International Programme

List of English taught courses offered to Erasmus+ programme and international exchange students

Building Construction

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Building Construction

Course code	Course title	Number of ECTS credits
AB_ZPP	Basics of automation of production processes	3
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Basics of automation of production processes (Code: AB_ZPP) | Number of credits: 3

Course objectives

The aim of the course is to familiarize students with the basics of automation of production processes. After successfully completing the course, the student: He understands and controls the principles of automation and robotization of production processes in detail. Can appropriately apply the goals, principles, specifics and trends of designing production processes. Can apply innovations in automation and robotization when designing production processes. Manage and expertly define the basic concepts and functions of designing production processes.

Topics

1. Automation and robotization of production processes. 2. Functions and structure of automated logistics systems. 3. Automated systems of production and handling processes. 4. Structure and function of manipulators.

5. Basic architecture of an industrial robot. 6. Motion elements of manipulators and robots.

7. Grip elements of robots, tactile and optical sensors. 8. Operational reliability and maintenance of automated systems. 9. Development trends of automation of production processes.

10. Principles of designing automated production workplaces. 11. Specifications when sorting objects for production processes. 12. Determination of the nature, number and sequence of product manufacturing operations.

13. Spatial arrangement of production process automation workplaces.

Seminars

1. Assignment of semester project topics. 2. Documentation of robotic workplaces. 3. Production preparation planning. 4. Production processes and production lines. 5. Additional devices expanding the function of robots and manipulators. 6. Equipment for operational and inter-operational handling. 7. Recalculation of the need for workplaces. 8. Coefficient of technical and overall use of the workplace.

9. Method and structure of manipulation operation. 10. Demonstration of designing a fully automated line.

11. Presentation of semester projects. 12. Presentation of semester projects. 13. Presentation of semester projects.

Building Materials (Code: AB_STH) | Number of credits: 4

Course objectives

The subject provides a basic overview of the structure and properties of building materials and their use. There are presented laboratory tests during exercises. After successful completion of the course, the student can describe the basic raw materials and production techniques of classical building materials, and define the physical properties and the units. The student can characterize different types of cement, lime, plaster, mortar, plaster and concrete, their composition and technical characteristics and their behavior. Student can find the technical data sheets, and work with them, and explain their designation. The student orientates in the offer and can explain special adaptations of materials such as steel, wood, glass, asphalt and plastics. S/he can describe the principles of selection and ordering of building materials and knows how to describe the processes of measuring, weighing, design of concrete mixture and determining concrete strength.

Topics

Physical quantities and units

Element as the basic building unit

Binders, Mortar, Concrete, Stone, Ceramic

Materials: Wood, Glass, Metals, Asphalt, Plastics, Durability and stability of construction materials.

Civil Engineering I. (Code: AB_POS_1) | Number of credits: 5

Course objectives

The aim is to obtain professional knowledge of foundations, substructure, vertical supporting structures, chimneys, expansion and construction systems. After successful completion of the course the student: a) knows to determinate a module coordination and to determine and define the structural systems of multi-storey buildings (structural wall system, skeleton, and combined), structural systems of hall buildings (construction systems stressed primarily in bending, compression mostly, mostly drawn) and the superstructure. b) knows the principles of dilated and non-bearing structures, and s/he can suggest expansion in terms of differential subsidence and volume changes. c) is able to describe the type of shallow and deep foundations and explain the underlying load distribution in the soil and its effect on settlement construction. d) is able to resolve the skeleton and massive bottom structure, lighting, underground construction, insulation and construction of underground structures without a basement. e) can apply the knowledge of the vertical supporting structures (technological point of view, design of structural walls and columns, openings in bearing walls). f) is able to characterize the types of chimneys, assess the impact of location on the stack is functioning correctly. Students can also evaluate the chimneys of the physical and chemical point of view and to propose a reconstruction or repair of the chimney.

Topics

1) Structural Systems I - multi-storey buildings 2) Structural Systems II - Indoor buildings

3) Dilation of buildings 4) Excavation and earthworks

5) Foundations I 6) Foundations II 7) Foundations III

8) Substructures 9) Vertical load-bearing structures I

10)Vertical load-bearing structures II

11) Vertical load-bearing structures III

12) Vertical load-bearing structures IV

13) Chimneys.

German Language I (Code: AB_GLE) | Number of credits: 5

Course objectives

The aim of the course is to provide the students with the basic competencies necessary for normal communication in the language studied. The course aims to gradually achieve the specified output level A1 according to the Common European Framework of Reference in the range of specified thematic areas (lessons 1 - 4). After completing the course, the student has knowledge at the A1 level and masters the basic grammatical structures and vocabulary necessary for communication in a foreign language. At the end of the course, the student masters the principles of pronunciation of the German language and has knowledge of German language at the A1 level according to SERR for languages: masters the basic vocabulary necessary for understanding in basic communication, knows the basic grammatical structures necessary to compose a simple sentence, masters basic phrases and phrases - greetings, introductions, basic information.

Topics

1. Principles of German pronunciation
2. Introduction
3. Everyday life
4. Asking for information. Questions
5. In a town
6. At a party
7. Transport, means of transport
8. Prepositions I, Prepositions II
9. Imperative
10. In a hotel
11. Travelling
12. Family, social life

Engineering Technologies I (Code: AB_STE_1) | Number of credits: 5

Course objectives

The subject provides the review about the most important enginiering technologies to students by the form of lectures and exercise. It also provides the reviuw about facilities, suitability, ways and the condicions of implementation of these technologies. It is the importent part of qualification all technical workers in ingineering. The chosen technologies wil be explained in details in the tied subject Engineering technology II. The abilities in the area of creation of technological equipments will be developed by the subject Production supported by computer. After completing the course, student is able to acquire the following skills: - in the field of technological process development - programming of CNC technological equipment - computer-aided production - to name the basic principles of the technology of machining materials - develop production processes.

Topics

1/ The introduction into engineering technologies, basic devision, the meaning of knowledge of techologies for construction of prodacts, prearation and organisation of production and in tde repairs, fundamentals of technical drawing. 2/ Fundamentals of measurement, semifinished articles and semi-production-basies of metallurgy, foundry, forming, and welding. 3/ Heat processing of metal - kinds,influence on mechanical and technological features, vitability, and examples of using, technological equipment and examples of using; checking of results 4/ Division of materials-mechanical, heat and another ways; suitability and examples of using; technological equpments, 5/ Cold forming - volume and surface; technological equipmentstools and conditions; 6/ Machinig - teory of chip formation basic division of metods, technological conditions, reached parameters; 7/ Machning - machines, tools, automalization 8/ Plastic - production of polymer: mixing, grind, granulation, rolling, extrusion, spinnig, stamping, injection, forming, paiting, dippig, casting; 9/ Composit materials - technology of production, bonding 10/ Finish - reasons, conditions, ways and materials; implementation procedurs, technologocal equipments 11/ Technology, installation and repair-documentation, working practices, mouting device, products and utilities organization, safety; 12/ Technological procedurs - general principles for the creation, technical documentacion; case studies; 13/ Techological procedurs - promote the creation of computer phylosophy of CAD/CAM systems.

Excursion (Code: AB_EXK_ps) | Number of credits: 2

Course objectives

The objective of the Excursion course is primarily aimed at providing students with practical experience and deepening their theoretical knowledge in the field of civil construction. This course is designed to give students direct exposure to construction project implementation, understanding of technological procedures, safety regulations, and construction process management. The excursions offer a unique opportunity to meet with professionals in the field, discuss current challenges and trends in construction, and apply theoretical knowledge to practical examples. In this way, the course supports the development of professional competencies, critical thinking, and practical skills that are crucial for students' future professional life in civil construction.

Topics

- The student is able to identify and summarize key technologies and methods used in civil construction, including historical development and current trends.

- The student is able to determine and describe current standards and regulations regarding work safety and environmental protection in the field of civil construction.

- The student is able to write a structured analysis or report defining and addressing a specific construction or engineering problem, applying theoretical knowledge and methodologies in the process.

- The student is able to describe factors affecting teamwork and communication on construction sites and in design teams, including proposing solutions for improving team collaboration.

- The student is able to design and explain how to apply theoretical knowledge to specific construction projects, including selecting appropriate materials, technologies, and methods for the project.

1. - 4. Preparation for the excursion

5 - 8. Participation in the excursion

9. - 13. Preparation of the final report from the excursion

Facility Management (Code: AB_FAM) | Number of credits: 3

Course objectives

The aim of the course is to obtain basic information and knowledge about the provision of services and management of processes and activities in administration and operation of buildings. Mastering the system of pre-design, project and operational evaluation of buildings will enable students to design buildings and manage operations in buildings in order to reduce the total cost of life of the building and increase the quality of their use.

After completing the course, the student is able to master the system of pre-project, project and operational evaluation of buildings.

Topics

1. Facility management, concepts, content and application, legislation ČSN EN 15221
2. Integration of activities, security and development of services, increasing efficiency
3. Space and infrastructure, space services, workplaces, technical infrastructure, maintenance
4. People and organizations, health, safety and protection, focus on users of objects
5. Computer and communication technology - ICT, logistics
6. Quality of services, strategic level, tactical level and operational level
7. Service level agreement (SLA)
8. Key performance indicators - KPIs (Key performance indicators)
9. Risks, monitoring and control of service delivery processes
10. Systems of evaluation and certification of building sustainability, building quality certificate
11. Evaluation criteria, environmental, social, economics and management
12. Basic principles of multicriteria evaluation, linear balance model GEMIS
13. Environmental criteria, LCA - life cycle assessment of buildings

Flexibility and Strength (Code: AB_PAP) | Number of credits: 5

Course objectives

After completing the course the student will be able to state tension in cross-section of basic types of stress - pressure, tension, bending, shear, buckling and twisting. Further s/he can determine the deflection of basic structure by analyzing the bending equation. Student understands solution of wall and slab structures and solution of wall and plate equation. After completing the course the student is able to evaluate and design solutions of wall and slab structures, he can determine the tension in the cross-section from the basic stresses - pressure, tension, bending, skidding, buckling pressure and twisting, and also determines the deflection of basic structures based on the analysis of the bending equation.

Topics

1) Basic functions, concepts and assumptions of elasticity theory. Displacement. Deformation. Voltage. Saint-Venant`s principle. Linear theory of elasticity. Physical laws, working diagram. 2) Analysis of the rod - the basics. The connection components of the internal forces and stress components, components of the internal forces and external loads. 3) Simple tension and pressure - stress, strain, relocation. Effect of temperature field and the initial tension. 4) Simple bending angle and bending 5) Simple shear. Simple bending - calculation of normal stresses. Design of curved beams. 6) Transforming of the bent rods. Differential equations of the bending line. 7) Method of initial parameters and Mohr's method. Calculation of the tangential stress - a massive and thin-walled sections. The importance of shear stress in bending. The center of the skid. 8) Torsion free and bound. Big twist - solid and non-circular cross-section circular. Thin-walled cross-section of closed and open. 9) Compound load cases of the rod. The spatial and angle bending. Tension (compression) and bending . Eccentric tension and pressure. The core section. Design of beams in case of a compound stress. 10) Stability and buckling strength of compression members. Euler solutions. Critical power and voltage. Buckling strength approach. 11) The theory of strength and failure. Stress and strain in the point of the body. The principal stress in plane strain, elastic and plastic state. 12) Wall construction, types of stress, stress distribution, deformation 13) Plate structure, types of stress, stress distribution, deformation.

Material Science I. (Code: AB_NOM_1) | Number of credits: 5

Course objectives

In terms of subject student obtains knowledge in the field matter, chemical composition, structure, properties and usage of metal materials. Student will be acquaint with basic technologies of processing and checking as well as with factors, which affect characteristics of metal materials. It will especially relate to steels and their alloyes and nonferrous metals. Integral part of education will be introduction of concrete examples of using discussed materials especially in mechanical engineering and also development trend in this area. Graduate of this subject will be able to describe structure and properties of material, will bw able to analyse chemical composition and structure and will be able to carry out composition testing and will be able to review usability of using selected material for application in construction. Knowledge - the student will be able to: - Be able to describe the basic properties of metallic engineering materials, introduce the basic methods of processing engineering materials, to explain the principles of changes in the properties of fundamental technological materials, describe the possibility of degradation processes in engineering materials and be able to classify the types of basic materials used in engineering. Skills - the student will be able to: - Be able to evaluate basic structural processes in machine parts during their lifetime, to design fundamental properties of engineering materials testing and evaluate results, assess the adequacy of the choice the material simple machine parts with respect to the stress. Be able to determine the basic properties of materials to use certain technology, compare the basic material characteristics and in the field of materials to assess the economic aspects of its activities.

Topics

1. Introduction to study of material problems – meaning of subject, schedule of lectures and exercising, requirements for grading of the course; materials characterization 2. Priciples of metals theory , atomic structure of metals, interatomic bonding in crystals; structure of crystals and their imperfections 3. Basic related thermodynamic concept – state and energy of system, Gibbs phase rule; diffusion in metals 4. Metals and alloys under incidence of outer forces – elastic and plastic deformation, strengthening and recovery 5. Bare metals and alloys, structure of metal systems, solid solutions and intermediate phases 6. Phase transformation in metal systems, crystallization and transformation in solid state, allotropy and polymorphism 7. Phase diagrams of binary systems, phase and structural analysis of systems in accordance with solubility of components 8. Technical alloys of iron, bare iron, influence of chemical elements on characteristics of alloys 9. Phasic and structural analysis of Fe-C based alloyes, binary diagrams

of metastable system Fe-Fe3C and stable system Fe-C, influence of other elements on characteristics 10. Principle of heat treatment steel and cast iron, chemical-heat treatment of steel, mechanical-heat treatment of steel 11. Classification of steels, carbon and alloyed steels; heat resistant steels, stainless steels and tool steels. 12. Nonferrous metals and their alloys, parameter of selected Cu, Al alloyes and other technically significant alloyes 13. Metal materials for production of basic parts of productive machines, power machines and traffic engineering.

Thermomechanics (Code: AB_TEM) | Number of credits: 4

Course objectives

The filling of the subject builds on the subject of Physics and is the basis for many technical disciplines. Students will deepen their knowledge of Thermodynamics of gases, heat, and learn the basics of combustion. These findings are a sine qua non for the understanding of the nature of economic production, transformation and distribution of thermal energy. Allows you to correct management of technological processes and is essential for a number of normal thermal technical calculations. After the course completion, student is able to apply knowledge from the subject of thermodynamics in solving problems in heat cycles and heat transfer.

Topics

Basic concepts. Microscopic and macroscopic view. Thermodynamic system, state, action; the status exchanges. Reversible and irreversible state changes. The quantity of the substance. The internal energy. The state values, the heat, the work. Empirical temperature. The zero and the first law of thermodynamics 2. Calorie equation of State and thermal. The different models: an ideal gas, the gas temperature. Unideal gases, solids, liquids, and models. Radiation 3. Material quantity dependent on temperature, expansivity, degree of expansion, compressibility. Heat and temperature parameters. Calorimetrs 4. A simple system. Isotermal, izobaric, izochoric, adiabatic and polytropic process, p-V diagram 5. Thermodynamic machines: engine, refrigerator, heat pump. Second law of thermodynamics, Thomson's and Carnot's formulations, the relationships between them. The Wording Of Carathéodory's 6. Carnot cycle, the efficiency of heat engines, entropy, thermodynamic temperature. The third law of thermodynamic. 7. The thermodynamic potentials: internal vacancies and the Gibbs energy, enthalpy. Their properties and applicability for a particular job 8. Real gases, the properties of liquids and vapours, tables, and charts properties 9. Phase vs. folder. Phase transitions, phase diagram. Claus and Claus-Clapeyron's equation. The mixture of gas and filling of steam; - thermodynamic properties of moist air, Mollie's diagram, h-s diagram processes with damp air 10. Heat conduction (conductor): Fourier's law; heat conduction compound wall; leadership with internal heat source 11. The flow of heat (convection) forced and natural (free), principles of dynamic similarity 12. Radiation (radiation): black body radiation law, the application in practice 13. Heat exchangers. Introduction to the modelling of thermal phenomena industrial practice 14. Fuel and combustion, combustion statics.