Application of strength (failure) criteria for metals and non-metals. Introduction of the stress and strain tensor invariants in interpretation of strength criteria. Experimental tests for determination of mechanical properties of steel, aluminum, wood and concrete altogether with experimental methods for sample testing in homogenous and complex stress states – resistance strain gauges, LVDT, electro-mechanical strain gauges. Application of strain gauges in quarter, half and full Wheatstone bridge. Presentation of modern strain/displacement measuring devices – video gauges and digital image correlation technics. Elastic-plastic and plastic properties of materials. Limit states for axially and eccentrically loaded bars and bended beams. Remarks

on elastic-plastic torsion of shafts. Reference to finite element software in relation to modelling of elements and structures taking into account its elasto-plastic material properties. Extreme theorems of limit states and its application for calculation of simple statically determined and statically indetermined beams. Buckling phenomena and determination of a critical loading value for axially compressed bars – elastic and elastic-plastic buckling – reference to typical situations in metal structures. Euler's formula. Introduction to the problems of 2D elasticity in plane stress and plane strain state and simple examples of Kirchhoff's plate bending (uniaxial bending and plates with axial symmetry).

Methods of evaluation:

Grades in the course will be based on the attendance, completion of the homework and test scores. The course ends with the Final Exam which consists of two parts, written and oral.

Exam: yes

Literature:

ebooks on www.bg.pw.edu.pl: Nash, William. Schaum's Outline of Strength of Materials. McGraw-Hill Professional Book Group, 1998. p vi. Ebrary.

http://site.ebrary.com/lib/pwarszawa/Doc?id=5002184&ppg=6 Case, J.; Chilver, L.; Ross, C.T.F. Strength of Materials and Structures (4th Edition) © 1999 Elsevier. Knovel. Patnaik, Surya N.; Hopkins, Dale A. Strength of Materials, ISBN-13: 9780750674027, 753 pp Butterworth-Heinemann, 2003. Engineering Village. Other (paper) books: Gere J.M, Timoshenko S.P.: Mechanics of Materials, Hibbeler R.C.: Structural Analysis Leet K.M., Uang C-M.: Fundamentals of Structural Analysis Materials prepered in frame of NERW programme, accessible at subject www page.

Notes:

Materials for teaching the subject in the form of uniform texts and presentations were developed as part of the NERW project. Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego Program Operacyjny Wiedza Edukacja Rozwój 2014-2020, Oś priorytetowa III Szkolnictwo Wyższe dla gospodarki i rozwoju, Działanie 3.5 Kompleksowe programy szkół wyższych "NERW PW Nauka – Edukacja – Rozwój - Współpraca"

Effects of education

General academic profile - knowledge

Charakterystyka W1

has knowledge of the complex action of internal forces in straight bars, knows the basic strength hypotheses, knows the basic concepts of the finite element method in the field of simple bar structures, knows the concepts of thin-walled open-section bars, has knowledge of the stability of solid and thin-walled bars, knows the basics analysis of stresses and displacements in plane problems and plates.

Verification: homework, tests, written and oral exams Field of study related learning outcomes: K1_W01, K1_W04 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka U1

Can determine stresses and displacements in the case of complex action of cross-sectional forces in straight bars, can perform preliminary static calculations taking into account buckling, can solve a simple beam on an elastic foundation, can determine the limit load for beams.

Verification: Homework, tests, written and oral exams

Field of study related learning outcomes: K1_U19, K1_U05, K1_U07, K1_U20 Area of study related learning outcomes: P6U_U, I.P6S_UK, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UU

General academic profile - social competences

Charakterystyka K1

Can independently interpret the final results of calculations in design exercises. Can formulate conclusions and describe the results of own work Verification: project exercises

Field of study related learning outcomes: K1_K02, K1_K07

Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KK

Name of course: Technology and Organization of Building Works I

Coordinator of course: dr inż. Hubert Anysz

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0431

Nominal semester: 4 / AY 2024/2025

Number of ECTS credits: 4

Language of course: english

Form of didactic studies and number of hours per semester:

• Lecture 60h

Preliminary requirements:

General knowledge about construction industry, general knowledge about elements of building.

Limit of students: unlimited

Purpose of course:

Student will know theoretical basis for technology and organisation of chosen building Works (after lectures at 4th semester) and practical rules for preparation of technological and organizational Project (after classes at 5th semester). Passing the exam is necessary to antend TOBW II.

Contents of education:

LECTURES: Construction as part of the national industry. Systems and processes within construction industry. Investment process procedures and participants. Design documentation. Technology - basic definitions. Systems techniques and technological equipment for construction works. Complex mechanisation of construction processes. Economy of works mechanisation. Directions for mechanisation development, modern construction equipment. Transport in construction - introduction. Means of horizontal transport in construction. Means of vertical transport in construction. Earthworks. Basic definitions. Methods of earthworks volumes calculation. Balance sheet for earthworks. Rules for soil movement on site. Classification of earthworks equipment. Bulldozers - characteristic, methods of work. Excavators - characteristic, methods of work. Scrapers - characteristic, methods of work. Ground compacting. Polish regulations and law in respect of mutual interdependencies of construction and archeology, typical treatment of archeological deposits on building site. Case studies from Polish building sites, including the technology of works. Non-typical excavation (i.e. linear excavations for installations). Precision of construction works, handing over the construction works. Concrete Works - processes leading to construction of reinforced concrete building element. Classification of shuttering. Presentation of different types of shuttering. Carpentry works. Calculation of loads for shuttering (in concrete construction works). Checking the shuttering works quality. Types and use of reinforcement in different construction elements. Production of concrete mix. Transport of concrete mix. Pouring of concrete mix and curing the fresh concrete in monolithic elements. Production of pre-fabricated concrete elements. Assembling of prefabricated elements and construction parts - basic information, introduction. Characteristic of elements for montage. Main and supplementary mounting equipment. Montage team. Rules for design of assembling works. Preparation of the building site for assembling works. Assembling of different elements. Montage in low temperatures. Quality of assembling works. Handing over the assembling works. Health and safety of assembling works. Chosen elements of road construction, asphalt and concrete pavements. Chosen finishing Works. Introduction for the next semester's projects. PROJECT: preparation of the three Projects, solving problems connected with organisation and technology of: earthworks, concrete works and assembling works.

Methods of evaluation:

Exam's rules (after 4th semester) Student will select the date writing his/her name on the list in the Department Secretary Office, room 525, at relevant time. Student will bring his/her index for the exam. Exam will consist of two parts: test and questions. TEST - 30 short question of a/b/c/d choice for 45 minutes, maximum result 30 points, QUESTIONS - 5 questions to be answered in written, 60 minutes, maximum result 70 points; there will be note '2' written to the index for cheating / using cribs. Results of the written part will be announced at the same day of the exam, Student has the possibility to participate in the oral exam to improve the mark. Minimum number of points to participate in the oral exam - 35. When the mark is accepted by the student, one total mark will be written in his/her index. Projects (5th semester) - three projects has to be prepared: technology and organisation of earthworks, concrete works and assembling works (marks from 2 to 5). Mark can be upgraded for activity of the student at the classes, mark can be lowered for lack of participation in the classes. Passing the exam is necessary to antend TOBW II

Exam: yes

Literature:

[1] Dyżewski A. Technologia i organizacja budowy, tom1 i 2. Arkady Warszawa 1989; [2] Lenkiewicz W. Technologia robót budowlanych. PWN, Warszawa 1985; [3] Martinek W., Osiecka E.: Podstawy inżynierii produkcji budowlanej. Oficyna Wydawnicza P.W. Warszawa, 1999; [4] R. Chudley: Building Construction Handbook Wydawca: Butterworth Heinemann, 2006; [5] H. Johnston Bidding & Estimating Procedures Construction Wydawca: Prentice Hall, 2001; [6] R. Chudley Advanced Construction Technology Wydawca: Prentice Hall, 2006; [7] D. Gransberg Construction Equipment Management for Engineers Estimators Wydawca: CRC Press Inc., 2006; [8] R. Barry Construction of Buildings v 1 Wydawca: Blackwell Science, 1999; [9] R. Barry Construction of Buildings v2 Wydawca: Blackwell Science, 1999; [10] Allen Fundamentals of Building Construction Materials & Methods 4e Wydawca: John Wiley & Sons, 2004; [11] S. Nunnally Managing Construction Equipment Wydawca: Prentice Hall, 2000.

Effects of education

General academic profile - knowledge

Charakterystyka W1

The student has basic knowledge about the investment process in the construction industry and about the participants of the process. H/she knows the scope of technological and organizational documentation necessary for construction works execution. The student

knows how to assign machinery and brigades to certain works. He/she knows the progress of the construction works, as well as, safety issues. The student knows the rules of checking quality and about handing them over. Verification: Exam Field of study related learning outcomes: K1_W13 Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

General academic profile - skils

Charakterystyka U1

The student can choose and apply appropriate methods and technologies of work execution to certain elements of the construction object being erected. He/she can appoint and proceed with the handing over process. The student can prepare the technological-organization design of the construction, as well as, as-built documentation. Verification: Exam Field of study related learning outcomes: K1_U14

Area of study related learning outcomes: III.P6S_UW.o, P6U_U, I.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

The student understands the issue of responsibility in an engineer's activities, including reliability in presenting the result of his/her effort and interpreting them. He/she realizes the necessity of constant personal and professional development. The student strives for that and realizes the hazards in the construction industry.

Verification: Exam

Field of study related learning outcomes: K1_K01, K1_K04

Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KO

Name of course: Timber Structures I

Coordinator of course: Wojciech Gilewski, prof. dr hab. inż.; Anna Al Sabouni-Zawadzka, dr inż.

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0471

Nominal semester: 4 / AY 2024/2025

Number of ECTS credits: 2

Form of didactic studies and number of hours per semester:

- Lecture 15h
- Project type of course 15h

Preliminary requirements:

Basis of strength of materials - principles of the mechanical work of structural members in the limit states, structural elements of buildings, properties of materials and their use in buildings, ability to execute technical drawings.

Limit of students: -

Purpose of course:

Acquaintance with structural properties and principles of strength classification of wood and wood-based materials destined for use as timber structures. Acquaintance with practical use of limit states in design of the timber structures: solid and built-up members and their connections, modern frame-work structures. Knowledge about the methods of protection of wood against biological attack and fire.

Contents of education:

Forest, tree: growing, principal species, softwood and hardwood, physical properties of softwood. Grading of timber: visual and machine grading, grade and strength classes. Principles of limit state design method: ultimate and serviceability limit states, characteristic and design parameters of timber and wood-based materials. Design of members subjected to simple and combined stresses. Connections: load-carrying capacity and joint slip of dowel-type fasteners. Glued connection. Built-up members: mechanically jointed beams and columns. Modern frame-work constructions of houses: composition, loads, design. Protection of wood against biological attack and fire.

Methods of evaluation:

Each student executes and attests several exercises concerning design of timber joints and built-up members. In addition, his knowledge shall be confirmed passing a short test. The lectures are attested on the ground of the written works.

Exam: no

Literature:

In English: Examples of design exercises elaborated by teaching group English version of European Standards (EN) Ozelton E.C., Baird J.A.: Timber designers' manual. Third edition, Blackwell Publishing 2006. In Polish: Nożyński W.: Przykłady obliczeń konstrukcji budowlanych z drewna. Wydawnictwa Szkolne i Pedagogiczne, Warszawa 2000; Mielczarek Z.: Budownictwo drewniane, Arkady 1994; Neuhaus H.: Budownictwo drewniane, Polskie Wydawnictwo Techniczne, Rzeszów 2004.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Knows the rules of design of simple timber structures (beam, column, truss). Verification: Project, test. Field of study related learning outcomes: K1_W05 Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

General academic profile - skils

Charakterystyka U1

Is able to design simple timber structures; knows mechanical properties of wood. Can make and interpret engineering drawings of simple timber structures. Can use design codes for timber structures.

Verification: Project and its defense.

Field of study related learning outcomes: K1_U07, K1_U09, K1_U21 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

Can find selected data in the literature. Follows the code of professional ethics, understands the importance of reliability when presenting and interpreting the results of their own work. Verification: Project.

Field of study related learning outcomes: K1_K01, K1_K02, K1_K07 Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KK

Name of course: Transportation Engineering II

Coordinator of course: Person Responsible Piotr Olszewski, prof. dr hab. inż.

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0442

Nominal semester: 4 / AY 2024/2025

Number of ECTS credits: 3

Language of course: english

Form of didactic studies and number of hours per semester:

• Project type of course 45h

Preliminary requirements:

None

Limit of students: no

Purpose of course:

Learning the basic principles of designing transportation facilities, including roads and railroads. Acquiring the skills necessary to design simple transportation facilities such as: rural road segment, pavement, road-railroad crossing.

Contents of education:

PROJECT II: 1. Design of a rural two-lane road segment (21 hours): horizontal alignment, including circular and transition curves, vertical alignment, pavement design, cross-section design, report preparation. 2. Design of a road-railroad crossing (12 hours): selection of railroad track parameters, coordination of road and railway profiles, preparation of the crossing drawings. 3. Computer laboratory - traffic simulation using VISSIM program(9 hours).

Methods of evaluation:

Project: Projects are assessed separately in each semester - the final grade is a weighted average of component grades, all of which must be positive. The following weights are used in sem. 4: part 1 = 0.65; part 2 = 0.35; part 3 - pass by attendance.

Exam: no

Literature:

Project: Handouts containing the project task description and summaries of design guidelines are prepared by lecturers involved in the projects and given to students.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Knows the basic principles of geometric road design, including horizontal and vertical alignment, cross-section and pavement design. Verification: Field of study related learning outcomes: K1_W15, K1_W14 Area of study related learning outcomes: P6U W, I.P6S WG.o

General academic profile - skils

Charakterystyka U1

Knows how to design a road in plan, including selection of circular and transition curves and calculation of their parameters.

Verification:

Field of study related learning outcomes: K1_U07, K1_U08, K1_U20 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UU

Charakterystyka U2

Knows how to carry out vertical road alignment, including selecting vertical curve parameters and drawing a longitudinal profile.

Verification:

Field of study related learning outcomes: K1_U07

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

Charakterystyka U3

Knows how to design a typical road pavement and to draw a road cross-section. Verification: Field of study related learning outcomes: K1_U07 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

Charakterystyka U4

Knows how to select design parameters for a railroad track and to draw its cross-section. Verification:

Field of study related learning outcomes: K1_U08, K1_U20

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UU

General academic profile - social competences

Charakterystyka K1

Knows how to work on a project individually and in a team. Verification: Field of study related learning outcomes: K1_K05 Area of study related learning outcomes: P6U_K, I.P6S_KO

Name of course: Basics of Organization and Management Construction

Coordinator of course: dr inż. Dariusz Walasek

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0434

Nominal semester: 6 / AY 2024/2025

Number of ECTS credits: 5

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 30h
- Exercise type of course 15h
- Project type of course 15h

Preliminary requirements:

Technology and Organization of Building Works. Student should demonstrate knowledge of the technology of works and equipment necessary for executing the construction works.

Limit of students: 30

Purpose of course:

The student acquires skills in the organization and construction management. Studies methods of work organization, methods of scheduling and network planning methods. Obtained knowledge is based in practice on the execution of exercises in developing a design project.

Contents of education:

Critical Path Method. Design and analysis of the network. Networks design with limited resources. Programs concerning the construction works. Progress updating procedures. Methods of verification. Programs concerning supply, use and reserve of the construction materials (graphical and graphical-analytical methods). Reliability structures of the construction processes. Mathematical model of reserves. Organizational methods in Construction (Deterministic and probabilistic approach). Tasks sequencing. Site logistic. General rules of equipment selection. Temporary roads on site. Temporary facilities, Storage of construction materials on site. Localization of temporary workshops, storages and other temporary facilities on site. Main machineries and equipment on site. Construction Projects. Participants. Construction tasks and resources. Design and analysis of the network. Construction programmes (labour chart adjustment). Site logistics design: Quantity of main construction materials. Design of storage and other temporary site facilities. Selection of main equipment on site. Site logistic.

Methods of evaluation:

Written exam, execution and defense of the projects.

Exam: yes

Literature:

[1] Jaworski K. M.: Metodologia projektowania realizacji budowy. Wydawnictwo Naukowe PWN. Warszawa 1999; [2] Jaworski K. M.: Zagospodarowanie placu budowy domu jednorodzinnego i małego osiedla. Arkady. Warszawa 1989; [3] R. Chudley: Building Construction Handbook, Butterworth Heinemann, 2006; [4] R. Chudley: Advanced Construction Technology, Prentice Hall, 2006, 978-0-13-201985-9; [5] R. Barry: Construction of Buildings v1, Blackwell Science, 1999, 0-632-05261-9; [6] R. Barry, Construction of Buildings v2, Blackwell Science, 1999, 0-632-05092-6.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Verification:

Field of study related learning outcomes: K1_W13, K1_W11, K1_W10, K1_W07 Area of study related learning outcomes: I.P6S_WG.o, III.P6S_WG, P6U_W, I.P6S_WK, III.P6S_WK

General academic profile - skils

Charakterystyka U1

Verification: Field of study related learning outcomes: K1_U21, K1_U20, K1_U14, K1_U13 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UU

General academic profile - social competences

Charakterystyka K1

Verification:

Field of study related learning outcomes: K1_K07, K1_K08, K1_K01, K1_K02, K1_K04 Area of study related learning outcomes: I.P6S_KK, P6U_K, I.P6S_KR, I.P6S_KO

Name of course: Basics of Underground Structures

Coordinator of course: dr hab. inż. Monika Mitew-Czajewska

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0613

Nominal semester: 6 / AY 2024/2025

Number of ECTS credits: 2

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 15h
- Project type of course 15h

Preliminary requirements:

Passed exams in Soil Mechanics Geotechnical Engineering I and Engineering Geology.

Limit of students: 30

Contents of education:

Lectures: Classification of tunnels (traffic and transportation tunnels); Preliminary studies economic analyses, geological survey and site investigations; Factors influencing the location of the tunnel; Analysis of loads on tunnels and underground constructions; Design of tunnel sections; Road tunnels ventilation; Lighting and noise control in tunnels; Shield and TBM tunnelling. Practice: Classification of methods of construction of tunnels; Tunnelling in solid rock; Conventional method (New Austrian Tunnelling Method); Tunnelling in soft ground and under water table level; Cut and cover methods, Methods of constructions of deep excavations - diaphragm walls, Berlin walls, sheetpile walls etc. Calculations of deep excavation wall.

Methods of evaluation:

design practice and final test and colloquium.

Exam: no

Literature:

[1] W. Powrie - Soil mechanics. Concepts and applications; [2] M. Das Braja - Advanced Soil Mechanics; [3] M. Puller - Deep excavation; [4] Ch. Ou - Deep excavation. Theory and practice; [5] I. Hajnal, J. Marton, Z. Regele - Construction of diaphragm walls; [6] D. Chapman, N. Metje, A. Stark - Introduction to Tunnel Construction; [7] International technical press: Tunnels and Tunnelling, Tunnel, World Tunnelling, Gallerie e grandi opere sotterranee, Tunnels et espace soutterrain, Geomechaniecs and Tunnelling, GeoZone, Tunnelling journal, ATS Journal, Tunel; [8] web pages of ITA AITES (International Tunnelling Associacion) - www.ita-aites.org

Effects of education

General academic profile - knowledge

Charakterystyka W1

Has knowledge of the history of underground construction, knows the classification of tunnels according to their purpose, shape, cavity, and casing material. Knows the principles of ventilation, lighting and drainage of tunnels. Has knowledge of the loads acting on shallow tunnels.

Verification: based on a written test.

Field of study related learning outcomes: K1_W06, K1_W04, K1_W05, K1_W12 Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

General academic profile - skils

Charakterystyka U1

Is able to pre-select a tunnel construction method and determine the excavation support load in the opencast tunnel construction method.

Verification: on the basis of a self-made project and its defense

Field of study related learning outcomes: K1_U03, K1_U07, K1_U20, K1_U19, K1_U16, K1_U10

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UU, I.P6S_UK

General academic profile - social competences

Charakterystyka K1

Is able to work individually and in a team.

Verification: -

Field of study related learning outcomes: K1_K04, K1_K06, K1_K07 Area of study related learning outcomes: P6U_K, I.P6S_KO, I.P6S_KK

Name of course: Concrete Structures II

Coordinator of course: Rafał Ostromęcki, Ph.D., Eng.

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0452

Nominal semester: 6 / AY 2024/2025

Number of ECTS credits: 5

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 30h
- Exercise type of course 0h
- Laboratory 15h
- Project type of course 15h

Preliminary requirements:

The course is a continuation of Concrete Structures I, semester V. It is proposed to students having attended the previous part.

Limit of students: no limits

Purpose of course:

Introduction to reinforced concrete theory, giving the background for understanding the action of structures and ability to conscious design of structural members (continued). Elaboration of the project of multi-storey building, to practise preparation of calculations and structural drawings (continued).

Contents of education:

Lectures: Design for shear: truss model used in European practice, MCFT(modified compression field theory), design of transverse reinforcement to Eurocode 2 and Model Code 2010. Basis of structures design – actions on structures, ultimate and serviceability limit state, loadings combinations. Cracking in reinforced concrete members. Deflection of elements at bending. General rules for reinforcement – concrete cover, anchoring length. Design of beams – calculations, detailing of reinforcement, web to flange shear. Unidirectionally reinforced slabs – monolithic, beam and block floors – calculation, reinforcement detailing, transverse reinforcement, transverse ribs. Columns – calculation, second order effects, detailing of reinforcement. Foundations – pads and strip foundations – calculations and detailing of reinforcement. General information on pre-stressed structures. Project: Continuation of work started in the Vth semester – design of a primary beam, column, foundation pad and the stairs of multi-storey building. Structural drawings preparation. Laboratory: Introduction to measuring techniques and standard tests for concrete properties. Tests realized in laboratory: compressive strength of concrete, research

for mean elasticity modulus, behaviour of reinforced concrete beam under loading, testing of prestressed concrete beam.

Methods of evaluation:

1. Lectures: exam in writing and oral, covering the material of the Vth and Vth semesters. 2. Project: elaboration of the project and defence. 3. Laboratory: colloquium and elaboration of reports on tests made in laboratory. Final grade will be 60% of exam grade 20% project grade and 20% laboratory grade. Exam's result is of major meaning in case of unclear situation.

Exam: yes

Literature:

[1] EN-1990:2007. Eurocode 0: Basis of structural design; [2] EN-1991-1-1:2004. Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight and imposed loads; [3] EN-1992-1-1:2004. Eurocode 2. Design of concrete structures. Part 1-1: General – Common rules for building and civil engineering structures; [4] Material from lectures, project and laboratory is enough to get the grade. There are many up-to-date books in English and national languages to be found, regarding the theory and basic design of concrete structures with respect to national practice.

Effects of education

General academic profile - knowledge

Charakterystyka W1

The graduates have knowledge of mathematics and physics enabling them to describe and understand basic phenomena in the field of civil engineering. The graduates have knowledge of the fundamentals of dimensioning, construction of structural systems. The graduates have knowledge of the fundamentals of design and analysis of typical general structures. They know the basic standards and guidelines for design of buildings and their elements. Verification: Exam, project, colloquium

Field of study related learning outcomes: K1_W01, K1_W05

Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

General academic profile - skils

Charakterystyka U1

The graduates can apply mathematical methods of algebra for the analysis of basic technical problems, use the rules of mathematical logics in engineering calculations. The graduates can classify elements of structural systems. The graduates can define and classify effects on structures. The graduates can design selected structural elements and simple structures. The graduates can describe the observed phenomenon, perform and interpret the results of a simple experiment. They can perform basic tests to identify or estimate the quality of building materials. The graduates are expected to be able to apply basic standards and guidelines in design of structures and their elements.

Verification: Exam, project, colloquium

Field of study related learning outcomes: K1_U03, K1_U07, K1_U21, K1_U12, K1_U01, K1_U02

Area of study related learning outcomes: I.P6S_UW.o, P6U_U, III.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

The graduates have the ability to understand the importance of responsibility in engineering activity, including accuracy and reliability when presenting and interpreting the results of their own work. The graduates are aware of the responsibility for their own and their team's safety. They are aware of the hazards occurring in civil engineering. The graduates are aware of the recognition of knowledge in solving engineering problems and the need to consult experts in case of difficulties in solving the problem on their own.

Verification: Exam, project, colloquium

Field of study related learning outcomes: K1_K01, K1_K04, K1_K07

Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KO, I.P6S_KK

Name of course: Fire Safety

Coordinator of course: Robert Kowalski, prof. dr hab. inż.

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0350

Nominal semester: 6 / AY 2024/2025

Number of ECTS credits: 1

Language of course: english

Form of didactic studies and number of hours per semester:

• Lecture 15h

Preliminary requirements:

Students should have basic knowledge of: general construction, concrete structures, steel structures and timber structures. Basic knowledge of European Standards - Eurocode. No formal requirements.

Limit of students: 30

Purpose of course:

Purpose of classes is to acquaint students with basis of fire safety in engineering field. The scope of lectures consist of information on current Building Regulations in Poland and standards necessary for proper designing, executing and exploitation of the buildings.

Contents of education:

Risk induced by fire - examples.
Basic requirements of buildings fire safety. Inter arrangements of construction project in fire safety field.
Classification of buildings fire safety. Fire resistance of building elements. Fire load density. Fire zones. Escape routes. Location of buildings.
Fire developement in small room and in big area - phases. Smoke venting, alert systems, extinguishing systems.
Fire tests of building elements. Classification system for the reaction to fire performance of construction products.
Methods for achievement of required fire resistance of concrete, steel and timber structural elements.
Fire as the accidental design situation.

Methods of evaluation:

Written test - scope: materials from lecutres.

Exam: no

Literature:

European standards: EN 1991-1-2: Eurocode 1 - Actions on structures - Part 1-2: General actions - Actions on structures exposed to fire EN 1992-1-2: Eurocode 2: Design of concrete structures - Part 1-2: General rules - Structural fire design EN 1990: Eurocode: Basis of

structural design EN 1992-1-1: Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings EN 1992-1-1: Eurocode 2. Design of concrete structures - Part 1.1: General rules and rules for buildings Books: Buchanan A.H.: Structural Design for Fire Safety. John Wiley and Sons Ltd. 2004 Lennon T.: Structural Fire Engineering. ICE Publishing 2011 fib bulletins: fib Bulletin 38/2007. Fire design for concrete structures – materials, structures and modelling. fib Bulletin 46/2008. Fire design of concrete structures – structural behaviour and assessment. fib Bulletin 54/2010 – Structural concrete; Textbook on behaviour, design and performance; Chapter 6: Design of concrete buildings for fire resistance

Effects of education

General academic profile - knowledge

Charakterystyka W1

Student has obtained basic knowledge in fire safety engineering. Verification: Field of study related learning outcomes: K1_W14 Area of study related learning outcomes: P6U W, I.P6S WG.o

General academic profile - skils

Charakterystyka U1

Student is able to design simple structural elements for fire safety with simplified methods. Verification: Field of study related learning outcomes: K1_U07 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

Student is aware of consequences of not respecting of fire safety requirements in process of design, construction and use of buildings.

Verification:

Field of study related learning outcomes: K1_K01

Area of study related learning outcomes: P6U_K, I.P6S_KR

Name of course: Fundamentals of Bridge Engineering

Coordinator of course: Wojciech Karwowski, BEng, PhD

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0616

Nominal semester: 6 / AY 2024/2025

Number of ECTS credits: 3

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 30h
- Project type of course 30h

Preliminary requirements:

No limits

Limit of students: No limits

Purpose of course:

Basic knowledge related to design, construction and maintenance of bridges.

Contents of education:

Lectures: 1. References and standards. 2. Basic information. 3. Structural materials. 4. Actions on bridges. 5. Foundations, abutments and piers. 6. Concrete bridges: Girder bridges, Plate bridges, Frame bridges, Arch bridges. 7. Steel bridges (girder, frame, truss and arch), with composite (steel-concrete) deck, with orthotropic deck. 8. Integral bridges. 9. Cable-stayed and suspension bridges. 10. Timber bridges. 11. Composite - polymer bridges. 12. Bridge bearings and expansion joints. 13. Equipment of bridges. 14. Construction methods of bridges. 15. Diagnostics and maintenance. Design: conceptual design of composite (steel-concrete) bridge.

Methods of evaluation:

Design classes and exam.

Exam: yes

Literature:

 Bangash M. Y. H., Prototype Bridge Structures: Analysis and Design. Thomas Telford 1999; [2] Chen Wai-Fah, Duan Lian (edited by): Bridge Engineering Handbook. CRC Press. Boca Raton 2000; [3] Nigel R. Hewson, Pre-stressed Concrete Bridges. Design and Construction, Thomas Telford, 2003; [4] Radomski, W: Bridge Rehabilitation, Imperial College Press, 2002; [5] Ryall M.J., Parke G.A.R., Harding J.E. (edited by): Manual of bridge engineering. Thomas Telford. London 2000; [6] Edited by Parke G., Hewson N.: ICE manual of bridge engineering, Institution of Civil Engineers, Thomas tekford 2008, London.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Verification: Field of study related learning outcomes: K1_W05, K1_W13, K1_W08 Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

General academic profile - skils

Charakterystyka U1

Verification:

Field of study related learning outcomes: K1_U02, K1_U03, K1_U05, K1_U07, K1_U21 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

Verification:

Field of study related learning outcomes: K1_K01, K1_K02, K1_K07 Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KK

Name of course: Mechanics of Structures 2

Coordinator of course: prof. dr hab. inż. Tomasz Lewiński, dr hab. inż. Grzegorz Dzierżanowski, prof. PW

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0405

Nominal semester: 6 / AY 2024/2025

Number of ECTS credits: 5

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 30h
- Exercise type of course 15h
- Project type of course 15h

Preliminary requirements:

Matrix equations. Cramer's systems with quadratic matrices. Eigenvalue problems with one (standard) and two symmetric matrices. Positive definiteness of quadratic forms. Elementary skills from the mathematical analysis: differentiation and integration of elementary functions. The definite integral. Skills in solving the ordinary differential equations of constant coefficients. The variational form of these equations. Setting the relevant boundary value and initial value problems. Understanding the fundamental laws of Theoretical Mechanics concerning bar structures in plane and space. Setting the equations of motion of material points and rigid bodies. Equations of motion of systems with constraints - Lagrange equations. The courses required: Strength of Materials I, Mechanics of Structures 1. The admittance to the exam of MoS2 is conditioned by receiving an affirmative joint grade for Mechanics of Structures 1.

Limit of students: according to the Dean's decision

Purpose of course:

Skills in solving the plane equilibrium problems of frames subject to large axial loadings. Computing the stress resultants, displacements and angles of rotations of the cross sections. Skills in computing the buckling loads for plane frames. Skills in analysis of dynamical response of elastic systems with one degree of freedom. Undamped and damped vibrations caused by arbitrarily varying loadings. Ability to set and solve the vibration problems of systems with lumped masses and finite number of degrees of freedom: undamped vibrations under arbitrary loading. Eigenvibrations of systems of discrete distribution of mass and finite number of degrees of freedom. Skills in analysis of natural and harmonic vibrations of plane frames made from incompressible bars.

Contents of education:

Theory of equilibrium of plane frames subject to large axial loads. The displacement method in its enhanced form. Buckling of frames. The safety domains for independent multiple axial loadings. Theory of undamped and damped vibrations of systems of one degree of freedom. Arbitrary loading case - Duhamel's integral. The resonance diagram. The phase shift versus the damping level. Dynamical analysis of elastic systems of discrete distribution of mass and finite number of degrees of freedom. The forced harmonic vibrations. Analysis of displacements of masses depending on the enforced frequency values. Natural vibrations modes. Orthogonality of the natural modes (with mass weights). The normal coordinates and the mode-superposition procedure. The undamped vibrations caused by arbitrary loadings. Theory of flexural vibrations of elastic bars. Eigenmode analysis and harmonic vibrations of frames of incompressible bars of continuous distribution of mass. The displacement method in terms of amplitudes of generalized displacements and stress resultants for plane frames of incompressible bars.

Methods of evaluation:

The method of evaluation consists in the in-semester tests, homework projects and written as well as oral exams

Exam: yes

Literature:

[1] CHOPRA, A.K., Dynamics of Structures. Theory and Applications to Earthquake Engineering., New Jersey Prentice Hall, 2001 R. [2] W.CLOUGH, J.PENZIEN, Dynamics of Structures. Mc Graw Hill, NY, 1975. [3] Teaching materials available from the website. [4] The lecture notes.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Verification: Field of study related learning outcomes: K1_W01, K1_W04, K1_W07 Area of study related learning outcomes: P6U_W, I.P6S_WG.o

General academic profile - skils

Charakterystyka U1

Verification: Field of study related learning outcomes: K1_U03, K1_U04, K1_U05, K1_U06, K1_U07, K1_U09, K1_U19 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UK

Charakterystyka U2

By using the recommended literature the students are able to prepare the homework on their own. They are also able to defend their homework. Verification: The defence of the homework

Field of study related learning outcomes: K1_U23, K1_U20, K1_U19 Area of study related learning outcomes: P6U_U, I.P6S_U0, I.P6S_UU, I.P6S_UK

General academic profile - social competences

Charakterystyka K1

Students cooperate with each other; they learn how to work together as a team. They understand the importance of the responsibility in the engineering activity and of the professionalism in presenting the results of their work. Student become aware of necessity of accurate and precise analyses of the engineering problems, being informed of consequences of misinterpretations of the structures response.

Verification: Assessment of the students' activity during classes and team works. Field of study related learning outcomes: K1_K07, K1_K08, K1_K01, K1_K02 Area of study related learning outcomes: P6U_K, I.P6S_KK, I.P6S_KR

Name of course: Metal Structures II

Coordinator of course: Marian Giżejowski, DSc, PhD, C.Eng., Associate Professor

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0622

Nominal semester: 6 / AY 2024/2025

Number of ECTS credits: 5

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 30h
- Project type of course 30h

Preliminary requirements:

The following courses passed: Metal Structures I, Structural Mechanics I.

Limit of students: Not limited

Purpose of course:

To gain the basic knowledge and practical skills in the following areas: - Limit states design rules of end-plate bolted connections and elements of simple structural systems. - General rules for the arrangement and design of industrial buildings with and without crane transport - buildings consisting lattice-roof and columns, portal buildings consisting rafter and columns. - General rules for the arrangement and design of multi-storey buildings of simple construction.

Contents of education:

1. Textbooks and structural codes. 2. Categories of end-plate bolted connections, connection details and design rules of non-preloaded and pre-loaded connections, construction details and requirements. 3. Cross section resistance of rolled elements under combined loading (tension or compression and bending associated with low shear force, tension or compression and bending associated with high shear force). Resistance of welded plated structural elements. 4. Elements under tension and bending (sections used and design rules). 5. Methods of buckling analysis and estimation of effective length factors for elements in structural systems. 6. Elements under compression and bending (sections used and design rules including different instability modes). 7. Categories of steel buildings (covering, bracing or structural role of wall and roof panels). 8. Supporting elements of cladding. Purlins and wall rails (sections used and design rules). Purlins and wall rails acting as discrete restraints for structural elements of the load bearing system. 9. Load bearing systems of industrial buildings and used structural forms. Roof and wall bracing systems. 10. Rolled plain webbed and compound battened or laced columns under compression and bending (used sections and design rules). 11. Roof trusses and truss girders (rolled sections used for structural elements and design rules). 12. Plated structural columns and rafters - selection of

section type and design rules. 13. Compound battened and laced columns under compression and bending (design of chord members, battens and lacing members). 14. Column splices and truss-to-column connections. Column bases and base holding down systems. 15. Principles applied for simple constructions. Horizontal and vertical load combinations, load transfer through sub-systems of simple constructions, design of beams, columns and bracing members of vertical truss systems. Project. Design of steel industrial building comprising of roof truss and rolled beam-column verticals.

Methods of evaluation:

1. At least satisfactory marks for the class-test dealing with end-plate connection design and for the submitted design project of steel industrial building. Class-test and project have to be completed within the course semester and their combined mark contributes to the coursework aggregate. 2. Passing the written examination within the examination session with at least the satisfactory mark. 3.Course aggregate is an average mark of two components, namely the coursework aggregate and the examination mark.

Exam: yes

Literature:

 MacGINLEY T.J., ANG T.C.: Structural Steelwork. Design to Limit State Theory. 2nd Edition, Butterworth-Heinemann, Oxford 1995. 2. HOGAN T.J., THOMAS I.R.: Design of Structural Connections. 4th Edition, Australian Institute of Steel Construction, Sydney 1994.
 GARDNER L., NETHERCOT D.A.: Designers? Guide to EN 1993-1-1. Eurocode 3: Design of Steel Structures. Thomas Telford, London 2005.

Effects of education

General academic profile - knowledge

Charakterystyka W1

Student knows basic rules of sizing and detailing of typical elements of industrial steel frameworks (roof trusses, rafters, beam-columns). She/he is able to shape and design end-plate connections.

Verification: Submission and defense of the project. Passing the exam.

Field of study related learning outcomes: K1_W04, K1_W05

Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

Charakterystyka W2

Student exhibits the knowledge on application of steel grades and products for construction of industrial halls and their use for trusses, rafters and beam-columns. Verification: Completion of the project. Passing the exam

Field of study related learning outcomes: K1 W05

Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

Charakterystyka W3

Student knows structural codes referred to design of trusses, rafters and beam-columns, and their connections.

Verification: Completion and defense of the project. Passing the exam.

Field of study related learning outcomes: K1_W05

Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

General academic profile - skils

Charakterystyka U1

Student is able to evaluate stress resultants and size elements of steel portal load bearing systems (trusses, rafters, beam-columns).

Verification: Completion and defense of the project. Passing the exam.

Field of study related learning outcomes: K1_U03, K1_U05, K1_U06, K1_U07, K1_U21 Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

Charakterystyka U2

Student is able to define and collect permanent and variable (snow and wind) actions on simple industrial halls.

Verification: Completion and defense of the project. Passing the exam.

Field of study related learning outcomes: K1_U03

Area of study related learning outcomes: I.P6S_UW.o, P6U_U

Charakterystyka U3

Student is able to properly define the computational (numerical) model of typical framework of industrial hall.

Verification: Making calculations for the project. Field of study related learning outcomes: K1_U04 Area of study related learning outcomes: P6U_U, I.P6S_UW.o

Charakterystyka U4

Student is able to carry out constructional drawings of steel hall (schemes, drawings of roof truss and beam-column vertical).

Verification: Completion and defense of the project.

Field of study related learning outcomes: K1_U09

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o

Charakterystyka U5

Student is able to use the codes related to structural design of steel trusses, rafters and beam-column elements. She/he is able to use loading codes related to permanent, snow and wind actions.

Verification: Completion and defense of the project.

Field of study related learning outcomes: K1_U21, K1_U20

Area of study related learning outcomes: P6U_U, I.P6S_UW.o, III.P6S_UW.o, I.P6S_UU

General academic profile - social competences

Charakterystyka K1

Student is able independently define the design task. Verification: Completion and defense of the project. Field of study related learning outcomes: K1_K01, K1_K02, K1_K07 Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KK

Charakterystyka K2

Student can study lecture notes and supplementary materials that are necessary for the project presentation and getting a satisfactory course credit. Verification: Completion of the project. Passing the exam. Field of study related learning outcomes: K1_K01, K1_K07 Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KK

Charakterystyka K3

Student is able to complete the project taking an appropriate care for rational and safe design of structural elements and joints.

Verification: Completion of the project.

Field of study related learning outcomes: K1_K01, K1_K02, K1_K07

Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KK

Name of course: Soil Mechanics and Geotechnical Engineering II

Coordinator of course: dr hab. inż Grzegorz Kacprzak, dr Rafał Kuszyk

Type of course: Compulsory

Level of education: First cycle studies

Programme: Civil Engineering

Group of courses: Obligatory

Code of course: 1080-BU000-ISA-0482

Nominal semester: 6 / AY 2024/2025

Number of ECTS credits: 5

Language of course: english

Form of didactic studies and number of hours per semester:

- Lecture 30h
- Laboratory 15h
- Project type of course 30h

Preliminary requirements:

Students must have passed examines in Engineering Geology.

Limit of students: no limit

Purpose of course:

Correct understanding and solving of the common geotechnical problems such as designing of shallow foundations, embankments, pile foundations, consolidation of soil beneth foundations and road embankments, retaining wall, veryfication of slope stability.

Contents of education:

LECTURES Soil and Rock identification; Soil classification (including geotechnical categories); Nature, physical and mechanical properties of soil; Ground water - appearance and phenomenon connected with it; Bearing capacity of soils and foundations; Limit states; Stress distribution in the subsoil (total and effective streses); Theory of consolidations; Soil settlements. PRACTICE IN LABORATORY: - macroscopic analysis, - soil moisture analysis; - sieve test; - hydrometer analysis; - bulk density analysis, particle density analysis; - consistency limits test; LS (ws) - shrinkage limit, PS (wp) - plastic limit, LL (wL) - liquid limit - Casagrande apparatus; - density index calculation; - permeability calculation, active capillarity calculation, passive capillarity calculation; - OMC optimum moisture content calculation - Proctor compaction device; - modulus of primary compressibility indication, modulus of secondary compressibility indication - oedometer test; - shear strength indication: direct shear apparatus - shear test box, triaxial apparatus.

Methods of evaluation:

Design practice and final test and examines.

Exam: yes

Literature:

[1] A. Jumikis; Soil mechanics; Edited by D. van Nostrand Company, INC. Princeton, New Jersey, 1962. [2] Karl Terzaghi; From theory to practice in Soil Mechanics. [3] Wiłun Z., Stażewski R. Soil Mechanics.

Effects of education

General academic profile - knowledge

Charakterystyka W1

The student should know the rules for determining the geotechnical conditions for foundation of buildings and other geotechnical construction; The student should know the basics of design process and analysis of typical civil engineering construction (general facilities, buildings, industrial, bridge and underground constructions). Verification:

Field of study related learning outcomes: K1_W04, K1_W13, K1_W10, K1_W06 Area of study related learning outcomes: P6U_W, I.P6S_WG.o, III.P6S_WG

General academic profile - skils

Charakterystyka U1

The student is able to design structures and foundations of buildings and geotechnical construction.

Verification:

Field of study related learning outcomes: K1_U10, K1_U03, K1_U04, K1_U07 Area of study related learning outcomes: III.P6S_UW.o, P6U_U, I.P6S_UW.o

General academic profile - social competences

Charakterystyka K1

The student can work independently and collaborate in a team of designated task, identify priorities for implementation of tasks; The student understands the importance of responsibility in engineering activities, including the accuracy of the results of their work and their interpretation.

Verification:

Field of study related learning outcomes: K1_K01, K1_K06

Area of study related learning outcomes: P6U_K, I.P6S_KR, I.P6S_KO