VILNIUS TECH
International Relations Office

COURSE DESCRIPTIONS – AUTUMN SEMESTER 2022

AISVA19501	AIR LAW		6 ECTS
Lectures - 60 hours/semester	**Practical works** – N/A	**Consultations** - 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	Acquainting and giving students with the knowledge about international, national and EU requirements for aviation personnel, aircrafts, airports, air traffic management, aviation safety and aviation security.		
Course description	Air Law training gives knowledge about international, national and EU legislation related to the use of airspace for aviation and aviation activities.		

AISVA16510	AIR TRAFFIC CONTROL RULES AND PROCEDURES		3 ECTS
Lectures – 30 hours/semester	**Practical works** - 15 hours/semester	**Consultations** - 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To train rules and procedures of air traffic services.		
Course description	Air traffic service, classification of space, priority of traffic, controllers' favours.		

AISVA16711	AIR TRAFFIC ORGANIZATION		6 ECTS
Lectures – 36 hours/semester	**Practical works** - 24 hours/semester	**Consultations** - 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To grow in air traffic control experience for traffic control license.		
Course description	Air traffic organization deals with navigation and air traffic control systems for short and long ranges flights.		

AISVA19301	AVIATION ENGLISH 1		6 ECTS
Lectures – N/A	**Practical works** - 60 hours/semester	**Consultations** - 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To present general information concerning Aviation English, to introduce the main concepts and language structures related to their use, thus enabling students to start using English in an aviation related context.		

Course description	Aviation English 1 introduces students to peculiarities of Aviation English, more specifically to radio communication phraseology, aircraft constituent parts and aircraft types, navigation systems, main concepts related to airports and vehicles operating there, as well as basic weather phenomena. Provides the basics for further studies.

AISVA19503	AVIATION ENGLISH 3		3 ECTS
Lectures – N/A	**Practical works -** 45 hours/semester	**Consultations -** 2 hours/semester	**Individual work -** 33 hours/semester
Course aim	To make students learn standard phraseology and lexis while the aircraft is on ground and initial stage of flight.		
Course description	Aviation English 3 introduces the basic principles of air space classification, communication peculiarities according air space classes and flight order.		

AISVA19702	AVIATION ENGLISH 5		6 ECTS
Lectures – N/A	**Practical works -** 48 hours/semester	**Consultations -** 4 hours/semester	**Individual work** - 108 hours/semester
Course aim	To learn new vocabulary and grammatical structures, to develop their listening and speaking skills and to improve their comprehension (questions-answers) skills.		
Course description	Aviation English 5 helps for students to increase their listening ability at various phases of flight, they are tought to improve their reactions to instructions received, or issue appropriate instructions, much time is devoted to their skill to discuss miscalenuous situations as on ground or in the air.		

AIAIA17024	FUNDAMENTALS OF RESEARCH AND INNOVATION		6 ECTS
Lectures – 30 hours/semester	**Practical works** - 15 hours/semester	**Consultations -** 4 hours/semester	**Individual work** - 111 hours/semester
Course aim	The course aims to provide students with the knowledge and skills necessary for research and innovation developement.		

Course description	The module is about the methodological bases of science and innovations. Discribed scientific methodology category, their characteristics and interfaces. Physical methodological bases of science and physical modeling of technical processes, The similarity theory. The similarity criteria and their application in mechanics, aerodynamics, hydrodynamics. Dimensional analysis and its practical application. Statistical evaluation of experimental data. Regression analysis. Physical processes in a semi-empirical statistical modeling. Received distributions of fitness evaluation criterion and the correlation coefficient Chi square. Pafentology law. Research and presentation of the results. Innovation, the concept of the importance of their species. Conservative and radical innovation. Innovative process steps. Idea Generation, Evaluation and selection. Innovative projects. Intellectual property protection.

AIAIA22502	GENERAL KNOWLEDGE OF AIRCRAFT: POWER PLANT		6 ECTS
Lectures – 45 hours/semester	**Practical works** - 30 hours/semester	**Consultations** - 4 hours/semester	**Individual work** - 81 hours/semester
Course aim	To provide the knowledge about aircraft power plant, its implementation in a way the students could directly implement the knowledge in their future pilot profession. To motivate a further search for knowledge in a subject, to be able to understand quite deeply the aircraft power plant with which they will have a direct contact in their future work.		
Course description	Introduction to the aircraft engines, historical facts, applications. Introduction to the theory of turbine engines, general principle of work. Inlet devices. Basics of theory of compressor work, stage theory, types of compressors, implementation, and construction. Work of the fan, supersonic stages. Compressor surge. Work of combustion chamber, mixture of air/fuel, fuel combustion, types of cameras, cameras cooling. Work of Turbine, Theory of Turbine Stage, construction of Turbine, Turbine blades cooling. Nozzle types. Engine systems. Piston inner combustion engines, types, Theory of work, Construction, Systems. Characteristics of aircraft piston engines and their differences compared to the automotive piston engines.		

AISVA19502	HUMAN PERFORMANCE AND LIMITATION		6 ECTS
Lectures – 60 hours/semester	**Practical works –** N/A	**Consultations** - 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To analyse physiological and psichological factors influence on human feeling and efficiency in flight.		

Course description	Human factor in aviation, the basis of human physiology and psichology, their mistakes,reliability, co-operation, flying and health, stress and fatique control.

AIAIA21117	PRINCIPLES OF FLIGHT AND AIRCRAFT PERFORMANCE		6 ECTS
Lectures – 30 hours/semester	**Practical works** - 30 hours/semester	**Consultations** - 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	Provide knowledge of aircraft flight characteristics, the need to raise interest in the knowledge of the principles of flight; creatively apply knowledge gained in practical work in different work areas of the global market conditions, to understand their impact on the decisions and the importance of aviation development.		
Course description	The equation of motion for steady level flight. Trust required. Trust available and maximum velocity of the airplane. Power required. Power available and maximum velocity. Minimum velocity, stall and high lift devices. Rate of climb. Service and absolute ceiling. Range and endurance. Level turn. Take-off performance. Landing performance. Manoeuvres of airplane.		

AIAIB21150	AERODYNAMICS OF AIRPLANE		6 ECTS
Lectures – 30 hours/semester	**Practical works** - 30 hours/semester	**Consultations** - 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	a) To provide consistent aerodynamic engineering knowledge, including EASA Part 66 requirements. b) To develop the ability to select and apply appropriate aerodynamic analytical and simulation methods.		
Course description	Principles of aerodynamics, air properties, flow models, geometric and aerodynamic characteristics of wings and its sections, lift, drag, side force, moments about different axis, lift/drag ratio, high lift devices, control surfaces, interference, aerodynamic characteristics of airplane, lift curve, polar.		

AIAIB19301	AIR TRAFFIC CONTROL EQUIPMENT AND SYSTEMS		3 ECTS
Lectures – 30 hours/semester	**Practical works** - 15 hours/semester	**Consultations** - 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	Provide theoretical and practical knowledge about operation and parameters of communication and electrical equipment of air traffic control centers.		

Course description	Electrical equipment of air traffic control centers Communication equipment and systems of air traffic control centers and their interaction. Communication systems and electrical equipment of air traffic control centers and their interconnection with ground-based airport communication and electrical systems.

AIAIB21152	AIRCRAFT ENGINES		6 ECTS
Lectures – 30 hours/semester	**Practical works - 30** hours/semester	**Consultations -** 4 hours/semester	**Individual work - 96** hours/semester
Course aim	To provide the possibility for students to acquire university education in the field of aircraft engines engineering, in order to develop their interest of scientific knowledge of aircraft engibes; ability to apply the acquired knowledge of in activities of aviation companies in conditions of global economy.		
Course description	Introduction to the aircraft engines, historical facts, applications. Introduction to the theory of turbine engines, general principle of work. Inlet devices. Basics of theory of compressor work, stage theory, types of compressors, implementation, and construction. Work of the fan, supersonic stages. Compressor surge. Work of combustion chamber, mixture of air/fuel, fuel combustion, types of cameras, cameras cooling. Work of Turbine, Theory of Turbine Stage, construction of Turbine, Turbine blades cooling. Nozzle types. Engine systems. Piston inner combustion engines, types,Theory of work, Construction, Systems.		

AIAIB17151	STRUCTURE OF AIRCRAFT		6 ECTS
Lectures – 30 hours/semester	**Practical works - 30** hours/semester	**Consultations -** 4 hours/semester	**Individual work - 96** hours/semester
Course aim	To set the background of aircrafts constructions including aerodynamics, dynamics of flights, mechanics of substances, aircrafts power and engines in aviation. Training to analyze constructions of aircrafts, to explain logics of making decision related to different tasks and conditions.		
Course description	Principles of aircrafts classification. The most important elements of aircraft. Aircrafts weight and balance. Charges influencing an aircraft and their influence to the work of constructions. Constructions of aircrafts wings. Characteristics of aircrafts wings constructions. Control surfaces of aircrafts and their constructions. Empennages of aircrafts and their constructions. Undercarriages of aircrafts and their constructions. Physical significance of aeroelastic phenomenon in aviation, methods to decrease its negative influence. Propellers. Repair damages on the aircraft. Multiplayer structural strength calculation.		

AIAIM22300	AEROSPACE STRUCTURES AND MATERIALS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** - 111 hours/semester	
Course aim	To provide the knowledge regarding to space environment for common materials, will lern, evaluate and analyzed material selection with space related situations, will be able select appropriate material for specific requirements, moreover, students will be introduce to various manufacturing technologies, be able correctly chose design for related manufactured technology.	
Course description	During the course, students are introduced to the main materials used in the space environment and their processing technologies, such as computer machine tool processing technology, casting, composite materials production, casting, vacuuming, extrusion, 3D technologies and others. The prevailing environment in space and the design challenges it poses will also be assessed.	

AIAIM22101	INTRODUCTION TO UAV TECHNOLOGY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** - 111 hours/semester	
Course aim	To provide the knowledge regarding autonomous aerial vehicles technologies and systems, principles of operations, which on its turn will allow students to select the further direction during the master studies. To motivate students to investigate and research new technologies and systems, motivate the innovative thinking, search for new scientific knowledge.	
Course description	During the course students get familiar with main elements of the Unmanned Aerial Vehicles elements of technology like: powerplants, energy storage and supply, attitude and position determination systems and algorithms, thermal systems, radio communication systems, surveillance systems etc. With the increase of implementation of UAVs all over the world this knowledge becomes of extreme importance.	

AIAIM22301	REMOTE MONITORING	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – N/A
Laboratory works – 15 hours/semester	**Individual work** - 115 hours/semester	
Course aim	To provide the knowledge regarding autonomous aerial vehicles and autonomous space vehicles technologies and systems, principles of operations, which on its turn will allow students to select the further direction during the	

	master studies. To motivate students to investigate and research new technologies and systems, motivate the innovative thinking, search for new scientific knowledge.
Course description	During the course students get familiar with main elements of the Unmanned Aerial Vehicles and Automated Space Vehicles elements of technology like: powerplants, energy storage and supply, attitude and position determination systems and algorithms, thermal systems, radio communication systems, surveillance systems etc. Since in these days similar systems and algorithms on Unmanned Aerial Systems and Space Vehicles are used, the course includes both subjects.

AIAIM17184	RESEARCH WORK 1	3 ECTS
Preparation for evaluation – 10 hours/semester	**Research work** - 70 hours/semester	
Course aim	Thorough analysis of scientific and technical sources dealing with the theme of final master thesis and formulation of problems for the next reseach stage.	
Course description	Selection of problem to be solved in master thesis. Review of literature according the problem of master thesis. Preparation of summary of the review. Formulation of the task of master thesis.	

AIAIM22100	SPACECRAFT SYSTEM ENGINEERING	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** - 96 hours/semester	
Course aim	To understand and learn how to practically apply systems engineering methodology in the design process of a spacecraft.	
Course description	During the course students get familiar with main elements of the Unmanned Aerial Vehicles and Automated Space Vehicles elements of technology like: powerplants, energy storage and supply, attitude and position determination systems and algorithms, thermal systems, radio communication systems, surveillance systems etc. Since in these days similar systems and algorithms on Unmanned Aerial Systems and Space Vehicles are used, the course includes both subjects.	

ARCHITECTURE FACULTY

ARURA16001	ARCHITECTURE AND COMMUNITY		15 ECTS
Lectures – 45 hours/semester	**Practical works –** 150 hours/semester	**Consultations** - 10 hours/semester	**Individual work** - 195 hours/semester
Course aim	To provide students with knowledge of the methods of urban design on the urban edge, main principles of formation of urban complex. To develop abilities to analyze specific features of anthropogenic and natural settings of the site, to creatively apply the results of analysis in design process and to assess impact of the design solutions on the community and the environment.		
Course description	Students are introduced with the methods of urban design on the urban edge, where natural and anthropogenic settings converge. Natural and anthropogenic conditions, as well as compositional characteristics of the selected site are analysed. After assessment of needs of local community project of moderate-sized urban complex is prepared. Complex tasks of urban design of public spaces and architectural desing of buildings are solved creatively and rationally combining anthropogenic and natural elements of the site.		

ARARA17006	ARCHITECTURE AND SOCIETY		15 ECTS
Lectures – 75 hours/semester	**Practical works –** 120 hours/semester	**Consultations** - 10 hours/semester	**Individual work** - 195 hours/semester
Course aim	To understanding the importance of architecture as an instrument for ensuring the public interest and to gain knowledge of specific features of the design of public buildings based on the principles of sustainable development.		
Course description	This course is based on solving architectural, urban and technological problems by developing the project of public building (educational, cultural, etc.) in the real urban public space. The course consists of three different parts mentoring by different departments: Design of Public Building and Interior (Department of Architecture);Typology of public spaces (Department of Urban Design); Innovative building constructions, Material science and Building physics (acoustics, lighting) (Departments of Faculty of Civil Engineering).		

ARARA19701	ARCHITECTURE AND CONTEXTS		15 ECTS
Lectures – 30 hours/semester	**Practical works –** 75 hours/semester	**Consultations** - 10 hours/semester	**Individual work** - 285 hours/semester

Course aim	Educate thinking and empathetic personality, able to evaluate and dispose building' contextual aspects of a place and a time, reflecting realities and challenges of today life.
Course description	This is a research module discussing the problem of relation between Building and it's Contexts. The Contexts appear as Place and Time. Principles of sustainability needs to be employed in the research. This module will develop student' ability to look at a building not as to a volume, but rather to a potential spacethrough a human natural needs, will develop an empathetic architectural thinking. It will be strengthen through autonomous research and complexity project led by lectures, seminars and paper work.

ARURA19004	ARCHITECTURE AND CONTEXTS		15 ECTS
Lectures – 30 hours/semester	**Practical works –** 75 hours/semester	**Consultations -** 10 hours/semester	**Individual work -** 285 hours/semester
Course aim	The aim of course is to provide students with the knowledge of urban structures and complexes de-sign principles in historic, contemporary cities and reconstructed urban environment, taking into ac-count various contexts. The course gives a possibility to train students to create contemporary urban, architectural structures and complexes.		
Course description	Design principles of new architectural objects and urban complexes are analyzed, taking into account the various cultural, geographical contexts and the existing structure. After assessing the various context influences and examining the social potential of the public urban spaces, the concept of the spatial system in the urban structure is formed, the building complex is designed, the purpose of object is determined and the consequence to the visual identity of the urban fabric is evaluated. The spatial structure of an object forms, adds to context of the spatial structure and revitalizes the social content.		

ARARA17011	ARCHITECTURE AND INNOVATION		15 ECTS
Lectures – 45 hours/semester	**Practical works –** 60 hours/semester	**Consultations -** 2 hours/semester	**Individual work -** 293 hours/semester
Course aim	To get acquainted with the innovation, diversity and potential of modern architecture, to draw up a specific destination pioneering, innovative architectural object design using progressive design methods and tools.		

Course description	Study of the brightest XX - XXI century examples of innovation in architecture. It discusses the political and business influence towards creativity and innovation in architecture. The role of innovative ideas and concepts of ecology (sustainability), computer technology, new materials and technologies in shaping the architecture strategies. Examines creative thinking, analytical and creative activities for generating innovation aspects. Research of relationships between forms, ideas and concepts in architecture, expression and context of the role of innovative architecture. Analyzes the traditional values in architecture and trends of their change, variety and innovation of architectural expression, green and sustainable architecture in relation to the artistic dimensions, interface with science and computer technology. Absorbed parametric design (modeling) principles. The module - interdisciplinary, 2 VGTU departments participate in its realization.

ARURA16008	ARCHITECTURE AND INNOVATIONS		15 ECTS
Lectures – 30 hours/semester	**Practical works –** 75 hours/semester	**Consultations -** 10 hours/semester	**Individual work -** 285 hours/semester
Course aim	To acquaint students with innovative technology, and modern urban design trends within their impact on urban structures and complex systems design in historical and modern cities, recovered and reconstructed in urban areas. Educated abilities to form the urban fabric ideas and expressed them by the conceptual design and apply modern innovations in proposed solutions.		
Course description	Volumetric and spatial concept design is created, according to the prevailing urban fabric and within evaluation of contemporary trends in urban development and innovative technologies and applications for urban design.		

ARARA22905	CONTEMPORARY ARTISTIC EXPRESSION IN ARCHITECTURE		6 ECTS
Lectures – 10 hours/semester	**Practical works –** 20 hours/semester	**Consultations –** 2 hours/semester	**Individual work –** 48 hours/semester
Course aim	Learning the contemporary art expression character, variety and potentiality in architecture, prepare the project of the particular, experimental architectural object sustaining concrete method of the art expression.		
Course description	Study theoretical and methodological rules of art expression of the XX century top architecture and art schools. Discuss about vision, fantasy, intuition and sense role formative creative visions. Research creative contemplation, analysis and creative action aspects. Research creative movement mthodological structure, specific of the contemporary new, experimental ideas search methods. Discuss about varied manner of idea development and presentation.		

ARPGA17002	DRAWING 1		6 ECTS
Lectures – N/A	**Practical works –** 60 hours/semester	**Consultations** - 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	The course is aimed towards the visual understanding and graphic representation of natural, man-made forms and chamber architectural objects in free hand drawing, by applying the laws of line and tone perspective, chiaroscuro and using of variety of expressive means.		
Course description	A visual art module provides knowledge and skills of graphic representation of natural, man-made forms and chamber architectural objects by exercising sketch, study and interpretation types of free hand drawing. The means and methods of composition, representation of line and tone perspective, volumetric structure and form, chiaroscuro effects are studied by drawing natural forms (stone, tree), surfaces (glass window), chamber architectural objects, primary geometrical volumes, classic capital, vase, still-life. The course of assignments progresses from repre-sentation of discrete objects to larger sets, and from closed forms to open forms. The skills and knowledge acquired through on-site drawings is creatively applied in interpretative drawing assignment.		

ARARA22901	EXPERIMENTAL ARCHITECTURE		3 ECTS
Lectures – 5 hours/semester	**Practical works –** 25 hours/semester	**Consultations** - 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	The aim of the module is to find out -what is EXPERIMENTAL ARCHITECTURE? The aim is to highlight the advantages of experimental methods over other creative methods. It is planned to develop an innovative, maximally original architectural object project for a specific purpose, using advanced experimental design methods and tools.		
Course description	The basics and possibilities of experiment as a method are discussed. Precedents of experimental architecture are reviewed. The principles of horizontal, vertical and lateral thinking and their role in experimental creation are analyzed. Aspects of scientific and artistic research are analyzed. Theoretical and practical analysis of experimental research methods. Aesthetic, artistic and conceptual aspects of architectural experiment, forms, ideas and conceptual relationships in architecture are studied. The connection between novelty and originality with experimental architec-ture is discussed. Trends in interdisciplinarity, practical aspects and the impact of contemporary art and architecture on architectural innovation are analyzed. The principles of group work, creative workshops and the influence on innovation generation are tested. Practical ways and means of visualization of experimental architecture are analyzed. The module focuses on the application of a practical experiment in architecture.		

ARPGA17009	FUNDAMENTALS OF ARCHITECTURE		15 ECTS
Lectures – 45 hours/semester	**Practical works –** 150 hours/semester	**Consultations** - 8 hours/semester	**Individual work** - 197 hours/semester

Course aim	The aim of this subject is to provide knowledge about the basic principles of composition, architectural graphics tools, architectural object spatial structure. To give the ability to identify the compositional instruments, to perceive their significance for the architectural quality and to provide the ability to apply the appropriate graphical tools for the representation of architectural object.
Course description	The module is designed for the analysis of the architectural fundamentals and consists of three parts. The basic principles of architectural composition is examined, in relation to the natural prototipes and setting them in real architecture. The possibilities of three-dimentional imaging and computer drawing graphics of the object is analysed. The analysis of selected worldwide or Lithuanian architectural object (housing) its functional, three-dimensional structure is made (by making models and scratches by hand and by computer drawings), and carried out with drawings of various graphic tools.

ARPGA17011	HISTORY OF ARCHITECTURE 2		3 ECTS
Lectures – 30 hours/semester	**Practical works –** N/A	**Consultations -** 2 hours/semester	**Individual work -** 48 hours/semester
Course aim	To get acquainted with architectural features and contexts in Lithuania from the earliest examples to the end of the 19th century, to provide skills to analyse their causes and interactions.		
Course description	This course transverses through the development of architecture in Lithuania from the earliest examples to the end of the 19th century. Along the study of architectural forms, a great emphasis is given to a particular context and reasons that contributed to their development. This course introduces to the significant theoretical works and researches on Lithuanian architecture. The lectures bring the fundamental events within the history of landscape architecture. A research of Lithuanian architecture of different periods is conducted within the home work task, and on the basis of this research the students are asked to work on a creative task. Exam contains written/oral and drawn tasks.		

ARPGA17013	MODERN AND CONTEMPORARY ARCHITECTURE		3 ECTS
Lectures – 30 hours/semester	**Practical works –** N/A	**Consultations -** 2 hours/semester	**Individual work -** 48 hours/semester
Course aim	To know the essential works, ideas and trends of modern architecture from their source to the beginning of the twenty-first century, linking them to the main cultural movements and expressions.		
Course description	The course is designed to familiarize with modern architecture as the history of the application of modern thinking paradigm in architecture since their source (18th c.) to the present day. On the basis of analysis of outstanding architectural trends, models and theories and correlation with the socio-cultural context, the knowledge on modern ideas that influenced architecture is provided.		

ARARA16015	PRACTICE OF BUILDING TYPOLOGY		3 ECTS
Lectures – N/A	**Practical works –** 15 hours/semester	**Consultations –** N/A	**Individual work** - 65 hours/semester
Course aim	To deepen and consolidate the knowledge of building typology and to develop the ability to monitor, analyze and critically evaluate specific architectural situation. Introductory practice is assessed by a written report and oral presentation of it.		
Course description	The knowledge of architectural typology gained during the ”Typology of buildings” course will be developed and perpetuating by means of this parctice. Directly, visiting certain types of buildings that reflect different typology, the students will study architectural objects in situ, will identify typo-logical structure, and critical assess certain manifestations of typological schemes.		

ARARA16004	SCALE IN ARCHITECTURE		3 ECTS
Lectures – N/A	**Practical works –** 30 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	The goal of the course is to learn concept of scale and human scale in architectural composition, to reveal the importance and possibilities of using scale and human scale as compositional tool in the process of harmonizing architectural environment.		
Course description	Problems of scale and human scale in architectural composition are studied. The impact of volume’s mass and the division of its surfaces on the perception of scale and on the harmony with the surroundings is analyzed. Students learn how to integrate the created volume into the real historical surroundings by compositional means of balanced scale.		

ARPGA17004	SCULPTURE AND PAINTING BACKGROUNDS		3 ECTS
Lectures – N/A	**Practical works –** 45 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	The course is aimed to develop the sensibility for sculptural form and color, to introduce the means and principles of artistic practice in fields of sculpture and painting and learn to apply them in study projects.		

Course description	The module is aimed to acknowledge with the concepts of contemporary sculpture, the principles of the practice, and the relevance of the sculpture medium for the design and rethinking of public spaces. The practice assignment is devoted to the development of a sculpture project for a specific public space, characterized by openness of conceptual form and meaning, sensitivity to the character of the place, contexts and communities. The practice is intended to build up the skills of solving the challenges of the project development: from the artistic research of the site and the development of the proposals, to the building of the sculpture model, design of visual renders and graphic poster presenting the project.

ARARA16007	TECTONICS IN ARCHITECTURE		3 ECTS
Lectures – N/A	**Practical works –** 30 hours/semester	**Consultations –** N/A	**Individual work -** 50 hours/semester
Course aim	Understanding of principles of architectural tectonics and applying them in abstract composition of architectural forms.		
Course description	Problem of architectural tectonics is examined: interrelation of material, structure and form. Work consists of two parts: at first analytical study of chosen tectonic system is executed, it's origin, peculiarities and historic development is analyzed and, at last, abstract architectural composition, which in artistic manner reveals peculiarities of studied tectonic system, is produced. While creating artistic form with tectonic features it is recommended to experiment with various materials.		

ARARA16001	TYPOLOGY OF BUILDINGS		3 ECTS
Lectures – 45 hours/semester	**Practical works –** N/A	**Consultations –** 2 hours/semester	**Individual work -** 33 hours/semester
Course aim	To provide architectural knowledge about the structure and artistic expression of the different typology objects, to form the skills of capability to apply it solving a complex problems of buildings design and their environment formation.		
Course description	This assignment during the lectures analyzes various types of buildings (residential, administrative, public, etc.) and their historical development, functional characteristics, influence and opportunities of new technical requirements, the design features. There is an introduction in to the basic legal regularity information, design normative. Knowledge to be deepened and confirmed during the seminars and in the referees.		

ARURA17003	URBAN STRUCTURES		15 ECTS
Lectures – 45 hours/semester	**Practical works** – 150 hours/semester	**Consultations** – 10 hours/semester	**Individual work** - 195 hours/semester
Course aim	To provide students with knowledge necessary for understanding of contemporary urban development processes (trends and challenges) and solving complex urban design and planning tasks, as well as to develop professional skills in the fields of urban analysis, urban design and planning.		
Course description	Students are familiarized with the process of urban development, as well as methodology and princi-ples of integrated urban development. Practical work is composed of successive tasks which develop professional skills in the fields of urban analysis, urban planning and urban design. Urban analysis of selected small Lithuanian town is performed and findings are summarized. After assessment of the quality of town's urban structure, alternative urban growth models are prepared, combining po-tential of external and internal development opportunities. Selected urban model is further developed into urban concept, unfolding major proposals for modernizing of urban structure and sustaining spatial identity of the town. Later detailed urban design solutions for the site in the central part of the town are prepared.		

BUSINESS MANAGEMENT FACULTY

VVTEA16402	ARCHITECTURAL LAW		3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** - 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	The aim of this module is to indoctrinate students with lagal regulation of construction and territory planning.		
Course description	The course analyses: objects, subjects and sources of construction and territory planning law. Legal regulations of constuction planning, construction process, building control, construction explotation and territory planning are analysed as well as course of contestation solution and legal responsibility for delicts of construction and territory planning.		

VVTVB19101	BUSINESS FUNDAMENTALS		3 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** - 2 hours/semester	**Individual work** - 33 hours/semester

Course aim	To form a student's knowledge system of the business to practically apply this knowledge to the relationship between market players, to disclose the harmony of market players' interests arising in their business relationship, ensuring the creation of the added value.
Course description	Business fundamentals course presents various business concepts, reveals the basic economics and business concepts, categories, and creation of business value, introduces to business management steps and processes. Students are introduced to the external and internal factors that determine business success, benefits and challenges of the various sectors of the economy and business organization, and of legal types of business, business financing sources and financial aid opportunities for business creation and development. It also introduces the principles of business accounting and tax system, the fundamentals of management and communication, and discusses the importance of business ethics.

VVEIB17112	COMPARATIVE ECONOMICS		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations -** 2 hours/semester	**Individual work -** 33 hours/semester
Course aim	To form a system of theoretical and practical knowledge of students' developmental economy through the principles of comparative analysis. To enable students of economic engineering to carry out an economic analysis of different countries' general situations. To teach them to make comparisons between different countries through the economic aspects of development. To teach understand the patterns of economic development of different countries, applying the basics of systematic analysis, economic and development theories, statistical methods, and modern information technologies. To train in a reasoned interpretation, aggregation, and evaluation of comparative economic analysis results using theoretical knowledge of economic sciences.To prepare to anticipate development prospects. To create baggage of experience and understand how to assess each country's current situation, economy, and development.To gain awareness of the country's factors and the necessary aspects for each stage.		

Course description	The subject of economic development studies sets out theoretical and practical knowledge enabling students of economic engineering to learn how to assess the factors of economic development of different countries, the structures of economies of countries of varying development, as well as their changes in the process of development of countries, the main features of the development of nations, to predict the economic prospects of countries. Students will get acquainted with the development trends of different countries prevailing in the modern world, theories, and economic growth and development features. Learn to understand, adapt, analyze, evaluate the various stages of economic development of developed countries. The acquired theoretical knowledge and its practical application (homework) during the semester will enable students to anticipate certain patterns that are specific to countries at different stages of their development. After taking the course, students will understand the economic challenges and opportunities in certain countries of varying development that entrepreneurs face when creating and developing a business.

VVVKB19706	CONSUMER BEHAVIOUR		6 ECTS
Lectures – 30 hours/semester	**Practical works –** 10 hours/semester	**Consultations -** 4 hours/semester	**Individual work -** 116 hours/semester
Course aim	To provide students with the knowledge of innovations, peculiarities, strategies and means of consumer behaviour, to develop competencies for preparing and basing economically consumer behaviour strategies and means based on the orientation towards innovations and technological progress.		
Course description	Consumer Behaviour - course program allows students to acquire the latest knowledge in consumer behaviour and to develop a systemic understand in consumer behaviour decision making. While studying consumer behaviour students will be provided with the latest knowledge, enabling them to develop competitive consumer behaviour strategies. This course stress on innovative consumer value creation and business positioning in the local and international market.		

VVTEB16301	CONTRACT LAW		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations -** 3 hours/semester	**Individual work -** 32 hours/semester
Course aim	The aim of course is to provide knowledge about contractual and pre-contractual relations regulated by civil law.		
Course description	Contract law is a branch of Civil law which regulates formation, implementation, validity, interpretation, termination of contracts. This course introduces students to pre-contractual relations, content, implementation, nullidity of contracts, contractual liability, single types of contracts.		

VVVKB19705	COURSE PROJECT OF CONSUMER BEHAVIOUR		3 ECTS
Lectures – N/A	**Practical works –** 20 hours/semester	**Consultations –** N/A	**Individual work -** 60 hours/semester
Course aim	To get knowledge in contemporary marketing research methods; to get competence in performing valid marketing research; to perceive advanced and innovative practice in marketing research.		
Course description	The Role of Marketing Research. Marketing Decision Problems and Research Questions. Primary and Secondary Data. Exploratory Research: In-Depth Interviews and Focus Groups. Descriptive Research Designs: Survey. Causal Research Designs: Observation Techniques, Experiments, and Test Markets. Sampling theory and Methods. Scale and Attitude Measurement. Statistical Methods for Data Analysis Principles of Marketing Research Report. Database Development and Marketing Research. Decision Support System and Marketing Research.		

VVTVB17072	COURSE PROJECT OF ENTERPRISE ORGANIZATION AND MANAGEMENT		3 ECTS
Lectures – N/A	**Practical works –** 30 hours/semester	**Consultations –** N/A	**Individual work -** 50 hours/semester
Course aim	The objective of the module is to provide fundamental theoretical and practical knowledge about the organization and management of enterprises, to develop a systematic point of view of enterprise and its activity as a system.		
Course description	Introduction to organizations, external environment, inter-organizational relationships, strategy, organization design and effectiveness, fundamentals of organization structure, organizational culture, innovation and change, decision-making processes in organizations, manufacturing and service technologies, information technology, information for decision making and control, organization size, life cycle, and downsizing.		

VVEIB17279	COURSE PROJECT OF QUANTITATIVE MODELLING METHODS		3 ECTS
Lectures – N/A	**Practical works –** 30 hours/semester	**Consultations –** N/A	**Individual work -** 50 hours/semester
Course aim	The purpose is training the students to practice quantitative methods making decisions in economics and develop course project preparation skills. and to write a scientific essay. In the scientific essay student: 1) clearly defines the main parameters of the research (scientific problem, object of the research, purpose and tasks, methods of their solution, the benefit of the results of the research); 2) substantiates the formulated statements; 3) analyzes, compares, evaluates theories, methods.		

Course description	Subject includes choice and formulation of course project theme; identification of the object; research aim and tasks formulation. Also integrated: scientific literature search, selection and analysis; statistical data collection and processing; selection of the research methods. Subject includes the following quantitative decision methods applying in the course project: correlation-regression analysis; forecasting methods; linear programming; transport tasks (optimization of routes); multicriterial evaluation of the economic decision. Also carry out practical work: conclusions formulation and preparation presentation of the research results.

VVTVB17182	E-BUSINESS		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To provide theoretical and practical knowledge in e-commerce and alternative solutions, tools, value, and create abilities toevaluate efficiency of e-business processes, abilities to plan, organize, coordinate and control e-commerce.		
Course description	The course of e-commerce aimed to introduce students with specifics of e-business, aspects of planning, organizing, andcoordination and control functions in e-commerce, evaluation of e-business and separate tools efficiency.		

VVEIB17093	ECONOMIC ANALYSIS		6 ECTS
Lectures – 30 hours/semester	**Practical works –** 30 hours/semester	**Consultations –** 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To develop the ability to perform the analysis of the activities of various economic sectors and entities with the help of economic science knowledge, to summarize and interpret the results of the performed analysis.		
Course description	To form a complex of theoretical knowledge and practical skills that will be helpful to perform economic analysis of various economic sectors and entities and to make correct summarize and comments on the results of the analysis performed; to assess the potential for value creation of the planned activities and to forecast economic state changes of the analyzed objects while implementing management decisions in the conditions of the changing environment.		

VVEIB17190	ECONOMICS		3 ECTS
Lectures – 15 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To provide students with basic knowledge in economics, formulating systemic understanding of market economics relations, tendencies as well as practical skills, relevant for making and implementing economic decisions in their professional activities.		

Course description	During the couse of Economics is studied the theory of economics, the object, problems and goals of economics. The main topics of economics studies include: competition models and mechanism, conception of national product and calculation methods, fiscal and monetary policy, their aims and operation means, conception of inflation, kinds of inflation, evaluation of inflation, unemployment and employment policy, international economics and international economic links.

VVEIB17161	ECONOMICS OF HUMAN RESOURCE		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To prepare bachelors of economics who are able to know the processes of human resource economics from a systemic and dynamic point of view, to evaluate them and to anticipate the consequences of these phenomena at the organizational, economic sector, national and international level; to apply the knowledge and skills of human resource economics, applying them to the solution of socio-economic problems in practice, continuing studies and research in economics and related fields and multidisciplinary fields, creating favorable conditions for business creation and development, thus contributing to social, economic and technological development.		
Course description	The subject of human resource economics presents the system of human resource economics and reveals the significance of human resources in the economy.		

VVTVB22201	ENGINEERING PRINCIPLES		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To provide knowledge of engineering science and practice of the essence and significance, to assess the capacity of engineering facilities, products, processes, innovative development.		
Course description	Engineering Principles course presents Engineering science, practices and products (goods, services, processes, core, value, place of education and economic systems). All types of technologies and materials are discussed: High-technology engineering; traditional and renewable sources of energy and heat engineering, electrical, computer engineering; Modeling, design, construction of architecture, transportation. Environmental and land management, ecology, and other engineering processes; Engineering staff, management strategies, economic and managerial aspects, standards, quality, and reliability. Natural resources, water, raw materials, aggregates materials, metals, polymers, ceramics, composites, and other innovative materials, their classification, receiving, structure, properties, rational use, waste, ecological recovery.		

VVTVB17068	ENTERPRISE ORGANIZATION AND MANAGEMENT		6 ECTS
Lectures – 45 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	The objective of module is to provide fundamental theoretical and practical knowledge about the organization and management of enterprises, to develop systematic point of view of enterprise and its activity as a system.		
Course description	Introduction to organizations, external environment, interorganizational relationships, strategy, organization design and effectiveness, fundamentals of organization structure, organizational culture, innovation and change, decision making processes in organizations, manufacturing and service technologies, information technology, information for decision making and control, organization size, life cycle and downsizing.		

VVFRB19701	FINANCIAL ENGINEERING		3 ECTS
Lectures – 20 hours/semester	**Practical works –** 10 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To provide students with theoretical and practical knowledge on the essence of the subject of financial engineering, its object and methods, to present derivative securities' application possibilities and to train students how to apply practically modern investment portfolio formation and management methods.		
Course description	The subject of financial engineering analyses the theory of finance, activity of financial system, financial behaviour and investment management. Knowledge of these fields is related to the analysis, evaluation and selection of investment instruments. A lot of attention is paid to derivative securities - forwards, futures, options and swaps. Their return and risk is determined, as assessment is made for the purpose of taking reasonable investment decisions. Quantitative and qualitative research methods are used for taking financial decisions with regard to risk and uncertainty. Students get to know contemporary investment portfolio formation models, methods and theories and learn how to form and manage investment portfolio.		

VVTEB16502	FINANCIAL LAW		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To introduse the students with the theoretical and praktical knowledges about the scope of fanance law, influence to companies management, dispute finance law system and the institutes of finance law; Evaluate conflicts of finance legal regulation relations and liability; Provide evaluation and analysis of public finance problems and decisions taking. To know fundamentals of finance law, To analyze problems of finance law.		

Course description	Finance law subject consist of regulation finance law and financial legal relations at the law system. Scope of public finance, budget law and the process of the budget. State budget legal regulation of income and expenses. Fundamentals of admninistration of the tax and tax law system, liability for violation of tax law. Fianancial control, monetary and securities law.

VVEIB17022	FUNDAMENTALS OF EU STUDIES		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	The module aims at training professionals capable to comprehensively understand and analyze the ongoing processes of social and economic development, culture, science and technological development within the EU.		
Course description	Essentials of the EU studies examines the concept of EU and the studies of EU, the reflections of EU creation, evolution and development on science, the historical and political background of the EU origination, integration processes in Europe, their history; the EU as an international inter-state organization, the stages of the EU construction, the issues ;the EU as a social, economic and cultural space, the current issues, trends and challenges of EU formation and processes of development and expansion, the regions of EU; political, legal, economic systems characteristic to EU countries, cultures within the EU, and EU institutions and their functions; priorities adequate for the studies of EU development and enlargement processes.		

VVTEB16203	FUNDAMENTALS OF LAW		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To indoctrinate students with the fundamentals of law, with system of law and order, the basic legal acts.		
Course description	Description of law fundamentals: source of the law, legal relations, breach of the law and legal responsibility, efficiency of the law, legal culture, structure of legal regulation, lawful behaviour, validity of the law, gaps of the law, its elimination.		

VVTEB16702	INFORMATICS LAW		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To introduce students with informatics law and its regulation peculiarities.		

Course description	Informatics Law module analyzes general Law aspects of information technology and individual Law ranges (electronic business, electronic information, intellectual property, privacy and person's information protection in electronic space, electronic crimes and etc.).

VVFRB17705	INVESTMENT MANAGEMENT		3 ECTS
Lectures – 20 hours/semester	**Practical works –** 10 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To examine the main and most important investment management theoretical aspects, which should be based on empirical research. To provide basic investment management methods. To acquaint students with the management of investment portfolios and its processes, forming the ability to analyze the market situation, reasons and factors of financial instruments historical price changes. To teach students to take control of investment decisions.		
Course description	In the studies of investment management subject the investment concept and the main purposes of investment management are analysed. The place of investment management in financial management. The main areas of investment management are analysed: stock portfolio management, portfolio management of cash, bond and derivatives, the analysis of investment environment, the uncertainty of markets, risk management methods.		

VVTEB16112	LAW		3 ECTS
Lectures – 30 hours/semester	**Practical works –** N/A	**Consultations –** 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To indoctrinate students with the fundamentals of law, with system of law and order, the basic legal acts.		
Course description	Description of law fundamentals: Source of the law, legal relations, breach of the law and legal responsibility, efficiency of the law, legal culture, structure of legal regulation, lawful behaviour, validity of the law, gaps of the law, its elimination.		

VVEIB17186	MACROECONOMICS		6 ECTS
Lectures – 30 hours/semester	**Practical works –** 30 hours/semester	**Consultations –** 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To provide students with the basic knowledge in macroeconomics and teach to apply skills in the practice.		

Course description	During the course of Macroeconomics the following issues are analysed: national product, its structure and volume; aggregated supply, aggregated demand and factors influencing them; recession, inflationary phase and business cycles; fiscal and monetary policy and tools and measures for their implementation; unemployment and inflation; economic growth, international trade and its policy.

VVVKB17164	MANAGEMENT		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work -** 33 hours/semester
Course aim	To form basis of methodological knowledge of the base of theoretical knowledge of management and educate capabilities ofprofessional critical, systematic, constructive thinking.		
Course description	During the course the following topics are covered: essence of management, basic concepts and their interpretations, evolutionof management theories, cyber management model: subject and object of management. There are analysed organization as asystem (systemic view application), types of organizations, elements and environment of organization, establishment oforganizations and organization' management types of structures. Also there are analysed functions of management: planning,organizing, leadership and controlling, administrative and economic as well as psychological methods of management, managerrole in the system of organization management management' decisions' preparation and adoption of principles, its process, payfor work and motivation. There are disputed change and conflict management.		

VVVKB17170	MANAGEMENT		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work -** 33 hours/semester
Course aim	To acquire systematic understanding of management logics, to apply management methods to professional activities bysolving environment security issues.		
Course description	During the course the following topics are covered: essence of management, basic concepts and their interpretations,evolution of management, object and subject of management, environment and elements of organization, establishment oforganizations, cycle of management decisions and its phases, economic and psychological as well as administrativemethods of management. Also there are analysed functions of management - planning, organizing, motivation, controllingand regulation; strategy and its implementation plan creation, designing and adapting management structures, leadership,horizontal and vertical communication, assessment of employees, pay for work and motivation.		

VVFRB16504	MANAGEMENT ACCOUNTING		6 ECTS
Lectures – 30 hours/semester	**Practical works –** 30 hours/semester	**Consultations –** 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To acquaint students with the role of accounting information management system, to explain the essence of management accounting and accounting relations with other types of management system development and application of the mechanism introduced to the classification of expenditure and accounting, to provide production cost calculation methods, cost analysis and control systems examined costs-volume-profit analysis techniques and the use of marginal analysis theory and practical application.		
Course description	Accounting information in management system. The essence of management accounting and accounting relations with other species. Management system development and application. Classification of expenditure and there accounting. Production cost calculation methods. Cost analysis and management systems. Cost-volume-profit analysis methods and their application. The limit analysis theory and practical use. Budgets and estimates. Management accounting information targeted use.		

VVVKB17030	MANAGEMENT PSYCHOLOGY		3 ECTS
Lectures – 20 hours/semester	**Practical works –** 10 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	Provide graduates with specializations in individual exceptional subject knowledge and the development of cognitive, practical and carry-over business organisation and management skills, both institutionally organised and individual businesses, allowing businesses to become professional managers who know and that understand the external and internal business and business environment factors and their assessment of the accounting and management techniques.		
Course description	Management psychology as a behavioral sciences examine the management and leadership theories and their practical application techniques and methods. Management Psychology Studies provides the knowledge and practical skills needed to understand and explain the different levels manager's roles and functions in the organization. Students examine management psychology science peculiarities, leadership problems, manager's psychology peculiarities, motivation theories, conflict and change management techniques, management psychology specifics in various business and public management areas. Given knowledge and raised skills allows becoming professional business managers, who know and understands the internal and external business and enterprise environmental factors and their assessment and management methods.		

VVVKB17031	MARKETING		3 ECTS
Lectures – 15 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 48 hours/semester

Course aim	To deliver to the students the knowledge and practical skills about marketing activity, strategic and tactical decisions, used forproduct sales in local and international markets.
Course description	During marketing course holistic marketing concept and main elements are analysed. For students variety of marketing objects ispresented. Main marketing concepts: needs, wants and demands are presented. In the course main strategic marketing elementsand marketing information systems are introduced. In the course external and internal marketing environment is analysed andpractical analytical tools (PESTEL, SWOT, Boston Consulting Group matrix, etc.) are presented. Also main marketing researchmethods and tools are discussed. For students marketing planning process and marketing plan are introduced. During the coursemain product concept, product level, service marketing is discussed. Main pricing strategies for marketing of products arepresented. Also distribution channels and their selection process is discussed. Students are introduced to promotion strategiesand integrated marketing communication. New communication trends and innovative internet tools and media are presented.

VVVKB17033	MARKETING		6 ECTS
Lectures – 30 hours/semester	**Practical works –** 30 hours/semester	**Consultations –** 4 hours/semester	**Individual work -** 96 hours/semester
Course aim	To deliver to the students the knowledge and practical skills about marketing activity, strategic and tactical decisions, used forproduct sales in local and international markets.		
Course description	During marketing course holistic marketing concept and main elements are analysed. For students variety of marketing objects ispresented. Main marketing concepts: needs, wants and demands are presented. In the course main strategic marketing elementsand marketing information systems are introduced. In the course external and internal marketing environment is analysed andpractical analytical tools (PESTEL, SWOT, Boston Consulting Group matrix, etc.) are presented. Also main marketing researchmethods and tools are discussed. For students marketing planning process and marketing plan are introduced. During the coursemain product concept, product level, service marketing is discussed. Main pricing strategies for marketing of products arepresented. Also distribution channels and their selection process is discussed. Students are introduced to promotion strategiesand integrated marketing communication. New communication trends and innovative internet tools and media are presented.		

VVEIB17117	MICROECONOMICS		6 ECTS
Lectures – 30 hours/semester	**Practical works –** 30 hours/semester	**Consultations –** 4 hours/semester	**Individual work -** 96 hours/semester

Course aim	Develop an economic way of thinking: the micro-economic laws and their perception of performance, the ability to analyze and assess the various economic entities operating conditions, mechanisms and influencing environment, to apply the acquired knowledge into practice.
Course description	Microeconomics course examines households, businesses, industries and other independent decision-making activities of economic entities in the various economic systems and market structures, resources and income distribution problems, ie, allocations of scarce resources to meet the alternative, competing public and business needs.

VVFRB17704	PERSONAL FINANCE		3 ECTS
Lectures – 20 hours/semester	**Practical works –** 10 hours/semester	**Consultations –** 2 hours/semester	**Individual work -** 48 hours/semester
Course aim	To introduce the students the importance of individuals'/families' finance management. To give the necessary knowledge about personal finance management principles and methods, saving, investment, borrowing possibilities and instruments.		
Course description	The course analysis theory of personal finance, investments and its implementation for individual (family) for decision making in such areas as consumption, saving and borrowing, investments, pension planning, insurance services, purchasing of estate and tax planning. Explanation of family budgeting, balance sheet and cash flow accounts' arrangement and estimation, applying of these statements for motivation of financial decisions, assessment of personal financial status, individuals'/families' financial ratios, possible financial instruments for implementation of long and short term goals, consumption, saving, investment and borrowing decisions are analysed, investment strategy, creation and effective establishment of investment portfolio are studied, insurance services, importance of individuals' risk insurance are discussed, real estate planning and important tax problems for households are studied.		

VVFRB22501	PRICING		6 ECTS
Lectures – 30 hours/semester	**Practical works –** 30 hours/semester	**Consultations –** 4 hours/semester	**Individual work -** 96 hours/semester
Course aim	To provide theoretical and practical knowledge about modern methods of pricing, pricing strategies, the importance and the evaluation methods of the pricing factors in pursuance of price determination that would let the company to achieve its objectives. To provide the ability to recognize, analyse and evaluate pricing factors and to take economically-based strategic and tactical pricing decisions.		

Course description	Pricing discipline deals with an important instruments (e.g. pricing strategies and methods, data collection, quantitative and qualitative data processing methods, computer technology for addressing pricing issues) and pricing factors (e.g. customers, competitors, the organization's scope and cost, ethics, and laws) which are used in decision making process for economically efficient pricing. It focuses on their evaluation particularities, what by constantly changing, but specific market conditions would enable to maximize the value of the organization focusing on the sustainable development.

VVTVB17183	PRODUCTION TECHNOLOGY AND MANAGEMENT (WITH COURSE WORK)		6 ECTS
Lectures – 30 hours/semester	**Practical works –** 30 hours/semester	**Consultations –** 4 hours/semester	**Individual work -** 96 hours/semester
Course aim	To prepare Bachelors who would have integrated knowledge of business logistics and knowledge related to other professionalactivity and be able to apply general and special abilities of business planning, organising, coordination and implementation in theprivate and public sector and to use them constructively in wide range of professional activity, to create and develop business, tobe prepared for constant improvement through lifelong learning.		
Course description	There is analysed the nowadays conception of production technologies and management. The place of new technologies inbusiness process. The main production technologies are analysed.		

VVTVB17271	PROJECT PREPARATION AND EVALUATION		3 ECTS
Lectures – 15 hours/semester	**Practical works –** 30 hours/semester	**Consultations –** 2 hours/semester	**Individual work -** 33 hours/semester
Course aim	To provide theoretical and practical knowledge about business and investment projects, their concepts, classification, the variety of project life cycles, the peculiarities of jobs performed in separate project phases, project research performance methodologies, their application peculiarities for separate business projects, to provide knowledge on project research conducting, investment and production cost estimation, evaluation of particular project with regard to financial and other aspects.		
Course description	This subject analyses business and investment projects, their types, project life-cycles, job peculiarities performed in the separate phases of the project, project research (feasibility study) performance methodologies. The order of project research performance is analysed in details, discussing the jobs necessary to perform in every department in order to implement the project, as well as the resources required for these jobs. The sequence of project financial analysis performance is investigated, as well as financial, economic, social and efficiency indicators, risk and uncertainty analysis, risk evaluation methods and ways of risk diminishing.		

VVEIB17281	QUANTITATIVE METHODS FOR DECISION MAKING		6 ECTS
Lectures – 45 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To prepare Bachelors of Business Management who would have integrated knowledge of business management and knowledge related to other professional activity and be able to apply general and special abilities of business planning, organising, coordination and implementation in the private and public sector and to use them constructively in wide range of professional activity, to create and develop business, to be prepared for constant improvement through lifelong learning.		
Course description	The process of managerial decision making, qualitative and quantitative methods. Practice of correlation regression analysis in social science, interpretation of the results. Forecasting and planning in enterprise, methods of forecasting, their accuracy and reliability. Practice of operation research models application in economy and management. Linear programming. Theory of duality, usage shadow prices making managerial decisions. Transport type models and their peculiarities. Integer programming models, investment planning, planning of the production capability development, assignment problems. Multicriteria methods for alternatives evaluation.		

VVEIB20301	QUANTITATIVE MODELLING METHODS		6 ECTS
Lectures – 45 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	The purpose is training the students to practice quantitative methods making decisions in economics.		
Course description	Sources of statistical information; statistics organization and principles of operating; stages and methods of statistical research. Statistical analysis and evaluation of economic indicators: calculation of average, devotion from the average and etc. Identification and interpretation relationships between economic factors using correlation-regression analysis. Forecasting in enterprise: methods, accuracy and reliability. Practice of operation research models application in economics. Production with constrains resources. Linear programming models. Theory of duality, usage shadow prices for sensibility analysis in production planning. Integer programming models, investment planning, planning of the production capability development, assignment problems. Multicriteria methods for alternatives evaluation.		

VVVKB17105	STRATEGIC MANAGEMENT		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work** - 33 hours/semester

Course aim	To provide a theoretical background of strategic management and comprehensive understanding of the strategic managementprocess. To highlight the knowledge, skills, and resources that will most assist the general manager in making effective decisionsand undertaking successful actions. To develop practical skills of strategic management.
Course description	Taking into account the peculiarities of contemporary business strategies and analyzing international business experience, thestudents are acquainted with the main models and tools of strategic management; the role of leadership is discussed; theproblems of resistance to strategic change are highlighted; the tools which allow to overcome these problems and successfullyimplement business strategy are presented.

VVTVB17180	TOTAL QUALITY MANAGEMENT		3 ECTS
Lectures – 30 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 2 hours/semester	**Individual work -** 33 hours/semester
Course aim	To introduce students with the most widely applied quality management systems and methods in the EU, making the ability toanalyze the impact of quality management system (QMS) functions to various institutions to optimize the profile and to applyquality management techniques to address the quality problems and to find the solutions for continuous improvement activity.		
Course description	Course present the analysis of quality definition, quality evolution, quality place in society and organization in XXI century, thecontemporary quality management concepts, principles and aims, present quality management functions and their relationship,the quality management system implementation to seeking the organization effectiveness.		

VVVKM17060	INTERNATIONAL MARKETING AND COMMUNICATION (WITH COURSE PROJECT)		6 ECTS
Lectures – 20 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 10 hours/semester	**Individual work -** 115 hours/semester
Course aim	Theoretical knowledge and practical skills for self-sufficient work and activities in the area of the international marketing and communication.		
Course description	During the subject "International marketing and communication" students will be introduced to peculiarities, organization and theories of the international marketing and communication as well as to strategies of the international marketing and communication and their training methodologies. Students will understand, how to prepare strategies of the international marketing and communication and implement them, will analyse, how to accomplish marketing and communication researches in international markets, will analyse the complex of the international marketing and communication, peculiarities of its structure and its possibilities of international usage.		

VVVKM20300	LEADERSHIP IN ORGANIZATIONS (WITH COURSE PROJECT)		6 ECTS
Lectures – 20 hours/semester	**Practical works –** 15 hours/semester	**Consultations –** 10 hours/semester	**Individual work -** 115 hours/semester
Course aim	To provide students with theoretical knowledge for understanding leadership in the organization, to develop the ability to conceptualize and solve issues related to leadership in the organization, independently select, analyse and synthesize research data and promote the disclose and realization of the leadership potential.		
Course description	This course provides knowledge of leadership in organization and develops the skills to understand and describe the goals of leadership in organization, identify the leadership situation in organization, the impact of situations on leadership, leadership types and styles, be able to manage teams and work in management teams.		

VVVKM17283	MANAGEMENT THEORY		6 ECTS
Lectures – 20 hours/semester	**Practical works –** 20 hours/semester	**Consultations –** 10 hours/semester	**Individual work -** 110 hours/semester
Course aim	To master methodological principles of management and educate abilities to apply management theory for solving effectivelyproblems of modern complex business.		
Course description	The course of the management theory analyses the essence of the management theory, classification and evolution of theoriesand methods, modern interpretation. Interpretation from standpoint of theory of systems of various research objects. Quantitativeand qualitative methods of management decision making. Economic management methods and specifics of their application.Psychological management methods and their role. Administrative management methods and specifics of their application. Legalenvironment of management. Complex application of management methods. Management decisions support systems.Management decisions in the environment of informative society. Application of management theory in various areas of activity.		

VVEIM17401	METHODOLOGY OF SCIENTIFIC RESEARCH		6 ECTS
Lectures – 20 hours/semester	**Practical works –** 20 hours/semester	**Consultations –** 10 hours/semester	**Individual work -** 110 hours/semester
Course aim	To apply knowledge of economy and management to form, evaluate and make independently with systemic, critical and constructive thinking effective business management decisions, based on scientific argumentation under uncertainty conditions, assimilate scientific provisions of quantitative and qualitative recognition and interaction efficiency and their dependence on variety of conditions, to be ready for self-improvement through lifelong learning.		

Course description	Course presents the conception of science and scientific researches, stages of scientific research, principles of research planning and organization, methods of quantitative and qualitative research, data collection and processing, principles of scientific research report preparation.

VVVKM21101	MODERN ORGANIZATION MANAGEMENT		9 ECTS
Lectures – 16 hours/semester	**Practical works –** 16 hours/semester	**Consultations –** 8 hours/semester	**Individual work** - 200 hours/semester
Course aim	To provide the latest knowledge of management theory and develop the ability to apply it, to deal effectively with the practical problems of a modern complex business.		
Course description	Modern organization management course is focused on the peculiarities of modern organization management and the possibilities of applying the latest management theories. The interpretation of organizations as research objects for systems theory, the diversity of modern organizations and their management problems, the classification of management methods, are analysed. The effectiveness of organizations, i.e., planning, organization and control, are explored. Leadership in modern organizations and decision-making, quantitative decision-making methods are also discussed.		

VVVKM21103	ORGANIZATIONAL BEHAVIOR AND LEADERSHIP		9 ECTS
Lectures – 16 hours/semester	**Practical works –** 16 hours/semester	**Consultations –** 8 hours/semester	**Individual work** - 200 hours/semester
Course aim	To to provide theoretical knowledge focused on the perception of organizational behaviour and to develop skills, which let conceptualize and solve problematic issues of work-related human behaviour; to train students to apply analytical tools relevant for analysis and development of organizational behaviour models.		
Course description	This course provides knowledge in the field of organizational behaviour and develops skills required to assess and predict work-related human behaviour in the organization, to understand and describe organizational behaviour objectives, to identify factors impacting activities of teams and groups, to identify and apply appropriate behaviour strategies in conflicts, to understand and properly address issues of organizational culture development.		

VVEIM17108	QUANTITATIVE AND EXPERT SOLUTION METHODS		6 ECTS
Lectures – 20 hours/semester	**Practical works –** 20 hours/semester	**Consultations –** 10 hours/semester	**Individual work** - 110 hours/semester

Course aim	To form the system of theoretical knowledge, which enables to make the multiple criteria analysis of processes and entitiesof various social and economic sectors. To teach students to perform empirical analysis of economic processes in various sectors of economy and entities, to maketheir evaluation by various multiple criteria evaluation methods. To teach students how to interpret and generalise results of multiple criteria evaluation by using theoretical knowledge of economics.
Course description	The course "Quantitative Expert Solution Methods" is devoted to methods designed for both analysing complex socioeconomic processes, and for evaluation of influence of values of criteria of different formats on a chosen characteristic of such processes. Skills enabling students to make analysis of processes and entities of various social and economical sectors, to create mathematical models of such processes, to make quantitative evaluation of characteristics of a process, to use software are delivered to students.

VVVKM21102	STRATEGIC ANALYSIS OF BUSINESS		9 ECTS
Lectures – 16 hours/semester	**Practical works –** 16 hours/semester	**Consultations –** 8 hours/semester	**Individual work -** 200 hours/semester
Course aim	To provide knowledge about the principles of postmodern organizational development management and at the same time the ability to adapt the basic schemes of strategic business analysis, the results of which are oriented to reasonably prepare and adopt effective planning decisions and action programs for their implementation.		
Course description	The course of business strategic analysis examines the strategic business situation in the global context of opportunities and threats created by the external environment, details and prioritizes business environment factors and identifies key strategic capabilities, updates goals and expectations, develops corporations, business unit level strategies. Taking into account the postmodern principles of strategy formation and analyzing and evaluating relevant good practice, students adapt the main models and methods of solving strategic management tasks, reveal the role of leadership strategists. The course identifies the factors influencing the selection of the optimal strategy, solutions and tools that enable the successful implementation of the chosen strategy.		

CIVIL ENGINEERING FACULTY

STGGB17189	BASICS OF SOIL MECHANICS	3 ECTS
Lectures – 20 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 10 hours/semester	**Individual work** - 48 hours/semester	

Course aim	An understanding of essentials of soil mechanics.
Course description	Basic characteristics of soils. Effective stress. Pore pressure. Shear strenght. Failure Criteria. Stresses and displacements. Lateralearth pressure. Consolidation theory. Bearing capacity. Stability of slopes. Earth pressure.

STGGB17271	BUILDING ARCHITECTURE AND STRUCTURES	6 ECTS
Lectures – 60 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** - 96 hours/semester	
Course aim	To provide knowledge about the spatial and constructional structure of various buildings and structural systems.	
Course description	Spatial and constructional structure of buildings, classification, elements and their interaction. Low-rise and multi-storybuildings: foundations, walls, ceilings, floors, stairs, roofs. Structural systems of frameworks, large spacious and high-risebuildings and their elements, structural solutions.	

STGGB17272	BUILDING ARCHITECTURE AND STRUCTURES (COURSE WORK)	3 ECTS
Lectures –N/A	**Practical works** – 30 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** - 48 hours/semester	
Course aim	Architectural plan and structural design of a building.	
Course description	Architectural plan and structural designs: foundtions, walls, slabs, beams and lintels, roof and other structures. Graphicalexecution of plans, sections, detals and junctions. Preparation of explanatory note.	

STVNB17063	CONSTRUCTION ECONOMICS	3 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 6 hours/semester
Laboratory works – N/A	**Individual work** - 29 hours/semester	

Course aim	The aim of the course is to introduce students to the theory and methods of construction economics, to provide sufficient thinking andpractical skills needed to analyze the activities and projects of construction companies from an economic point of view.
Course description	The course introduces construction economics in the context of macro and micro environment. It includes topics on the characteristics ofconstruction sector, the significance of construction in the national economy system, the operating environment of the constructionindustry, the characteristics of the construction market, the patterns of demand and supply, construction globalization, the operatingeconomy of construction companies (sources of financing, income, costs, economic profit and its maximization, competition and pricing).The theory and methodology of the subject are mastered during lectures, by studying professional literature and interactive sources.Special and general skills are developed during practical works and by preparation of homeworks that include development of buildingproject idea, market analysis, financial estimates, determination of market value and estimated profit.

STTMB17107	DYNAMICS AND STABILITY OF BUILDINGS	3 ECTS
Lectures – 20 hours/semester	**Practical works** – 10 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** - 48 hours/semester	
Course aim	To learn analysis and design of civil structures subjected to dynamic loads. Acquire fundamentals of elastic stability of buildings. Learn how to perform static, dynamic and buckling numerical analysis of structural systems.	
Course description	First part of the course covers fundamentals of free and forced vibration of bar type structures. Students learn simple SDOF and more generalized MDOF system modal analysis. Multiple different structures are analyzed numerically using student created code and commercial software. Second part of the course covers fundamentals of elastic stability of building structures. Analysis is based on finite element method and solutions of eigenvalue problems. Prerequisites: This course is recommended to third-fourth year bachelor students. To take this course student must have good knowledge of mechanics of materials, static structural analysis (internal force, displacement, stress calculations) and be able to write finite element code for plane bar structures (2D frames, beams, trusses).	

STGSB17038	HUMAN'S SAFETY	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	

Course aim	To provide knowledge on occupational safety legislation and principles of occupational safety and health, environmental protection, ergonomics and civil protection.
Course description	Human safety conception, meaning and tasks. Management of work safety. Legal reglamentation of human safety. Riskmanagement. Occupational hygiene. Occupational stress and management. Ergonomics, general principles. Electrical safety.Lightning. Static electricity. Fire protection. Evacuation from buildings.

STGSB17049	HUMAN'S SAFETY	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	
Course aim	To provide knowledge on occupational safety legislation and principles of occupational safety and health, environmental protection, ergonomics and civil protection.	
Course description	Human safety conception, meaning and tasks. Management of work safety. Legal reglamentation of human safety. Riskmanagement. Occupational hygiene. Occupational stress and management. Ergonomics, general principles. Electrical safety.Lightning. Static electricity. Fire protection. Evacuation from buildings.	

STGSB17036	HUMAN'S SAFETY AND ENVIRONMENTAL PROTECTION	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	
Course aim	To provide knowledge on occupational safety legislation and principles of occupational safety and health, environmental protection, ergonomics and civil protection.	
Course description	Human safety conception, meaning and tasks. Management of work safety. Legal reglamentation of human safety. Man and environment. Atmosphere pollution and protection. Waters pollution and protection. Wastes. Risk management. Occupational hygiene. Occupational stress and management. Ergonomics, general principles. Electrical safety. Fire protection. Evacuation from buildings.	

STTMB17047	INTEGRAL MECHANICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** - 96 hours/semester	
Course aim	To acquire and assimilate knowledge about behaviour of mechanical objects under action of forces at known boundary and initialconditions. To understand main fundamental principles of statics and dynamics. To learn solving practical problems of mechanics.Introduce students to theoretical and practical principles of engineering methods for calculating strength and stiffness of structuralmembers under simple loading. Prepare students for further structures design studies.	
Course description	Object of integral mechanics. Equilibrium of particle and rigid body. Kinematics of particle and rigid body. Kinetics of particle andbody. Elasticity. Basic concepts and assumptions. Tension and compression. Geometrical properties of cross-sections.Mechanical properties of structural materials. Shearing. Torsion. Bending of beams. State of stresses and strains. Hypothesis ofstrength.	

STGGB17048	MASONRY AND COMPOSITE STRUCTURES	3 ECTS
Lectures – 20 hours/semester	**Practical works** – 20 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** - 38 hours/semester	
Course aim	To provide knowledge of masonry construction and the calculation of the safety limit state eligibilityrequirements of the construction of masonry structures, laminated stone computing and designfeatures.	
Course description	While studying the acquired knowledge and cross-laminated solid masonry bearing partitions andsolutions, the calculation method and limit state design, lintels and arches and beams design.	

STGSB17170	MATERIALS SCIENCE AND BUILDING MATERIALS	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	
Course aim	To give the knowledge about meaning of material knowledge, their structure, properties, basic investigations methods, practical use.	

Course description	Classification of materials according to the origin and structure. Material composition, structure and properties of the relationship. Materials selection and use. The main characteristics of building materials and their methods. Structural ceramics, glass and glassware. Binders. Concrete and mortar configurations, features and articles. Painting materials. Heat and sound insulating materials. Properties of wood and products from it. Properties of polymers and plastics in use.

STTMB17046	MECHANICS OF MATERIALS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 96 hours/semester	
Course aim	To give knowledge and acquaint with engineering methods for simple strength and stiffness problems.	
Course description	General principle, hypothesis, assumption, conception. Tension and compression. Geometrical properties of cross sections. Shear. Torsion. Bending. Fundamentals of stress-strain state. Compound stresses. Dynamic and cyclic loading. Understanding of buckling and cracking.	

STGGB17031	REINFORCED CONCRETE STRUCTURES 1	6 ECTS
Lectures – 45 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 81 hours/semester	
Course aim	To give knowledge about the behavior of concrete and reinforced concrete structures, to develop the ability to calculate the resistanceand to calculate the reinforcement of the concrete structures and to carry out the detailing of reinforced concrete structures.	
Course description	Knowledge about concrete and reinforcement strength and deformation characteristics, concrete and reinforcement behavior inreinforced concrete elements. It is taught to calculate the resistance of bending, tensile and compressive reinforced concretemembers. The ability to calculate the longitudinal and transverse reinforcement of reinforced concrete structures and to carry out thedetailing of reinforced concrete elements. A general understanding of the essence the pre-stressed concrete elements.	

STMEB17022	STEEL STRUCTURES 1	6 ECTS
Lectures – 45 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 81 hours/semester	
Course aim	Steel structure forming members and their connections to the design, according to European and international standards, thenecessary knowledge and skills to be granted. To develop abilities to apply that knowledge to update them on a permanent basis,taking into account the emerging structural design tools and techniques. Empowered with knowledge and skills must be the basis forbuilding and structural systems design skills to acquire.	
Course description	Module covers the first part of course for design of steel structures. Introduction into materials and assortment of steel products usedin manufacture of steel structures will be provided. Collecting and combining of loads will be presented in short. Basic knowledgesabout connection means and their behaviour and application are included in a module. Design procedures for simple structuralmembers - beams, columns and beam-columns - will be presented in this course. Theoretical knowledges will be solidifying onesduring laboratory and practical lectures.	

STTMB17103	STRUCTURAL MECHANICS AND FUNDAMENTALS OF ELASTICITY THEORY	6 ECTS
Lectures – 45 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** - 81 hours/semester	
Course aim	To teach fundamentals of structural design.	
Course description	Computational schemes of buildings. Their kinematical analysis. Design of elastic structures: frames, beams, trusses, arches, combined structures subjected by various loads and actions. Influence lines theory. Main theorems of structural mechanics. Determination of displacements. Calculation methods of statically indeterminate bar structures. Numerical analysis of structures. Theory of elastic body stresses. Equilibrium equations. Theory of strains. Physical equations. Mathematical models of elasticity theory problems. Two-dimensional problem of elasticity theory. Design of thin plates, assumptions. Geometrical equations. Internal forces of thin plates. Physical dependencies, equilibrium equations, boundary conditions.	

STMEB17037	TIMBER STRUCTURES	3 ECTS
Lectures – 20 hours/semester	**Practical works** – 10 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** - 48 hours/semester	

Course aim	To provide knowledge to students on the demands and understand principles of wood as a building material, buildings from the timberconstruction, the establishment of calculating schemes, the design and construction of timber elements and connections.
Course description	Capacity to of knowledge about the wood as a building material, timber in construction, solid sawn timber, wood-based panels, timberstrength grading and strength classes, timber durability, fire resistance, protection treatment, limit state design, timber joints, types ofconnections, construction of roof of house, log, timber frame and prefabricated houses, frames, arches, trusses, domes, their typesand calculations.

STGGM17137	DESIGN OF PRECAST AND PRESTRESSED REINFORCED CONCRETE STRUCTURES	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** - 195 hours/semester	
Course aim	Learn how to design the precast and prestressed concrete structures. Understand how to compose the frame systems forbuildings of the precast and prestressed concrete structures. Get information about joints of precast structures and of thesedesign.	
Course description	Essence of precast and prestressed reinforced concrete structures, their advantages, types and areas of use. Technological-structural peculiarities of prestressed concrete. Analysis and design of linear, plane structures and frames consisting of thesestructures. Analysis and design of joints, nodes and stability diaphragms. General information about precast and prestressed structures of other purposes, peculiarities of their design.	

STGSM17122	FUNDAMENTALS OF RESEARCH AND INNOVATION	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – N/A
Laboratory works – N/A	**Individual work** - 50 hours/semester	
Course aim	The course aims to provide students with the knowledge and skills necessary for research and innovation development.	

Course description	Aims, tasks and the main methods of scientific research and innovations in the field of civil engineering. Development of innovation processes and commercial implementation of innovations. Protection of intellectual property. An application of mathematical modelling and experimental research to solving problems of civil engineering. Methods of data mining and data processing. The role of statistics and probability calculus in the process of scientific research. Methods of design of experiments, operational research methods, statistical quality control methods. Methods used for assessing the reliability of construction objects. Methods applied to estimation and management of risk posed by industrial objects. Methods of group creativity.

STGGM17115	MODELLING AND COMPUTER ANALYSIS OF STRUCTURE (WITH COURSE PROJECT)	9 ECTS
Lectures – 15 hours/semester	**Practical works** – N/A	**Consultations** – N/A
Laboratory works – 45 hours/semester	**Individual work** - 180 hours/semester	
Course aim	Fundamentals for the computer-added design and analysis of the structures by using the finite element method.	
Course description	Fundamentals of the finite element method. Evaluation for the static and dynamic loads and actions. Preparation of initial data, analysis process and interpretation of the obtained results for the continuum and frame structures.	

STMEM17071	NONLINEAR ANALYSIS AND DESIGN OF STEEL STRUCTURES	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** - 115 hours/semester	
Course aim	Understanding of geometrically and physically nonlinear calculations procedures and theoretical background of design of structural steel elements. Ability to calculate and perform design of steel elements taking into account nonlinearities and actual behavior of the joints.	
Course description	Introduction to the subject of the topic. Global introduction of nonlinear calculation of steel structures. Analysis of beam-column elements. Nonlinear (stability, geometrical and physical) analysis of steel frame structures. Modelling of steel joints. Analysis of steel frame taking into account flexibility of the joints. Analysis and design of Steel frames evaluating geometric and physical non-linearity and flexibility of the Joints according to the Eurocode 3 and Lithuanian design standards.	

STGGM17117	REINFORCED CONCRETE THIN-WALLED SPATIAL STRUCTURES	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** - 195 hours/semester	
Course aim	Provide information about practical analysis of reinforced concrete thin-walled spatial structures.	
Course description	Diversity, application areas and development review of thin-walled spatial structures. General principles of design andconstruction of thin-walled spatial structures. Practical methods of analysis and detailing of shallow shells of double curvature,cylindrical shells and prismatic folded plates, shells of revolution, suspension and cable-stayed structures.	

STMEM17122	STABILITY OF STEEL STRUCTURES	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** - 115 hours/semester	
Course aim	To provide high-quality knowledge and necessary skills for solving the theoretical, analytical and design tasks of steel structure stability.	
Course description	The course is dedicated to the introduction of the fundamental steel structural stability verification principles and requirements stated in European design standards. The course covers the general design methods as well as mathematical models used for the stability verification and applied in the commercial structural analysis software. The course details the simplified design methods presented in European standards. By using nonlinear structural analysis software as the basis for a virtual laboratory, students will explore and learn the fundamentals of structural stability.	

CREATIVE INDUSTRIES FACULTY

KIFSB18302	CREATIVE WRITING		3 ECTS
Lectures – 4 hours/semester	**Practical works** – 4 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 70 hours/semester
Course aim	The course is intended to introduce students to the most famous schools of contemporary literature, to their representatives, as well to their works and develop the skills of literary creation in different genres.		

Course description	The course presents the most famous tendencies in the contemporary literature and develops the skills of creative writing, of press release, as well of copywriting.

KIFSB17128	ETHICS		3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	Acquaint with philosophical ethics and fundamental ethical problems and concepts. Transmit a knowledge of ethical foundations, principles and systems. Foster critical judgement and the capacity for logical, reasoned discussion. Encourage a sense of values.		
Course description	Students learn about basic ethical schools and systems, fundamental issues of deontological and teleological ethic. Historical developement of ethical thought, periods such as Early Asian, Greece and Romain, medievvial, Reneissance, New Age and modernism. The main ethical issues are discussed: good and evil, principle of morality and free will, person as a goal in itself, notion of dignity, conscience, norm and morality, grounding morals in athority and discourse, notion of virtue, happiness and meaning of life and etc. Analyzed texts and philosophic al arguments os themost significant scholars of the field (Plato, Aristotle, Kant).		

KIFSA17006	LOGIC		3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	Raise a culture of thinking and the ability to automate the logic of technical knowledge and they can be applied in practice of economics engineering.		
Course description	The course covers the studies of thinking from the point of view of their structure and form (statements, concepts, reasoning and arguments). There are some elements of mathematical logic provided. Theoretical presentation is aimed at most at practical thinking problems that demand everyday training for formal logical thinking, ability to model, discuss, draw generalizations and conclusions, make decisions.		

KIFSB17127	LOGIC		3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	Raise a culture of thinking and the ability to automate the logic of technical knowledge and they can be applied in practice of economics engineering.		

Course description	The course covers the studies of thinking from the point of view of their structure and form (statements, concepts, reasoning and arguments). There are some elements of mathematical logic provided. Theoretical presentation is aimed at most at practical thinking problems that demand everyday training for formal logical thinking, ability to model, discuss, draw generalizations and conclusions, make decisions.

KIFSB17146	PHILOSOPHY OF TECHNOLOGY		3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To reveal the main problems of philosophy of technology and to cultivate the skills for good orientation in the flow of contemporary technogenic dynamics.		
Course description	The course provides the concept of technology and the overview of the characteristics of its development. Students are introduced to the sources of the philosophy of technology as a discipline, to the specific features of its emergence and further development. The course provides the most important periods of history of technology, in order to highlight the essential dependency between the development of technology, its concept and the changing of the attitude to technology. Students are introduced to the most famous theories of technology, developed by such authors as E. Kapp, F. Dessauer, J. Jaspers, M. Heidegger, J. Ellul, H. Skolimowsky, D. Bell, E. Toffler, A. Huning, H. Schelsky, G. Ropohl, H. Lenk, F. Rapp. Technology is analysed and interpreted from ontological, epistemological, anthropological, axiological thinking perspective. The course discusses the main challenges to human beings, it also examines actual problems of technology.		

KIFSA17209	SOCIOLOGY		3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To introduce the knowledge about social reality, to help to understand a sociological view towards society, it's structure and processes, which influence individual's socialization, people inter- relations, social action and collaboration.		
Course description	The course analyzes the subject of sociology, methods, laws' structure, its categories and position among humanitarian disciplines. Special attention is paid to the development of a social process, its standards and emerging peculiarities. The course also presents relation between sociological theory and research.		

KIKOB17050	BUSINESS COMMUNICATION		6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 96 hours/semester

Course aim	Students acquire knowlege in business communication and are able to apply it in practice.
Course description	The course on Business Communication (BC) consists of two parts: theoretical and practical. Students get acquainted with fundamental concepts and features of BC that influence communication efficiency, communication barriers, ways of eliminating them, means and ways to make communication more efficient, to address, analyse and critically assess different issues of ineffective communication, solve them in a rational way by verbal and nonverbal means in different communicative situations: during meetings, discussions, debates, public speaking, group work, employment interviews, conflicts. Practical tasks are individual and group:, meetings, negotiations, job application supporting documents employment interviews, field research, etc.

KIPIB18508	AUDIOVISUAL PROJECTS		6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	The student will know and understand how to manage and create visual messages in video format and how to effectively prepare and present Business presentation for the target audience. Students will also have to create a creative work - is based on a complete visual narrative, which is dedicated to a particular target audience.		
Course description	Students will become familiar with the common history and film genres, film production bases. They will write creative script of the chosen film genre. To advance their knowledge and prepare for the actual creative process, select customers and will create a film project, doing his presentation.		

KIKOB17052	CREATIVE BUSINESS		6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To provide integrated system of theoretical and practical knowledge of entrepreneurship fundamentals for creative industries, which would allow student to orient themselves better in national and international environment while incepting and developing business companies. Knowledge of entrepreneurship would let to solve urgent management and economic issues in order to maintain performance sustainability and efficiency of creative business companies.		

Course description	Entrepreneurship fundamentals for creative industries as learning subject provides possibility for students to obtain economic, managerial, and sociologic (theoretical and practical) knowledge about inception and development of enterprises. A wide spectrum of theoretical and practical approaches towards specifics of contemporary business: recognizing and evaluation new opportunities, designing business models, choosing financing sources and predicting modes of business closing. Various types of organizations, their alliances, business growth specifics in Europe and USA are being considered.

KIUSB18101	ENGLISH FOR CREATIVE COMMUNICATION		3 ECTS
Lectures – N/A	**Practical works** – 16 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 62 hours/semester
Course aim	To help students acquire and develop linguistic and professional communicative skills so that the future specialists are able to employ the acquired competences in practice, analyze information, and are proficient in communicating in spoken and written forms in daily, academic and professional activities.		
Course description	English for Creative Communication module is meant for students of Creative Industries, Entertainment Industry and Events Engineering with the English language competences corresponding to B1-B2 levels and seeking to acquire knowledge and abilities of B2 - C1 language knowledge level. Special and general abilities are educated based on the topics (communication, culture, intercultural communication, management, marketing, advertising) covered in the module. Communicative (reading, writing, listening and speaking), cognitive, general abilities are aimed at developing communicative skills in English in academic and professional contexts, both in speaking and writing.		

KIUSB17101	ENGLISH LANGUAGE		3 ECTS
Lectures – N/A	**Practical works** – 30 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To help students develop linguistic and communicative skills, acquire knowledge according to CEFR B2-C1 level in order to communicate spontaneously both in written and spoken forms on daily, cultural and professional topics.		
Course description	The course covers an important aspect of academic language study relevant to all subject areas. The aim of the course is toreach a high (B2-C1) level of English to study in an academic institution. The course is aimed at the first-cycle students with B1-B2 level of English. The integrated skills course will develop students' reading, writing, listening and speaking skills in anacademic context. It will enable students to prepare assignments, write a research paper in English.		

KIUSB18104	ENGLISH LANGUAGE FOR THE MEDIA		3 ECTS
Lectures – N/A	**Practical works** – 16 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 62 hours/semester
Course aim	To help students acquire and develop linguistic and professional communicative skills as well as relevant knowledge so that the future specialists are able to use their acquired competences and analyse information, communicate in spoken and written language in their everyday, academic and professional situations.		
Course description	The module English for the Media is targeted at the development of Creative Industries and Entertainment Industry students' C1 level of the English language competences, for further development of skills gained in the module Speciality English in both daily and professional situations. The course develops the independent user's language skills, professional vocabulary (through media topics), the correct technical and scientific language usage knowledge, abilities to analyse and summarize speciality literature, effective academic presentation skills.		

KIFSB17126	ETHICS		3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	Acquaint with philosophical ethics and fundamental ethical problems and concepts. Transmit a knowledge of ethical foundations, principles and systems. Foster critical judgement and the capacity for logical, reasoned discussion. Encourage a sense of values.		
Course description	Students learn about basic ethical schools and systems, fundamental issues of deontological and teleological ethic. Historical developement of ethical thought, periods such as Early Asian, Greece and Romain, medievvial, Reneissance, New Age and modernism. The main ethical issues are discussed: good and evil, principle of morality and free will, person as a goal in itself, notion of dignity, conscience, norm and morality, grounding morals in athority and discourse, notion of virtue, happiness and meaning of life and etc. Analyzed texts and philosophic al arguments os themost significant scholars of the field (Plato, Aristotle, Kant).		

KIPIB18505	FILM INDUSTRY		3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	Enable the students to be able to analyse and associate film industry phenomena with a wider field of cultural studies, to apply the acquired knowledge for the research of creative industries.		

Course description	The aim of the Course is detailed studies of the development of film industry from the emergence of cinema technology in the 19th century to the most important developments in contemporary film industry. Students will also get acquainted with the system of film industry, production, distribution and exhibition, will encourage students' critical attitude towards global film industry. After completing the course students will be able to analyze and evaluate film industry processes, to understand the principles of film industry and to see tendencies in its development.

KIKOB20101	INTRODUCTION TO THE SPECIALITY		3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To acquaint with the sector of creative industries, its activities and role in the development of modern society.		
Course description	The activities of the creative industries sector are analyzed, the strategies of communication, creative industries and their situation in the world market are introduced. The importance of creativity education in the social and economic development of the creative sector is discussed.		

KIKOB18501	JOURNALISM AND CONTENT STRATEGY		6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	Development of understanding in journalism' functions and purposes, according to development of modern society.		
Course description	Subject provides knowledge about the subject, which deals with public information and communications and the essence of the concept, presents the evolution of journalism, principles and functions. During the lectures, analyzes the content and dissemination of information and strategy, taking into account the mass media specifics. Contributes to understand media strategies and define competitiveness. Also - evaluate media communication and the communication efficiency.		

KILSB18001	LITHUANIAN LANGUAGE 1 (FOR FOREIGN STUDENTS)		3 ECTS
Lectures – N/A	**Practical works** – 32 hours/semester	**Consultations** – 5 hours/semester	**Individual work** - 43 hours/semester
Course aim	To develop a certain level of commucative competence in order to communicate properly Lithuanian language in certain areas of lifeand in formal and informal situations.		

Course description	Upon completion of the beginner's level of a Lithuanian language for foreigners, the international students must be able tocommunicate in everyday situations, where the spoken and written language is needed, where the problems with a commucativecharacter are faceed. They have sufficient understanding of a slow and clear speach, comprehension of the main idea of written texts,can speak clear, understandible, but simple language. At the beginner's level of the Lithuanian language for foreigners, persons mustbe able to interact in common or unusual situations when social or linguistic problems are faced.

KIFSB18301	MEDIA ETHICS		3 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	The aim of the course is to introduce the main theories of normative ethics, to study the influence of media on moral attitudes and to critically evaluate various ethical aspects of media.		
Course description	The course introduces the main systems of normative ethics (virtue ethics, utilitarianism, deontology) and media concepts. Various methods of conflict resolution and situation assessment are applied in the analysis of ethical problems and moral dilemmas arising in the field of media. Issues of media ethics are discussed on a personal, interpersonal and societal level. Is disccused how much the media strengthens and how much weakens our moral consciousness. As well is analyzsed media ethics reliationship with other applied ethics.		

KIKOB17054	MEDIA STUDIES (WITH COURSE WORK)		6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To acquaint students with the main issues and methodological perspectives of media studies, developing the understanding of the ways of initialization and organization of media projects - as well as the understanding of the functioning of media products in nowadays culture.		
Course description	A course consists of the analysis of basic concepts in Media Studies, the examination of the main methodological approaches to media studies and the discussion of actual theoretical and practical problems, concerned with the production and consumption of media culture. Special attention is paid to the case studies. In the framework of this course students get acquainted with Media schools (Frankfurt media school, Canada Media School), various authors and disciplines, in the context of which main problems of Media Studies were formed.		

KIPIB17070	MUSIC INDUSTRY		3 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 33 hours/semester

Course aim	The aim of the course is to present the pecularities of music industry, how music affects listeners and what are the technical possibilities and ways to develop a musical product.
Course description	The program is structured to review the phenomenon of music and reveal its place in the cultural and industrial context. The object of study is investigated in various aspects. The introductory part of the course overviews physical properties and organization principles of music, as well as music communication; it is examined how music reaches and affects the human mind. Regarding the technical aspects of music there are these specific issues distinguished in the development of a musical product: musical instruments, sound reinforcement, recording. A brief summary of the Western music history reveals how demographic, technological and social factors influence the development of music and music industry. Review on music bussiness includes artists' management, music publishing, music production and organization of concerts and festivals.

KIFSB17109	PHILOSOPHY		3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	The course is intended to introduce students to the basic problems of philosophy and to provide with skills for critical thinking.		
Course description	The course examines the origin of philosophy and the role of philosophy in the development of European cultural history. Course presents the topics of being, the nature of things and ideas, knowledge, the relationship between science and philosophy, the human place in cosmos, in a society and in the state. The main focus is placed upon antique philosophy and its subsequent interpretations.		

KIFSB17108	PHILOSOPHY		3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	The course is intended to introduce students to the basic problems of philosophy and to provide with skills for critical thinking.		
Course description	The course examines the origin of philosophy and the role of philosophy in the development of European cultural history. Course presents the topics of being, the nature of things and ideas, knowledge, the relationship between science and philosophy, the human place in cosmos, in a society and in the state. The main focus is placed upon antique philosophy and its subsequent interpretations.		

KIFSB22146	PHILOSOPHY OF TECHNOLOGY		3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester

Course aim	To reveal the main problems of philosophy of technology and to cultivate the skills for good orientation in the flow of contemporary technogenic dynamics.
Course description	The course provides the concept of technology and the overview of the characteristics of its development. Students are introduced to the sources of the philosophy of technology as a discipline, to the specific features of its emergence and further development. The course provides the most important periods of history of technology, in order to highlight the essential dependency between the development of technology, its concept and the changing of the attitude to technology. Students are introduced to the most famous theories of technology, developed by such authors as E. Kapp, F. Dessauer, J. Jaspers, M. Heidegger, J. Ellul, H. Skolimowsky, D. Bell, E. Toffler, A. Huning, H. Schelsky, G. Ropohl, H. Lenk, F. Rapp. Technology is analysed and interpreted from ontological, epistemological, anthropological, axiological thinking perspective. The course discusses the main challenges to human beings, it also examines actual problems of technology.

KIPIB20501	PHOTOGRAPHY STUDIES		6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	The aim of the course is to develop students creativity skills, develop visual vision and thinking, and develop skills to adapt photography and multimedia online, television, advertising, marketing communications and other creative and entertainment industry practices.		
Course description	Photography studios include contemporary photography and its role in the process of visual communication, the peculiarities of visual culture. The course introduces the history of photography, its types, variety and differences of means of photography expression; as well with the tools of new media, photography as artistic expression and their versatile application in professional entertainment industries and communication activities. The aim of the course is to explain the nature of photography and multimedia communications.		

KIKOB18201	POPULAR CULTURE STUDIES (WITH COURSE WORK)		6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 111 hours/semester
Course aim	Introduce to main concepts of communication of culture and its using to analyses of cultural texts		
Course description	Introduce the concept of popular culture and definitions in sociology of culture, cultural studies and semiotics. Clarify the links between popular culture, economics and social processes. Introduce and explain to the concept of culture in semiotics and structuralism; explain the tools of semiotic analysis and its application to analyses the popular culture as text and to communication of culture. Introduce students to audience classifications, and correlations between reading of cultural texts and audience attitudes and values (process of communication of culture).		

KIKOB18301	QUANTITATIVE RESEARCH (WITH COURSE WORK)		6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	To get knowledge and skills necessary for doing quantative research.		
Course description	Course creates possibility for students to get acquainted with theoretical presumptions of quantitative research methods, to find out purpose and specifics of quantitative research, to get acquainted with data collection in quantitative researches. Students perform quantitative research: prepare research programme, collect data and make data analysis. Students prepare research report - course-paper. Students have to demonstrate ability to choose appropriate research methods, to perform the research and to interpret and present research findings.		

KIPIB18303	SCRIPT WRITING		3 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 96 hours/semester
Course aim	Familiarize with the basics of creative screenplay writing and train to write creative screenplays for various creative projects. Train to model various life-situations using creative screenplay's techniques.		
Course description	Screenplay writing. Subject selection. Screenplay conceptual grounding. Foreseeing practical problems. Evaluation of technical solutions. Text presentation to a client. Modelling potential customer. Creative screenplay presentation. Analysis of climax situations and their solutions.		

KIKOB17210	SOCIOLOGY		6 ECTS
Lectures – 8 hours/semester	**Practical works** – 8 hours/semester	**Consultations** – 4 hours/semester	**Individual work** - 140 hours/semester
Course aim	To introduce the knowledge about social reality, to help to understand a sociological view towards society, it's structure and processes, which influence individual's socialization, people inter- relations, social action and collaboration.		
Course description	The course analyzes the subject of sociology, methods, laws' structure, its categories and position among humanitarian disciplines. Special attention is paid to the development of a social process, its standards and emerging peculiarities. The course also presents relation between sociological theory and research.		

KIUSB17098	SPECIALITY ENGLISH LANGUAGE 1		3 ECTS
Lectures – N/A	**Practical works** – 45 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To help students acquire and develop linguistic and professional communicative skills as well as relevant knowledge so that the future specialists are able to use their acquired competences and analyse information, communicate in spoken and written language in their everyday, academic and Professional situations.		
Course description	The course is targeted at students of Business Management Faculty with a B1-B2 level of the English language knowledge and skills, and who seek to gain professional language skills to communicate more effectively in English in daily and in Professional situation on topics covered in the list. During the course, students develop the independent user's (B) language skills: reception (listening and reading comprehension), production and interaction (speaking and writing), and mediation (translation). Students also master basic professional vocabulary, gain knowledge of the correct technical and scientific language usage, develop skills in analysing the speciality literature.		

KIUSB17170	SPECIALITY ENGLISH LANGUAGE 2		3 ECTS
Lectures – N/A	**Practical works** – 45 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 33 hours/semester
Course aim	To help students acquire and develop linguistic and professional communicative skills as well as relevant knowledge so that the future specialists are able to use their acquired competences and analyse information, communicate in spoken and written language in their everyday, academic and Professional situations.		
Course description	The course is targeted at the development of Business Management Faculty students' C1 level of the English Language competences, for further development of skills gained in the course Speciality English Language 1 for communication in both daily and Professional situations. The course develops the independent user's language skills, professional vocabulary, the correct technical and scientific language usage knowledge, abilities to analyse and summarize speciality literature, effective academic presentation skills.		

KIUSB17179	SPECIALITY ENGLISH LANGUAGE		3 ECTS
Lectures – N/A	**Practical works** – 30 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To help students develop linguistic and communicative skills, acquire knowledge according to CEFR B2 - C1 level in order to communicate spontaneously both in written and spoken forms on daily, cultural and professional topics.		

Course description	The course covers an important aspect of academic language study relevant to all subject areas. The aim of the course is to reach a high (B2-C1) level of English to study in an academic institution. The course is aimed at the first-cycle students with B1-B2 level of English. The integrated skills course will develop students' reading, writing, listening and speaking skills in an academic context. It will enable students to prepare assignments, write a research paper in English.

KIUSB17167	SPECIALITY ENGLISH LANGUAGE		3 ECTS
Lectures – N/A	**Practical works** – 30 hours/semester	**Consultations** – 2 hours/semester	**Individual work** - 48 hours/semester
Course aim	To help students acquire and develop linguistic and professional communicative skills as well as provide relevant knowledge so that the future specialists are able to use their acquired competences and analyse information, communicate in spoken and written language in their everyday, academic and professional situations.		
Course description	The course is targeted at the development of Transport Engineering and Transport Traffic Safety Engineering students' C1 level of the English Language competences, for further development of skills gained in the course English Language for communication in both daily and Professional situations. The course develops the independent user's language skills, professional vocabulary, the correct technical and scientific language usage knowledge, abilities to analyse and summarize speciality literature, effective academic presentation skills.		

ELECTRONICS FACULTY

ELKRB16516	DEVELOPMENT OF MICROCONTROLLER-BASED DEVICES	3 ECTS
Lectures – N/A	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** - 65 hours/semester	
Course aim	To learn to design and investigate the microcontroller-based devices and be able to substantiate solutions working individually or in the team.	
Course description	The knowledge about the creating of microcontroller-based device block diagram and circuit diagram, knowledge how to choose the microcontroller and other components for the realization of microcontroller-based device are obtained. Microcontroller program creating knowledge are deepened, the microcontroller-based device simulation knowledge are obtained. The competence of microcontroller-based device construction and testing are gained.	

ELEIB16761	DIGITAL AUTOMATICS (WITH COURSE PROJECT)	6 ECTS
Lectures – 20 hours/semester	**Practical works** – 20 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 10 hours/semester	**Individual work** - 106 hours/semester	
Course aim	Gaining knowledge about digital automation elements, their structure, operation and use of digital automation.	
Course description	Positional system of calculation, logic algebra, elementary logic functions and gates, digital triggereded and combining devices,digital devices, microprocessor devices. Microprocessor system structure, operation, application of digital automation.	

ELESB16502	DIGITAL DEVICES	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** - 96 hours/semester	
Course aim	Provide sufficient knowledge of design and analysis of digital devices and develop the ability to apply the acquired knowledge in engineering activities. Develop the need to be interested in electronics and electrical engineering. Develop the ability to maintain their professional competence by life-long learning.	
Course description	Digital devices subject delivers knowledge about number systems and codes, digital logic functions, logic algebra, combinational logic design, combinational and sequential logic circuits, bistable memory devices, synchronous sequential logic circuit design. Abilities to combine theoretical and practical elements, to experiment, analyze and interpret data are exercised. Abilities to work independently and responsibly, thoroughly schedule own work and time are developed.	

ELESB20722	DIGITAL SIGNAL PROCESSING TOOLS	6 ECTS
Lectures – 32 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 24 hours/semester	**Individual work** - 100 hours/semester	
Course aim	Aim is to acquire knowledge about development and improvement of the modern DSP tools, acquire cognitions about their operating principles and application possibilities and abilities to choose a reasoned solution, working individually or in group.	

Course description	Digital signal processing tools course aim is to acquire knowledge about modern means of digital signal processing, their operating principles and application possibilities. In this course there are analysed: Finite Impulse Response digital filters, Infinite Impulse Response digital filters, filter structures. For non-linear digital signal processing are analysed Artificial Neural Networks: Single-Layer Perceptron, Multi-Layer Perceptron, Self-Organizing Maps, applications and learning algorithms of the neural networks. Knowledge about digital signal processing tools, its design, modelling and application for audio and image signal processing is acquired. Problems and solutions of digital speech signal processing, modelling and synthesis are analysed. Modern digital signal processors and specialized programming tools are analysed.

ELEIB16563	ELECTRIC DRIVES	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	
Course aim	Acquire knowledge about the basic laws of operation and control of eclectic drives; learn to apply it in practice. Learn to choose electric drives and their elements according to specification of technological process. Acquire the knowledge about specialized MatLab Simulink software, skills for elaborating Simulink models, ability to work individually and in the team.	
Course description	The basic knowledge about modern electric drives, their construction, characteristics, performance in technical systems, isprovided. The functional parts of electric drives, classification, and specialized Matlab/Simulink means are considered. Selectionof motors, control modes of direct current electric drives, scalar control of induction drives ad control of electric drives with micromotors is analyzed. Transients in the electric drives.	

ELEIB16503	ELECTRICAL ENGINEERING AND ELECTRONICS	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	
Course aim	Provide electrical engineering knowledge, develop the ability to creatively analyse and solve electrical issues.	
Course description	Direct current circuits. Alternating current circuits. Circuits of a single-phase and three-phase current. Transformers. Electronic components and equipment. Electrical machines. Electric drives of technological devices and their control equipment. Electrical grids. Protection against electric.	

ELEIB16501	ELECTRONICS	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	
Course aim	To gain basic knowledge and competence in electronics.	
Course description	Develop knowledge about electronic fundamentals, operation principles of the rectifiers, amplifiers, operational amplifiers, logiccircuits, triggers, sensors and other basic electronic devices.	

ELESB16301	FUNDAMENTALS OF ELECTRONICS	6 ECTS
Lectures – 45 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 96 hours/semester	
Course aim	To teach theoretically and practically analyze and understand the structure of the semiconductor, properties, pn and MeS junctions, MOS structures, dielectrics and metals used in electronics properties and their importance in the modern information society development in the context of electronic devices studies.	
Course description	Introduction to the subject matter of the issues. Electron properties. Structure of solids. Electron energy bands. Solids, free electron properties. Semiconductor charge carriers. Solid electrical conductivity. Heterogeneous semiconductors, pn and MeS junctions and the MOS structures. Contact and surface effects. New carbon nanostructures. Summary.	

ELESB16520	INFORMATION CODING	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	
Course aim	The aim of the subject is to familiarize with the fundamentals of the information coding, educate the cognition of information coding algorithms and its peculiarity, abilities to apply the information coding algorithms by solving practical tasks.	

Course description	The subject focuses on the information source coding - terms of information content and entropy, symbol and stream codes. Variable-length codes, arithmetic coding, dictionary coding are analysed in this subject. There are performed a review of channel coding - block codes, Cyclic codes, Reed-Solomon codes, used for optical disk consumer electronics, mobile internet systems, computer storage management systems and digital television. Also in this subject the convolutional codes, Trellis codes are analysed. The fundamentals of audio coding and compression standards: PCM, MP3, AC3, and AAC are taught. The fundamentals of coding and compression of still pictures using JPEG, coding and compression of moving pictures using MPEG-1, MPEG-2, MPEG-4, and H.264 is taught. Also in this subject are reviewed technologies such as: cryptography, block cipher, stream cipher, single key and two keys encryption. The RSA algorithms, digital signatures, DES, AES are introduced.

ELEIB16351	MECHATRONIC EQUIPMENT	6 ECTS
Lectures – 45 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 96 hours/semester	
Course aim	Provide knowledge about mechatronic equipment and systems; match theory and practice elements, interpret experimental data,choose and apply mathematical methods for simulation of mechatronic equipment and systems, acquire ability to use advancedinformational technologies for preparing graphical and text documentation of investigation into mechatronic systems.	
Course description	The mechatronic system definition and the main elements are considered transformers, the principle of their operation, equivalentcircuits, phasor diagrams, characteristics; construction of direct current machines, principle of their operation and controlmethods; induction motors, the principle of operation and control methods; small power synchronous motors, their characteristics,control methods; stepper motors and their control; sensors of mechatronic systems: tachogenerators, resolvers, encoders ofrotational speed and position.	

ELESB16504	OPERATING SYSTEM CONCEPTS	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 33 hours/semester	
Course aim	Learning operating system concepts to cognize operating system functioning, algorithms and data structures implemented in operating systems, to be able to manage real operating systems.	

Course description	Operating system concepts subject delivers knowledge about operating system purposes and working, process and thread concepts, CPU scheduling, critical section concept and process synchronisation, deadlock definition and management methods, main memory management technologies and virtual memory organization, file system. A modelling and investigation structure of operating systems in the application software environment of the applied software is taught. Abilities to combine theoretical and practical elements, to experiment, analyse and interpret data are exercised. Abilities to work independently and responsibly, thoroughly schedule own work and time are developed.

ELESB16513	OPERATING SYSTEM CONCEPTS	6 ECTS
Lectures – 45 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 96 hours/semester	
Course aim	Learning operating system concepts to cognize operating system functioning, algorithms and data structures implemented in operating systems, to be able to manage real operating systems.	
Course description	Operating system concepts subject delivers knowledge about operating system purposes and working, process and thread concepts, CPU scheduling, critical section concept and process synchronisation, deadlock definition and management methods, main memory management technologies and virtual memory organization, file system. A modelling and investigation structure of operating systems in the application software environment of the applied software is taught. Abilities to combine theoretical and practical elements, to experiment, analyse and interpret data are exercised. Abilities to work independently and responsibly, thoroughly schedule own work and time are developed.	

ELKRB20703	PROGRAMABLE MICROSYSTEMS	3 ECTS
Lectures – 24 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 16 hours/semester	**Individual work** - 38 hours/semester	
Course aim	To learn the FPGA principles, analyse their characteristics, choose the FPGA and other components for concrete application, develop and analyze programs for FPGA and be able to substantiate solutions working individually or in the team.	

Course description	The knowledge about the Field Programable Gate Array (FPGA) evolution, purpose, classification, structure and structure of FPGA-based devices are obtained in the Programable Microsystem Course. The knowledge about the main FPGA families and features of their representatives are delivered as well. The chosen family of FPGA is studied, the selected concrete device of the family is analyzed in details. The methods of of FPGA logical structure design and realization of program processors are studied. The realization of concrete FPGA-based devize examples is analyzed. The theoretical and practical skills of development of FPGA-based devices are gained.

ELESB16302	SCRIPT PROGRAMMING	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** - 96 hours/semester	
Course aim	Learning to program mathematical scripts and functions, internet pages and scripts to master modern script programmingtechnologies and be able to apply them to solve engineering problems.	
Course description	Script programming subject delivers knowledge about programming of mathematical functions and scripts, 2D and 3D graphics,Web pages, their style and control scripts. Programming with Matlab, HTML-kit and ATOM software and qualified application of itto solve engineering problems is taught. Abilities to combine theoretical and practical elements, to experiment, analyze andinterpret data are exercised. Abilities to work independently and responsibly, thoroughly schedule own work and time aredeveloped.	

ELESB16501	SIGNALS AND CIRCUITS 2	6 ECTS
Lectures – 45 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 96 hours/semester	
Course aim	To understand the processes which occur during the propagation of signals in linear and nonlinear circuits and to be able to evaluate changes which occur in signals.	
Course description	Classification of signals, deterministic broadband spectra of periodic and non-periodic signals and their properties, Laplace transformation and its properties. Spectra of narrowband signals. Analysis of the signal changes in linear circuits by using different methods: classic, operators and time domain methods. Applications of nonlinear devices in order to change the frequency of signal spectrum: multiplication and replacement, modulation and detection.	

ELESB16522	SIGNALS AND SYSTEMS	6 ECTS
Lectures – 45 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** - 96 hours/semester	
Course aim	Teach to understand the processes which occur during the propagation of signals in linear and nonlinear circuits and develop the ability to evaluate changes which occur in signals.	
Course description	Classification of signals, deterministic broadband spectra of periodic and non-periodic signals and their properties, Laplace transformation and its properties. Spectra of narrowband signals. Analysis of the signal changes in linear circuits by using different methods: classic, operators and time domain methods. Applications of nonlinear devices in order to change the frequency of signal spectrum: multiplication and replacement, modulation and detection.	

ELESB20724	SOFTWARE DESIGN	6 ECTS
Lectures – 32 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 24 hours/semester	**Individual work** - 100 hours/semester	
Course aim	Provide explanations of concepts, terms and basics of object oriented programming and attain ability to specify programming problems using Unified Modeling Language diagrams.	
Course description	Provide explanations of concepts, terms and basics of object oriented programming. Provide practical skills to specify programming problems using Unified Modeling Language (UML) diagrams. Be able to read programming problems specified using UML and map them into Java programming language.	

ELKRB16514	THE BASICS OF MICROCONTROLLERS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** - 96 hours/semester	
Course aim	To learn the microcontroller principles, analyse their characteristics, choose the microcontroller for concrete application, developand analyze microcontroller programs and be able to substantiate solutions working individually or in the team.	

Course description	The knowledge about the microcontrollers purpose, classification, architecture, functional blocks and programming are obtainedin the microcontroller basics course. The knowledge about the main microcontroller families and features of their representativesare delivered as well. The chosen family of microcontrollers is studied, the selected concrete microcontroller of the family isanalyzed in details, the knowledge about the microcontroller features, hardware, instruction set and software used for the editingand debugging of microcontroller programs are delivered. The theoretical and practical skills of development of programs for thechosen family of microcontrollers are gained.

ELEIM17100	ELECTRICAL ENERGY AND MARKET	6 ECTS
Lectures – 28 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** - 115 hours/semester	
Course aim	To provide the main energy market patterns, various types of power plants economic, economical electric power load distribution knowledge. Teach to energy generation, transmission, distribution and supply costs, the cost of energy tariffs. Teach create energy balances and economic feasibility perspective of energy systems development.	
Course description	Electricity production possibilities and their efficiency. The cost of electricity, classification, accounting. Alternative sources of economic analysis. Energy balance. Energy Systems economy. Wholesale energy markets and ways of organizing electricity pricing principles. The knowledge of the system and market operators. Analysis of the electricity markets in the global reorganization practice.	

ELEIM17102	ELECTRICAL POWER SYSTEMS (WITH COURSE PROJECT)	9 ECTS
Lectures – 42 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 3 hours/semester
Laboratory works – N/A	**Individual work** - 180 hours/semester	
Course aim	To acquire the knowledge of the latest achievements in the field of Electrical Energetic Systems and their control.	
Course description	The types of energetic systems.Transcents,calculations and stability of electricl systems. Electrical generators and transmission lines.Remote control.Nontraditional electrical energy sources. Modelling technigue.	

ELEIM17354	ELECTRICS DRIVES OF MECHATRONIC SYSTEMS	9 ECTS
Lectures – 28 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** - 180 hours/semester	
Course aim	Acquire knowledge about power electronic converters, applied in mechatronics systems, learn to design them.	
Course description	Elements, instruments and equipments of power and information electronics of mechatronic systems. Non-controlled andcontrolled rectifiers, net invertors, impulse voltage converters, autonomous current and voltage inverters, frequency converters.Control of power converters systems (structures). Operational amplifier, summator and integrator. Microprocessor controllers andcontrolling computers. Digital - analogous and analogous - digital converters.	

ELEIM17101	MASTER'S RESEARCH WORK 1	3 ECTS
Final thesis – 80 hours/semester		
Course aim	To provide special knowledge in the field of electrical energy system engineering, necessary for application of newest technologies and independent development of new products and services, and train to perform an applied research that gives new results in the field of electrical energy system engineering.	
Course description	Analisys of scientific information related to the subject of final work. Preparation of a scientific review.	

ELEIM17301	PHOTOVOLTAIC ENERGY SYSTEMS	9 ECTS
Lectures – 42 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 3 hours/semester
Laboratory works – N/A	**Individual work** - 180 hours/semester	
Course aim	To acquire the knowledge and competence in photovoltaic energy systems, planning, design and operation.	
Course description	Principle of operation of photovoltaic elements, analysis and design of photovoltaic energy systems are described.	

ELEIM17300	WIND ENERGY SYSTEMS	9 ECTS
Lectures – 42 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 3 hours/semester
Laboratory works – N/A	**Individual work** - 180 hours/semester	
Course aim	To acquire the knowledge and competence in wind energy systems, planning, design and operation.	
Course description	Principle of operation of wind power stations, analysis and design of wind energy systems are described.	

ENVIRONMENTAL ENGINEERING FACULTY

APPEB16508	BUILDINGS' HEATING SYSTEMS	6 ECTS
Lectures – 45 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	To acquire and assimilate knowledge about buildings' heating systems and equipment, to learn and to get practical skills of designing of heating systems, to acquire functioning principals of main heating equipment and to learn select it correctly, to understand how to save energy and control modern heating systems, to understand the impact of design solutions for human comfort, energy use and functioning of other building systems.	
Course description	Heating systems - overview, classification and application in buildings of different destination. Elements of heating systems. Variants of heat supply to the buildings. Principal schemes, functioning regimes, capacity calculation and equipment selection methodology of different heating systems: water based, steam based, electrical, radiant. Installation, control and maintenance of heating systems. Energy saving possibilities using and retrofitting of heating systems.	

APPEB16303	ENGINEERING THERMODYNAMICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	

Course aim	Convey the technical thermodynamics, as foundation of energetics science, methodical principles; form the principal habits for its application.
Course description	Energy. Thermodynamic system, state, processes. First law of Thermodynamics: heat and work, specific heats, enthalpy. Gas mixtures. Second law of Thermodynamics: irreversibility, entropy. Thermodynamic properties of substances. Water vapour, humid air. Processes of stationary flow and work. Cycles of thermal machinery. Fundamentals of thermodynamics analysis: energy and exergy balances, effectiveness and thermodynamic usefulness.

APAVB17054	PREVENTION OF ENVIRONMENTAL POLLUTION	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	The main goal is to gain theoretical knowledge of the pollution prevention possibilities and techniques, and be able to using them in industrial, energy and transport sectors. Understand and be able to practically apply the acquired knowledge of the developing new environmental pollution reduction methods and technologies. To become proficient in self-organize work in selecting methodologies and tools to solve environmental pollution problems.	
Course description	During the course of study will be acquired knowledge about the identification of environmental pollution sources and their characteristics; knowledge about the sustainable development to ensure the pollution prevention in production, energy and other industries sectors using observation (monitoring) guidelines; knowledge about the environmental components (air, water, soil) and the potential of contamination risk assessment and management with implementation of fundamental principles of sustainable development; knowledge about the prevention methods of waste and physical pollution and possibilities of control way tools and it's organization in companies to prevent the spread of pollution in to the environment take into account the integrated pollution prevention and the implementation of the legal system in Lithuania and other countries.	

APPEB16716	RENEWABLE ENERGY TECHNOLOGIES	6 ECTS
Lectures – 40 hours/semester	**Practical works** – 10 hours/semester	**Consultations** – 12 hours/semester
Laboratory works – 20 hours/semester	**Individual work** – 78 hours/semester	

Course aim	To give knowledge about renewable energy sources, technologies and sustainable development. The level of this knowledge should ensure abilities necessary for the engineering activities, enable to comprehend the principals and possibilities of operation of new technologies and to evaluate their advantages and disadvantages. To be able to suggest new variants of integration into the existing and designed systems and to calculate the main technical and economic indicators
Course description	Renewable energy (solar, wind, hydro, bio, geothermal) sources. The renewable energy sources transformation technologies. The sustainable energy development. The conservation of primary energy. Political, strategic, administrative and legal environment. The main evaluations of technical and economic indicators.

APAVB17050	SUSTAINABLE ENVIRONMENT (INTRODUCTION TO SPECIALTY)	3 ECTS
Lectures – 45 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 31 hours/semester	
Course aim	Introduce students to the environmental engineering and sustainable environmental development commonality through pollution elimination and prevention technologies.	
Course description	Introduction to environmental engineering science, its development trends. The knowledge about the concept of sustainable environment and ways to develop environmentally sustainable. Introducing the water, waste water, waste air and physical pollution and possible solutions.	

APAVB17205	WATER AND WASTEWATER	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To acquire and assimilate knowledge of water consumption and wastewater volume calculations, pipelines diameter selections, pipes materials used for water and wastewater networks. Get knowledge with water and sewer networks rotes selection principles at city plans. To understand the pump operation, water and wastewater treatment methods, and sludge handling. To learn how design the water purification and wastewater treatment plants.	
Course description	Water supply and wastewater facilities, design and construction practice and methods. Water supply; water consumption; well field; wells, water treatment plants, hydraulic calculations of water distribution networks; wastewater; calculation of gravity and pressure sewerage runoff networks; pipelines material. Water purification, wastewater and sludge treatment.	

APAVM17131	CLEANER PRODUCTION (WITH COURSE PROJECT)	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To give knowledge about Cleaner Production, its assessments practices and implementation of Cleaner Production projects.	
Course description	Environmental strategies; cleaner production concept and implementation methodology; implementation of cleaner production projects; role of authority and financial institutions in cleaner production development; perspectives of cleaner production.	

APAVM17263	ECOLOGICAL DESIGN	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To deepen and to improve one's knowledge about special purpose eco-products, its research and evaluation. To understand of modern eco-products industry technologies evaluation methods. To learn analyzing, planning, modeling and evaluating of global, regional and local purpose eco-products. To obtain scientific research skills, applying obtained knowledge to the ecodesign process evaluation and improvement.	
Course description	The evaluation of eco-design and eco-product demand to different purpose objects. Advanced technologies of eco-product development. Experimental and virtual modeling of eco-product. Evaluation and improvement of eco-design process. Eco-products industry technologies to different objects. Eco-Design, start-up to market at continually changeable environment. Complex evaluation of eco-design system.	

APAVM20105	ENVIRONMENTAL POLITICS, LAW AND ECONOMICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	Gaining knowledge about the policy instruments based on the environmental policy, legal and economic principles are applied. Learn to assess the damage to the environment, the use of economic instruments to adapt the environment of economic evaluation techniques and gain a basic understanding of Lithuania, the European Union and international environmental laws concerning the base, and stakeholders.	

Course description	The study of the subject acquired knowledge of environmental policy and legal subjects, the environmental protection system, international environmental law functions, sources, objects and subjects, the basic principles, treaties, conventions. Are trained to the basic legal, economic and voluntary instruments for the application of skills, an introduction to environmental governance. Learn to analyse the economic and administrative measures for environmental use. Provided knowledge about environmental law framework for the European Union's environmental laws and stakeholders.

APAVM17133	INNOVATIVE ENVIRONMENTAL PROTECTION TECHNOLOGIES (WITH COURSE PROJECT)	6 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – 15 hours/semester	**Individual work** – 115 hours/semester	
Course aim	SDM is intended for deepening student knowledge about environmental technologies and their performance in the context of sustainable development. This is achieved by gaining understanding about related risk and threats, developing abilities to work independently and in a team, using critical thinking for the assessment of situation, identification of problems and applying rational thinking in search of solution.	
Course description	Study discipline module (SDM) will help students to deepen knowledge about underlying environmental technologies and their performance assessment in the context of sustainable development. Students will gain special abilities to find solution for the environmental technology problem using modern informative technologies. Students will gain general abilities to deepen and structure the knowledge; to fulfill assigned task(s) and prepare for assessments independently during the semester; to think and assess situations critically; to work in a team; to prepare work tasks carefully and clearly; to submit work results systematically and clearly using visual aids.	

APAVM17134	PHYSICAL POLLUTION AND REDUCTION TECHNOLOGY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – N/A
Laboratory works – 15 hours/semester	**Individual work** – 115 hours/semester	
Course aim	To learn about the noise, vibration, ionizing and non-ionizing electromagnetic radiation generation conditions; analyze production processes caused by the physical environment; learn to choose the physical pollution reduction and prevention of the ways and means to become proficient and assess their effectiveness; understand all kinds of physical pollution effects on the body; understand the basics of physical pollution rationing.	

Course description	The noise, vibration, ionizing and non-ionizing electromagnetic radiation sources, their origin and physical, mathematical and technical evaluation; physical pollution reduction measures and technologies; dissemination in the environment and its effects; Modern testing and measurement methods, dispersion modeling principles.

FUNDAMENTAL SCIENCES FACULTY

FMMMA16111	MATHEMATICAL MODELS OF MODERN ARCHITECTURE	3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** – 48 hours/semester	
Course aim	To introduce basics of analytical geometry and mathematical analysis. To develop logical and ana-lytical thinking, ability to generalize information and ground the conclusions, to communicate effectively with specialists of different fields, to formulate and solve practical problems, to learn new knowledge.	
Course description	The course presents the basic concepts and ideas of analytic geometry and mathematical analy-sis. Contains the general information of basic mathematical models and scientific approaches for contemporary architectural theory and practice.	

FMMMB16101	ALGEBRA AND DIFFERENTIAL CALCULUS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	To introduce basics of linear algebra, analytical geometry and differential calculus.	
Course description	The course covers the elements of linear algebra (matrices, determinants, systems of linear equations), analytical geometry (vectors, straight lines, planes, curves and surfaces of second order) and differential calculus of functions of one variable (limits, derivatives, investigation of functions). The questions of their practical application are touched upon.	

FMSAB16101	ALGEBRA AND DIFFERENTIAL CALCULUS	6 ECTS
Lectures – 10 hours/semester	**Practical works** – 10 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 136 hours/semester	
Course aim	To acquaint students with methods of solving systems of linear equations. To expose range of applications of the differential calculus.	
Course description	Methods of solving systems of linear equations. Elements of vector algebra ana analytic geometry. Second-degree curves and quadric surfaces. Limit of a sequence. Limit of a function. Continuous and discontinuous functions. Derivative and its applications. Curve sketching. Functions of several variables. Extrema of functions of several variables.	

FMSAB16108	ALGEBRA AND DIFFERENTIAL CALCULUS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	To acquaint students with methods of solving systems of linear equations. To expose range of applications of the differential calculus.	
Course description	Methods of solving systems of linear equations. Elements of vector algebra and analytic geometry. Second-degree curves and quadric surfaces. Limit of a sequence. Limit of a function. Continuous and discontinuous functions. Derivative and its applications. Curve sketching. Functions of several variables. Extrema of functions of several variables.	

FMISB16204	ALGORITHMS AND DATA STRUCTURES	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 96 hours/semester	
Course aim	The aim of the course is to introduce students to the data structures and their practical realization by creating the corresponding functions and classes, teaching algorithms, analyzing and evaluating them.	

Course description	The subject provides a systematic analysis of data structures, including massive linear lists, linear and hierarchical data structures. Familiarized with the list, stack, deck, heap, binary tree, Bayer tree, red-black tree. The procedures with elements of the data structure are explained, the memory demand is analyzed, the restrictions and efficiency of data structures are discussed. Algorithms ar presented, their properties are analyzed, algorithm complexity and asymptotic analysis of algorithms are presened. Comprehensive analysis of fast and slow sorting algorithms is presented. Searching and recursive algorithms are explained, dynamic programming is introduced. The principles of data exchange between external and internal memory in sorting and searching algoritms are analyzed when very large data are used.

FMIGB16004	APPLIED ENGINEERING GRAPHICS	3 ECTS
Lectures – N/A	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 33 hours/semester	
Course aim	To acquaint with the main requirements for the engineering graphics documentation, using automated computer design systems. The student will be able to read and understand the drawings of building constructions. To provide the knowledge to be able to apply engineering graphic methods in the design of structures, to be able to understand the design document correctly, to be able to depict drawings of parts of buildings and constructions using modern automated design systems.	
Course description	Projection drawing. Views, their layout in the drawings. Simple and complex sections. Construction drawing. Drawings of building constructions. Building plans, facades, their drawing. An overview of automated computer design systems, their application peculiarities in construction. CAD data management, CAD standards.	

FMIGB16301	APPLIED ENGINEERING GRAPHICS	6 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To present general principles of the projection drawing and their application to mechanical drawings; to develop skills to read and perform assembly drawings using computer graphic systems and drawing standards.	
Course description	Module presents basics of the projection drawing. It introduces how to create mechanical drawings, teaches to read and perform assembly drawings, presents detailed information about the development of the details working drawings; shows the application of computer systems for mechanical drawing.	

FMCHB16301	CHEMICAL THERMODYNAMICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	Introduction to chemical thermodynamics and its applications.	
Course description	Principal laws of thermodynamics. Elements of statistical thermodynamics. Thermodynamics of chemical, biochemical and biophysical processes. Equilibrium. Electrolytes and electrode processes. Phase equilibria. Disperse systems, surface phenomena and adsorption. Thermodynamics of electron and inion transfer in living systems.	

FMCHB16102	CHEMISTRY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide the students with chemistry knowledge necessary for the studies of general and special courses as well as in the practice activities.	
Course description	Introduction to the course studies. Dissolution of materials and formation of solutions. Expression of solution concentration and methods for its calculation. Chemical kinetics and chemical equilibrium. Catalysis. Properties of nonelectrolytes and electrolytes solution. Electrolytic dissociation. Degree and constant of dissociation. Water dissociation, pH and pOH. Hydrolysis of salts and its application. Oxidation-reduction processes. Water hardness and it's softening. Electrochemical processes within galvanic cells, electrolysis and corrosion of metals, the methods of protection the metals against corrosion.	

FMCHB16109	CHEMISTRY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 111 hours/semester	
Course aim	To enable students to seek basic chemical knowledge in shaping their concept of their application in practical and professional activities.	

Course description	Introduction to the course studies. Dissolution of materials and formation of solutions. Expression of solution concentration and methods for it's calculation.Properties of nonelectrolytes and electrolytes solutions. Electrolytical dissociation. Degree and constant of dissociation. Water dissociation, pH and pOH. Hydrolysis of salt and it's application. Oxidation-reduction processes. Water hardness and it's softening. Electrochemical processes within galvanic cells, electrolysis and corrosion of metals, the methods of protection the metals against corrosion.

FMCHB16101	CHEMISTRY	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 33 hours/semester	
Course aim	To enable students to seek basic chemical knowledge in shaping their concept of their application in practical and professional activities.	
Course description	Will be able to produce solutions of various concentrations, to select and apply substances; know the composition and properties of natural waters, perceive the formation of non-electrolyte solutions, and use their properties in production processes. Understand the thermodynamic and kinetic systems forecasting methods and oxidation-reduction reactions occurring in chemical sources of electricity, corrosion and protection of metal from it, will perceive energy storage.	

FMCHB16106	CHEMISTRY	3 ECTS
Lectures – 10 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 6 hours/semester	**Individual work** – 62 hours/semester	
Course aim	To enable students to seek basic chemical knowledge in shaping their concept of their application in practical and professional activities.	
Course description	Will know and understand forecasting methods of thermodynamic and kinetic systems, solution formation and properties. Will be able to calculate the concentrations of solutions. Know the composition and properties of natural waters. Understand oxidation-reduction processes occurring in electrochemical current sources, electrolysis and metal corrosion. Get acquainted with the organic compounds used in the field of transport. Will be able to conduct chemical experiments.	

FMITB21710	CLOUD COMPUTING	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide knowledge's about cloud computing.	
Course description	Introduction to cloud computing. Cloud computing - architecture, virtualization, service management, security.	

FMIGB22101	COMPUTER GRAPHICS	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 33 hours/semester	
Course aim	Introduce with the principles of image formation, color theory, modern technologies of raster, vector and three-dimensional graphics, programming of interactive computer graphics.	
Course description	The concept of computer graphics (CG). CG image creation sequence. Colour models and understanding of colours. CG software. Raster and vector graphics systems. Computer animation. Three-dimensional CG creation systems. Basics of image processing technology. Mathematical foundations of CG. Homogeneous coordinates. 2D and 3D transformations. Classification of flat geometrical projections. Programming of interactive 3D graphics.	

FMISB18500	CRYPTOGRAPHY AND INFORMATION SECURITY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – 15 hours/semester	**Individual work** – 100 hours/semester	
Course aim	The aim of the course - to provide students with knowledge on information security needs, possible threats and abilities to select suitable countermeasures or prevention mechanisms against it.	
Course description	The subject introduces students with definition of information security, ways to assure the security (CIA triad) and possible threats. What is, what types of cryptography exist, how it can be used to assure security is analyzed. Students get know the principles of some symmetrical, asymmetrical cryptography and hash function algorithms. Different type of security threats are analyzed in the subject. Students find out the basics of malware programming code, attacks against web systems, computer networks, personal computers and persons as well as understands possible solutions to prevent it.	

FMGSB19301	DESIGN OF MULTIMEDIA ELEMENTS	6 ECTS
Lectures – 15 hours/semester	**Practical works** – 45 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	Be able to apply the principles of multimedia design, to select right elements of artistic expression, to create aesthetically, expressive and evocative computer visualization.	
Course description	This course introduces with multimedia design elements, promotional products design features, their aesthetic, expression and the importance of conveying and expressiveness of information. The presentation of multimedia design elements for the specifics of using graphical means of expression and compositional principles. Analyzing visual design and development cycle of the imaged object. Taught create abstracted image of the object, to create the specific environment. Introduced in style design, taught to create a representative multi-media product design. Taught to choose and combine font style, proportions, composing.	

FMGSB19202	DIGITAL IMAGE TECHNOLOGY	6 ECTS
Lectures – 15 hours/semester	**Practical works** – 45 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	To introduce the main methods of digital image processing, with main algorithms and their practical realization. To gain skills to work with the most powerful and popular image processing software and get to know the exclusive features of the program.	
Course description	The course deals with digital imaging technologies. It acquaints with digital video concepts, tools, elements. The following are examined in more detail: a) Peculiarities of raster and vector graphics and their application in different media. b) Peculiarities of human visual perception. c) Colour and its standards and correction in the digital space. d) Interaction of a digital image with time. e) Principles of extracting and processing complex digital images and their application in different media. f) Integration of the creative process with digital imaging technologies.	

FMMMB16102	DISCRETE MATHEMATICS 1	3 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** – 33 hours/semester	
Course aim	To acquaint with basic concepts of mathematical logic, combinatorics, relations, sets. Students must be able solve typical problems, apply modern mathematical methods to solve real life problems, to modify and generalize formulation of problem.	
Course description	Elements of mathematical logic. Boolean functions. Finit sets and combinations. Combinatorical numbers. Generating functions. Recurrence relations. Theory of realtions. Equavalence relations. Classes. Order relations. Functions. Injective and surjective functions.	

FMGSB16102	ENGINEERING AND COMPUTER GRAPHICS	3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** – 48 hours/semester	
Course aim	To get fundamentals of computer and engineering graphics by studying problems, terms, concepts and also applying knowledgein practice solving different engineering tasks by using suitable tools for that purpose.	
Course description	Introduction to computer and engineering graphics: problems, definitions. Connection with other subjects. Application areas.Hardware and software of graphical systems. Graphical pipeline. Raster and vector graphics. Theory of colour. Light sources.Creation and visualization of a three-dimensional computer model. Representation of three-dimensional objects. Classification ofplanar geometric projections. Parallel, perspective projections. Camera. Parameters of the camera. Invisible-line determination.Visualization of the scene (Phong and Gouraud shading). Ray tracing. Creation of two-dimensional computer images. Theinformational structure of computer drawings. Technical drawing. Basic views, sections and slices. Drawing by study profile.	

FMITB19524	ENTERPRISE GOVERNANCE OF INFORMATION AND TECHNOLOGY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	To provide knowledge and abilities, needed for management of enterprise used infromation and technologies, its risk evalaution and governance to regulation requirements.	

Course description	Introduction to enterprise information and technology management based on process management methodology. An overview of information and technology business specification, organizational structure, process management methodology. The course provides an overview of ITIL v.4. ITIL processes and functions are initated for practical modeling and analysis.

FMCHB16503	FUNDAMENTALS OF BIOCHEMISTRY	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 6 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 144 hours/semester	
Course aim	To introduce to the major compounds of the living organisms, their characteristics and metabolism.	
Course description	Biomolecules and cells. Major compounds of living organisms: proteins, nucleic acids, lipids, carbohydrates, mineral compounds, and water. Their structure, properties, and functions. Major metabolic and energy pathways.	

FMSAB16121	FUNDAMENTALS OF MATHEMATICAL ANALYSIS	9 ECTS
Lectures – 60 hours/semester	**Practical works** – 45 hours/semester	**Consultations** – 6 hours/semester
Laboratory works – N/A	**Individual work** – 129 hours/semester	
Course aim	To give basic knowledge in linear algebra, analytical geometry and calculus and to teach to apply it to analyze various problems and studying other disciplines.	
Course description	The module covers the basic notions with elements of linear algebra and analytical geometry, the real numbers system, sequence, function, limit and derivative, as well as applications of the derivative in economics, engineering and other fields. Notions of the indefinite, the definite integrals, and their applications.	

FMCHB19104	GENERAL CHEMISTRY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 6 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 79 hours/semester	
Course aim	Impart fundamental knowledge and develop abilities necessary for a job in biotechnology sphere.	

Course description	Introduction to the course studies. Atomic structure and chemical bounds. Dissolution of materials and formation of solutions. Expression of solution concentration and methods for its calculation. Chemical kinetics and chemical equilibrium. Catalysis. Properties of nonelectrolytes and electrolytes solution. Electrolytical dissociation. Degree and constant of dissociation. Water dissocesiation, pH and pOH. Hydrolysis of salts and its application. Oxydation-reduction processes. Water hardnes and its softening. Electrochemical processes within galvanic cells, electrolysis and corrosion of metals, the methods of protection of the metals against corrosion.

FMFIB16113	GENERAL PHYSICS	3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 33 hours/semester	
Course aim	To give knowledge of classical mechanics, fluid and gas mechanics, mechanical vibrations and waves, molecular physics andthermodynamics.	
Course description	Taught rolling and rotational movement kinematics and dynamics, mechanical oscillations and waves, molecular physics andthermodynamics. Emphasis on gas dynamics, transport phenomena (diffusion, viscosity, thermal conductivity), thermodynamicprocesses in subjects, according to the Environmental Engineering Faculty specific subjects taught.	

FMFIB16119	GENERAL PHYSICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 81 hours/semester	
Course aim	To give knowledge about basic interactions in nature, gravitational, electrical and magnetic fields, nature of mechanical and electrical phenomena and processes, states of gas and liquid material, to characterize the content of created technologies achieved by physics science, to educate skills of the scientific thinking, to teach to estimate theoretical and experimental got data and their reliability, to prepare for the engineering studies. To give practical skills of laboratory works.	
Course description	Fundamental interactions in the nature, their characteristics and laws and their interpretation in the bioengineering studies. Mechanical fluctuations and oscillations and their occurrence in the engineering equipment and constructions. Ideal and real gases, their characteristics and laws. Liquid state of material and its peculiarities.	

FMFIB16115	GENERAL PHYSICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide fundamental knowledge about the nature of mechanical and thermal properties and phenomena; to develop abilities forspecial courses.	
Course description	The methods of research in physics, their applications and limits. Fundamental interactions in nature. Kinematics and dynamics oftranslational and rotational motion. Conservation laws in mechanics. Mechanical oscillations and waves. Thermodynamics and statisticalmethods. Laws of thermodynamics. Heat engines. Thermal and mechanical properties of materials.	

FMISB16106	INFORMATION TECHNOLOGIES	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	Provide a basic understanding about information processing patterns and the tools.	
Course description	The module on a deeper examination of information technology. Course structure includes the following science topics: Basic science concepts and definitions. Informatics structure. Information, data and knowledge. Information properties. Information Systems. Information systems characteristics. Types of information systems, structure and classification. Mathematical computer basics. Boolean algebra. Boolean functions. Logic Circuits. Logical operation of computer basics. Machine types and their characteristics. Classical computer architecture. Software. Operating systems, their purpose and structure. Operating systems. Networks. Data transmission technologies.	

FMISB18100	INFORMATION TECHNOLOGIES	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 96 hours/semester	
Course aim	The main aim of this course is to introduce for students a mathematical logic, information theory, automata, formal languages and grammars primers.	

Course description	In this course will be presented the fundamental principles of information technologies: binary arithmetic, logical operation, information and data interpretation in binary level, memory addressing and data structures, automata theory concepts, the basics of Turing machine and assembler programming. Also practical tasks to improve the fundamentals of programming is provided.

FMISB16101	INFORMATION TECHNOLOGIES	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide knowledge for students about the theoretical background of information technologies. To provide practice for modern office software and OS usage.	
Course description	The module on a deeper examination of information technology. Course structure includes the following science topics: Basic science concepts and definitions. Informatics structure. Information, data and knowledge. Information properties. Information Systems. Information systems characteristics. Types of information systems, structure and classification. Mathematical computer basics. Boolean algebra. Boolean functions. Logic Circuits. Logical operation of computer basics. Machine types and their characteristics. Classical computer architecture. Software. Operating systems, their purpose and structure. Operating systems. Networks. Data transmission technologies.	

FMMMB16110	LINEAR ALGEBRA AND DIFFERENTIAL CALCULUS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	To give basic knowledge of linear and vector algebra, analytic geometry, differential calculus.	
Course description	Introduction into set theory. Complex numbers. Matrices, determinants, elements of vector algebra and analytical geometry. Solution of systems of linear algebraic equations. Limit calculus of functions of single variable. Differential calculus.	

FMSAB16105	LINEAR ALGEBRA AND MATHEMATICAL ANALYSIS	9 ECTS
Lectures – 45 hours/semester	**Practical works** – 45 hours/semester	**Consultations** – 6 hours/semester
Laboratory works – N/A	**Individual work** – 144 hours/semester	
Course aim	The aim of this course is to provide a sufficient understanding of basic linear algebra concepts, functions, limits and derivative terms, the integral and features as well as develop skills to address various economic and other problems.	
Course description	The aim of this course is to introduce principles of algebra and mathematical analysis. The first part of this course covers theory and applications of linearity, including matrices and determinants, linear equations and systems of linear equations, Economic system balance model (Leontjev model) for optimal planning and solving linear programming problems. The second part of this course covers the basic concepts of mathematical analysis: a functions and their properties, limits, continuity, a comprehensive view of the theory and techniques of differential and integral calculus including differentiation rules, methods and applications, techniques of integration, improper and multiple integrals and its practical applications also ordinary differential equations.	

FMMMB16310	MATHEMATICAL ANALYSIS AND PROBABILITY THEORY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To present basic knowledge of Fourier analysis, complex analysis, operational calculus, probability theory and mathematicalstatistics.	
Course description	Complex functions, differentiation and integration. Laurent series, irregular points. Residues. Evaluation of complex and realintegrals. Laplace transform. Basic theorems of the operational calculus. Applications in solving of differential equations.Probability theory: random events and random variables, numerical characteristics of random variables, multidimensionalrandomvariables. Mathematical statistics: random sampling, processing of samples, estimation of parameters, testing ofhypotheses,regression, correlation.	

FMMMB16111	MATHEMATICS 1	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To introduce basics of linear algebra, analytical geometry and differential calculation.	

Course description	Introduction into set theory. Complex numbers. Matrices, determinants, elements of vector algebra and analytical geometry. Solution of systems of linear algebraic equations. Limit calculus of functions of single variable. Differential calculus.

FMMMB16311	MATHEMATICS 3	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To introduce basics of probability theory and mathematical statistics, to train a student to use obtained knowledge for solving of real world problems.	
Course description	The basic probability theory concepts and theorems. The distribution functions of random variables and numerical characteristics. The problems of mathematical statistics. Empirical characteristics. The point and interval estimates of unknown parameters. Statistical hypothesis testing, elements of correlation theory, regression.	

FMMMB16109	MATHEMATICS FOR BIOENGINEERING	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	To introduce basics of linear algebra, analytical geometry and differential calculus. To develop the ability to formulate and solve practical problems.	
Course description	The course covers the elements of linear algebra (matrices, determinants, systems of linear equations), analytical geometry (vectors, straight lines, planes, curves and surfaces of second order) and differential calculus of functions of one variable (limits, derivatives, investigation of functions). The questions of their practical application are touched upon.	

FMGSB22101	MEDIA PRODUCTION	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	

Course aim	This course will provide students with such knowledge: 1) Terminology and definitions used in audiovisualy industry; 2) Screenwriting for short films: structure & dramaturgy; Industry standart script formatting; 3) Audio and video equipment - theoretical knowledge ant practical skills; 4) Video editing - basics of using Adobe Premiere software; 5) Film crew: Roles and responsibilities; 6) Various media forms (advertising, music video clips, etc.) and their application.
Course description	"Media production" provides students with a general knowledge on audiovisual arts industry. Module introduces all stages of film production - development, production, editing and postproduction. Students gain theoretical and practical knowledge on using audio and video equipment, develop practical video editing, scriptwriting skills.

FMCHB16502	MOLECULAR AND CELL BIOLOGY	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 6 hours/semester
Laboratory works – 45 hours/semester	**Individual work** – 129 hours/semester	
Course aim	The goal is to provide knowledge about cell structure and functioning, structure of the genome, its functioning and regulation, basics of compounds traffic in the cell, signalling pathways and their regulation, cell cycle and its control, cells interactions; introducing into some modern techniques used in cell biology.	
Course description	The Molecular and Cell Biology course provides knowledge about cell as a basic functional unit of living organisms, cell processes and their control, complexity of biological systems. The module explains postulates of cell theory, prokaryotes and eukaryotes differences, fundamentals of genome functioning emphasizing gene expression regulation in eukaryotes. The course provides theoretical and practical knowledge about cells endomembranous system and cytoskeleton, the functioning and origin of the organelles and their interrelationships, basics of proteins sorting and transport, molecular chaperone and ubiquitin/proteosome system functioning; examines the issues of cellular-matrix interactions and matrix structure, intercellular and intracellular signalling; regulation of eukaryotic cell cycle. The course provides practical skills of eukaryotic cells cultivation and experimental manipulations.	

FMIGB16302	OBJECT-ORIENTED, PARAMETRIC MODELING BIM 1	3 ECTS
Lectures – N/A	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 33 hours/semester	

Course aim	To introduce the basic princips of building information model (BIM) and it's management requirements, using computeraided design systems. After completing this course will be able to read and understand building construction drawings. To present general engineering and computer graphics fundamentals necessary in civil engineering design. To provide with knowledge how engineering graphics methods are applied in building information modeling (BIM) design.
Course description	Building Information Modelling (BIM) application using engineering graphics software. Building information modeling computer software, and it's features for civil engineering. Parametric modeling of building elements and their descriptive information. Preparation of building three-dimensional models. Building element and construction (concrete, metal, wood) detailing using building information modeling tools. Preparation of the drawings. Views arrangement in the drawings. Construction drawing. Material schedules and bill of materials. Building plan, section, elevation formation. Building construction drawings. Reinforced concrete, metal, wood, geotechnical design and detailing drawings. BIM and CAD data management and standards. The building structure design schemes. Plotting graphs and using them in documents.

FMGSB16101	OPERATING SYSTEMS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To get knowledge about functions of OS and to get skills in using system commands and system administration.	
Course description	Understanding operating system (OS), architecture and purpose. Threads, processes execution planning, memory management and file systems. Administration of OS and automation of tasks. Main OS: MS Windows, Unix, Mac OS X.	

FMITB16101	OPERATING SYSTEMS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To get knowledge about functions of OS and to get skills in using system commands and system administration.	
Course description	Understanding operating system (OS), architecture and purpose. Threads, processes execution planning, memory management and file systems. Administration of OS and automation of tasks. Main OS: MS Windows, Unix, Mac OS X.	

FMCHB16302	ORGANIC CHEMISTRY	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 6 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 144 hours/semester	
Course aim	Aware of the basis of organic chemistry, basic organic compound classes, their characteristics, evolution and practical use of organic compounds.	
Course description	Classes of organic compounds and IUPAC system of nomenclature. Alkanes and organohalogen compounds. Alkenes and alkynes. Aromatic compounds. Alcohols and phenols. Ethers. Aldehydes. Ketones. Carboxylic acids and derivatives of carboxylic acids. Amines. Organoelement compounds. Mechanisms of organic reactions.	

FMFIB16124	PHYSICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To give knowledge about basic interactions in nature, gravitational, electrical and magnetic fields, nature of mechanical and electrical phenomena and processes, states of gas and liquid material, to characterize the content of created technologies achieved by physics science, to educate skills of the scientific thinking, to teach to estimate theoretical and experimental got data and their reliability, to prepare for the engineering studies. To give practical skills of science research.	
Course description	Fundamental interactions in the nature, their characteristics and laws and their interpretation in the engineering studies. Kinematic and dynamic of rotational and translational motion. Mechanical fluctuations and oscillations and their occurrence in the engineering equipment and constructions. Ideal and real gases, their characteristics and laws. Electromagnetic oscillations and waves, their characteristics and laws. Waves and quantum phenomena determined by electromagnetic radiation.	

FMFIB19122	PHYSICS	6 ECTS
Lectures – 10 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 10 hours/semester	**Individual work** – 136 hours/semester	
Course aim	To give a comprehension about basic interactions, about nature of mechanical phenomena and processes in gases, liquids and solids. To formulate practical abilities to apply fundamental nature laws and teach to solve quantitative and qualitative tasks.	

Course description	Physics course gives knowledge on translation and rotation motions of rigid body, kinematics and dynamics of both types of motion. The course explains a nature of mechanical oscillations, a propagation of waves through various media, as well as clarifies basic questions of molecular physics and thermodynamics. The course emphasizes fluid and gas dynamics, acoustics, transport phenomena in non-equilibrium thermodynamic systems taking into account specifics of studies in Transport engineering faculty.

FMFIB16128	PHYSICS 1	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide students with knowledge of classical mechanics, molecular physics and thermodynamics and formulate practical abilities to apply fundamental nature laws and teach to solve quantitative and qualitative tasks.	
Course description	Research methods of physics, theories and their application limits. Fundamental interreactions in nature and their occurrence characteristics. Kinematics and dynamics of movement. Conservation of energy in mechanics. Harmonic, damped, forced motion. Mechanical waves and their spread. Macroscopic systems and their research. Molecular properties of gases. Maxwell and Bolcman distribution. The laws of thermodynamics. Equations of state for real gases. Critical point, phasic transmutation. Liquefaction of gases. Liquids, their characteristics and interaction with the solids.	

FMITB16502	PRINCIPLES OF PROJECT MANAGEMENT	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 33 hours/semester	
Course aim	To prepare project managers, practice on project management tools and methods.	
Course description	Introduction to Project Management. Project Management Basics. Initiating Processes. Planning Processes. Project Scope Planning. Project Time Planning. Project Cost Planning. Project Quality Planning. Project Human Resources Planning. Project Communication Planning. Project Risk Planning. Project Procurement Planning. Project Executing Processes. Project Monitoring and Controlling Processes. Closing Processes.	

FMMMB16301	PROBABILITY THEORY AND MATHEMATICAL STATISTICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To introduce basics of probability theory and mathematical statistics, to train a student to use obtained knowledge for solving of real world problems.	
Course description	The basic probability theory concepts and theorems. The distribution functions of random variables and numerical characteristics. The problems of mathematical statistics. Empirical characteristics. The point and interval estimates of unknown parameters. Statistical hypothesis testing, elements of correlation theory, regression.	

FMSAB20325	PROBABILITY THEORY AND MATHEMATICAL STATISTICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 81 hours/semester	
Course aim	To master the basics of probability theory and get acquainted with the elements of mathematical statistics by making the statistical analysis with the help of R software.	
Course description	In the first part of the course the main elements of combinatorics and operations of random events are presented. They are followed by a definition of the probability space, the classical definition of probability and theorems of probability summation and multiplication. The theorems of Bernoulli, Poisson, local and integral theorems of Muavre-Laplace are given. In addition, consideration of random variables (vectors) distribution and their numerical characteristics, the central limit theorem make up a separate part. In the second part, empirical analogs of theoretical distribution characteristics and the main concepts of mathematical statistics are described, such as: population, sample, statistics, main properties of statistics. The problem of confidence interval construction is formulated and the basic concepts of the hypothesis testing are introduced. Teh R software is used for practicals.	

FMSAB19310	PROBABILITY THEORY AND MATHEMATICAL STATISTICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	
Course aim	To master the basics of probability theory and get to know the elements of mathematical statistics.	

Course description	The module expounds on the basic notions and theorems of probability theory, distribution laws of random variables and their numerical characteristics. Various problems of mathematical statistics and the ways of their solution are presented as well as empirical characteristics, and point and interval estimates of unknown parameters. Statistical hypotheses and their verification are considered as well as correlation and regression elements.

FMITB19108	PROCEDURAL PROGRAMMING	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To acquaint students with potentials of procedural programming, fundamental data structures of programming language and general algorithms for their processing. To learn students writing, validating and documenting procedural code.	
Course description	Programming languages. Execution of program in computer. Programming environment. Concepts of data, data structures and algorithms. Programming styles. Paradigm of procedural programming. Fundamental data types. Expressions. Assignment. Statements of clause and loop. Scope. Input/output. Functions. Data exchange between functions. Arrays. Structures. Pointers. Introduction to functional programming. Laboratory works are coded in C++ syntax.	

FMITB22705	PROJECT OF INFORMATION TECHNOLOGY DEVELOPMENT	6 ECTS
Lectures – N/A	**Practical works** – 45 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 111 hours/semester	
Course aim	To provide hands-on experience in self-planning and implementation of software and/or research projects in Information technology field.	
Course description	Students remember the principles of software project management, best practices of software systems design and implementation, research methods, requirements for data analysis and apply all these knowledge for development of individual project. During the semester different phases of project development are analyzed (project idea generation, project exclusivity, requirement and architecture specification, project success evaluation, analysis of project results, etc.). It is also a strong focus on proper project documentation and presentation for different type of audience.	

FMIGB17002	TECHNICAL DRAWING	3 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 33 hours/semester	
Course aim	Sketch drawing, means of dimensivining, material marking in drawings. Demountable and non-demountable joints, types ofsrews, viewing and marking of screws, screw fastening elements. Assemblies drawings and their drawing order. Understandingand detailing of assembly drawings. Specification. Viewing of springs, gears, gear and chain trains. Kinematics diagrams.Marking of surface machining types in the drawings. Tolerances and fits.	
Course description	Sketch drawing, means of dimensivining, material marking in drawings. Demountable and non-demountable joints, types ofsrews, viewing and marking of screws, screw fastening elements. Assemblies drawings and their drawing order. Understandingand detailing of assembly drawings. Specification. Viewing of springs, gears, gear and chain trains. Kinematics diagrams.Marking of surface machining types in the drawings. Tolerances and fits.	

FMISM20302	CYBER FORENSICS (WITH COURSE WORK)	9 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – N/A
Laboratory works – 30 hours/semester	**Individual work** – 180 hours/semester	
Course aim	To provide specific knowledge, necessary to identify cyber crime events, implement reaction procedures and perfrom computer forensics tasks.	
Course description	Increase of cyber crime has increased the need for organizations to have specialists with specific knowledge, necessary to identify, investigate them and take actions to minimize such cyber crime consequences. Demand for such specialists can be seen both from commercial organizations (for such event identification, informal investigation and response) and legal enforcement institutions (formal cyber crime investigation). In this module specific technical, law and organizational methods are analyzed, that are necessary to handle cyber crime cases and perform computer forensics tasks.	

FMISM20102	CRYPTOGRAPHIC SYSTEMS	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	To expand knowledge of applied cryptography and information protection technologies used in computer systems.	

Course description	Theoretical and practical foundations of cryptographic information security methods are acquired. Popular and advanced cryptosystems are analyzed, which provide information confidentiality, integrity and authenticity. Abilities to used obtained knowledge in information society technologies (e-business, e-money, bitcoin, e-government, e-voting etc.) are provided. Main module topics are: problems of information security; history of coding; symmetric and public key cryptography; DES; AES; RSA; stream ciphers; cryptographic protocols; authentication; electronic signature; management of electronic identity; block chain technology.

FMISM22304	ETHICAL, LEGAL AND HUMAN ASPECTS OF INFORMATION SECURITY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	The aim of the subject is to familiarize students with the ethical, legal and human aspects of information security and to teach them to apply in practice.	
Course description	The module provides an overview of the ethical, legal and human factor information security aspects: IT security, internet and intellectual property regulation, the fundamentals of legal regulation of privacy and personal data, cybercrime and regulation of their research, the principles of professional ethics of cyber security and the main professional codes of ethics and the influence of the human factor in information and cyber security.	

FMISM20301	INFORMATION SECURITY MANAGEMENT	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To provide students with knowledge and skills necessary manage information security related processes of an organization.	
Course description	The course content oriented toward state of the art in information security management problems and solutions. The content contains most relevant and important topics about information security management purpose, tools and organization, processes and information sources particularities, vulnerabilities and associated risk. The course is adapted for MSc students, who have the Informatics or informatics engineering BS degree.	

FMISM20101	INFORMATION TECHNOLOGY SECURITY METHODS	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	To provide knowledge on information technology security methods and principles.	
Course description	This module presents modern information technology security insurance aspects, necessary while studying the ”Information andIT security” Master course. Basic concepts and models are being described and analyzed; major information security insurancetechnologies are presented and described. Primary attention is dedicated to technological information security aspects.	

FMMMM19101	NUMERICAL METHODS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 111 hours/semester	
Course aim	The goal is to introduce the basic numerical methods and to learn how to apply these methods for solution of specific problems.	
Course description	In this course students learn the concepts of computer arithmetic, stability and computational complexity of numerical algorithms. Students learn numerical methods for solving nonlinear equations and systems of equations, direct and iterative methods for solving linear systems of equations, finite difference method for solving differential equations, interpolation and approximation methods, and numerical integration methods.	

FMISM17302	SECURE PROGRAMMING	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 100 hours/semester	
Course aim	To present secure programming methods to students and form practical skills of using them.	

Course description	This module covers a wide range of topics in area of secure programming, such as safe initialization, access control, input validation, symmetric and public key cryptography, typical programming mistakes and vulnerabilities, secure and vulnerable libraries, code parsing and analyzing methods and tools, software testing and evalution methods. Specific secure programming issues for different operating systems and WEB environment.

MECHANICS FACULTY

MEBIB17028	AUTOMATIC CONTROL	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide structure and principals of automatic control systems (ACS). System description in time domain and frequency domain spaces. Classification of ACS, technical means and criteria evaluation of stability.	
Course description	In this course are presented principles and structure of automatic control systems (ACS), description of ACS in time and frequency domains (differential equations, Laplace transform, transfer function, frequency response). Controller types and devices. Stability, stability criteria. Quality evaluation, quality criteria.	

MERSB17115	CAREER INTERNSHIP	12 ECTS
Career internship – 260 hours/semester	**Preparation for evaluation** – 60 hours/semester	
Course aim	Acquirement and development of engineering, management, control and practical work with mechanisms skills.	
Course description	Factory's structure, using mechanism, constructions of machines and producible production. Gained skills of practical work in the company. Material is gathered for final work. Report of the practice is written in the end.	

MEMKB17158	CUTTING PROCESSES AND TOOLS	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 33 hours/semester	

Course aim	To provide knowledge of processes which take place in metal cutting zone, conventional metal cutting methods, modern metal cutting tools, their design, geometry and materials.
Course description	The module provides information about processes which take place in metal cutting zone, about basic metal cutting tools, their types, design and geometrical parameters, about materials used for cutting part of metal cutting tools.

MEMKB17222	DESIGN OF MACHINES AND INSTRUMENTS 2 (WITH COURSE PROJECT)	6 ECTS
Lectures – 40 hours/semester	**Practical works** – 10 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 10 hours/semester	**Individual work** – 96 hours/semester	
Course aim	Knowledge about process of machines and instruments design: methods of design of base members, guides. Knowledge about programmable machines. Ability to design programmable equipment. Develop skills to apply this knowledge to the selection of the main components and assemblies of machines and instruments.	
Course description	To get acquainted with methods of the design of base parts of machines and instruments, guides. To get acquainted with the programmed automation - the structure, constituent parts, control principles of CNC type machines. To get acquainted with the design principles of robots as a programmable equipment. To get acquainted with functional mechanisms of instruments.	

MERSB17780	DESIGN OF MECHATRONIC AND DIGITAL PRODUCTION SYSTEMS. COMPLEX PROJECT	6 ECTS
Lectures – N/A	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 126 hours/semester	
Course aim	Introducing students with different types of mechatronic systems. Joint of mechanic, electric and numeric control systems in mechatronics. Fundamentals of dynamics of mechatronic systems.	
Course description	Practical understanding of mechatronic systems. Control and design of different types of mechatronic systems. Synthesis of desired properties in mechatronic system design. Parameters of control of different types of mechatronic systems, dynamics of mechatronic system control. Design of real systems using digital modeling without solving differential equations analytically.	

MEMKB17226	DESIGN OF TOOLS AND DEVICES (WITH COURSE WORK)	6 ECTS
Lectures – 40 hours/semester	**Practical works** – 10 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 10 hours/semester	**Individual work** – 96 hours/semester	
Course aim	Acknowledge with design schemes, materials, use, calculation and design of tools and devices, theory of their quality achievement.	
Course description	Design of cutting tools. Calculation and design of specialized cutting-edged tools. Characteristics and use of abrasive tools. Design schemes of specialized devices, their use, design elements of devises, calculation and design of devices, accuracy securing.	

MERSB17106	INTRODUCTION TO ENGINEERING PROGRAMMING	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** – 48 hours/semester	
Course aim	Deliver general understanding of mechatronic and robotic systems and their place in general engineering. Transfer generalknowledge about mentioned systems, reveal their structure, and analyze structural elements and their internal links withinsystem. To bring knowledge about evaluation of general parameters of these systems and ways to recognize them in theintegrated environment. Bring knowledge about control using general programing of devices, reveal possibilities andlimitations.	
Course description	In this course students are introduced with understanding and main definitions of mechatronics and robotics. There arerevealed structure of mechatronic system, introduced with structural components. There are given description of operationof mechatronic and robotic systems, revealed various configuration. Main principles of programing and theirimplementation for system control presented in the course.	

MEMKB22501	JOINING TECHNOLOGIES	6 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 4 hours/semester
Laboratory works – 30 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide knowledge about non-destructive joining technologies, their application possibilities, to familiarize with the processes and equipment.	

Course description	The Module provides knowledge about different non-destructive joining technologies used in industry. Different welding methods are analyzed: gas welding, consumable-electrode manual arc welding, gas-shielded arc welding (MIG, MAG, TIG), submerged arc welding, resistance welding and special welding methods (laser welding, electron-beam welding, plasma-arc welding, ultrasonic welding and other methods). Knowledge about metallic and non-metallic materials, soldering and brazing, bonding is provided. Different processes are presented as well as information on joints control.

MEMKB17383	MATERIALS SCIENCE 2	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – 2 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 33 hours/semester	
Course aim	To provide knowledge about the metal materials structure and formation processes, the selection and properties modify of steels and non-ferrous metals and its alloys, their thermal, thermochemical and thermo-mechanical treatment processes.	
Course description	The materials selecting criteria and metallic materials grouping system studied in the module. Crystalline structure of materials and diffusion process. Real and deformed metal structure, recrystallization. Materials crystallization and alloys phase diagrams. The structure and phase transformations of Fe-C alloys. Carbon and alloyed structural steels. Corrosion and degradation of materials. Non-ferrous metals and its alloys. Thermal, thermochemical and thermo-mechanical treatment of metals.	

MERSB17111	MECHATRONIC SYSTEMS 1	3 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** – 33 hours/semester	
Course aim	Introducing students with different types of mechatronic systems. Joint of mechanic, electric and numeric control systemsin mechatronics. Fundamentals of dynamics of mechatronic systems.	
Course description	Overview of mechatronic systems, different their types. Properties of Different types of mechatronic systems. Synthesis ofmechatronic systems using in their design different physical sources of power - electrical, hydraulic, pneumatic. Realoperation of mechatronic systems - exciting and deflecting. Multiply degree of freedom in mechatronic systems.Nonlinearities in mechatronic systems. Modeling of simple mechatronic systems.	

MERSB17110	ROBOTICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To introduce the structure, design principles and main design stage calculations of industrial robots. To introduce sensors, drivesand control systems of industrial robots. Present information about recent developments and trends in the development ofrobotics. To introduce the basic principles of design of industrial robots.	
Course description	Overview of industrial robots. Structure and components of robotic systems. Controllers, actuators and sensors of industrialrobotic systems. Control principles of industrial robots. Programming motion of industrial robots.	

MERSB17054	THEORY OF MECHANISMS AND MACHINES (WITH COURSE PROJECT)	9 ECTS
Lectures – 45 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 6 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 144 hours/semester	
Course aim	To teach understand the structure of mechanisms and machines, kinematic and dynamic processes in them, in preparingto studies of modern machinery and equipment.	
Course description	Concepts of machine and mechanism. Structure of linkage mechanisms, their metric synthesis, graphical and graphoanalytical kinematics. Classification of cam mechanisms, dimension calculation, the profile synthesis. Gear mechanisms,gear and their design. Machine dynamics. Flywheel design for the machine. Mechanisms balancing. 5 laboratory works.Course project. Exam.	

MEMKM18303	BUSINESS GAME	6 ECTS
Lectures – 22 hours/semester	**Practical works** – 23 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	Provide knowledge and enable students to implement their business ideas.	
Course description	The subject points out the theoretical and practical aspects of the design, development and implementation of the business model. The theoretical part introduces business models, their structure and preparation, the interpretation of strategies in business models and business model processes. In the practical part, real business model examples are analyzed and a business model is developed within the student teams through the element of the game.	

MEMKM20301	DIAGNOSTIC AND MONITORING	6 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 15 hours/semester
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To acknowledge with new methods and means of technical diagnostics of mechanical systems.	
Course description	Diagnostics and monitoring of mechanical systems. Kinds of failure probability of their rise, detection technique. Failure elimination. Models and technique. Monitoring of environment protection and technological equipment mechanical systems.	

MEBIM21063	DYNAMICS OF BIOMECHANICAL SYSTEMS	9 ECTS
Lectures – 45 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 15 hours/semester
Laboratory works – N/A	**Individual work** – 165 hours/semester	
Course aim	To introduce to the main principals of biomechanical systems' dynamics, development methods of equations of motion, modeling of human musculoskeletal systems and analysis, application of biomechanics principles to clinical and biomechanical research.	
Course description	Concept of mathematical and dynamic model. General body movement. Elements of a dynamic model and their properties. Linear and nonlinear system characteristics. Analysis of random processes in biomechanical systems. Analysis of systems of one and more degrees of freedom by analytical and numerical methods. Direct and inverse dynamics problem. Mechanical modeling of the human body, dynamic characteristics. Dynamic motion analysis using musculoskeletal models. Muscle simplified models, dynamic characteristics. Vibrations and natural frequencies of the human body. Characteristics and methods of human exposure to vibrations.	

MEMKM17338	DYNAMICS OF MECHANICAL SYSTEMS (WITH COURSE WORK)	12 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 15 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 245 hours/semester	

Course aim	To get acquainted with the structure of mechanical systems, their constituent parts, methods of estimation of the dynamic characteristics and parameters of mechanical system. To get acquainted with dynamics of mechanical systems. To get acquainted with dynamics principles of MS design, calculations, which could be peformed during the MS design. To present information related with newest atchievements in field of MS dynamics research.
Course description	Mechanical elements, structure, principles of design, components of mechanical systems. Constituent parts of mechanical systems. Structure and composition principles of mechanical systems. Definition of positioning accuracy of mechanical systems. Direct and inverse kinematic problems of mechanical systems, velocity problem, problems of static forces, dynamic problems. Selection of Actuators of mechanical systems, strength calculations. Selection of sensors of mechanical system. Control devices and equipment of mechanical system. Definition of natural frequencies. Elements of modal analysis.

MERSM17148	EXPERIMENTAL PRACTICE	6 ECTS
Lectures – N/A	**Practical works** – 30 hours/semester	**Consultations** – 10 hours/semester
Laboratory works – N/A	**Individual work** – 120 hours/semester	
Course aim	To give competencies to plan, design and set-up experiment in order to solve specialized problems, to obtain knowledge and experience of new investigation methods.	
Course description	The student is introduced to main principles and methods of planning and performing experimental research. The course covers various experimental designs and methods as well as main criteria for reliable measurements and analysis of experimental results.	

MERSM17156	EXPERIMENTAL RESEARCH OF MECHATRONIC SYSTEMS	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	To deliver fundamentals of modelling, experimental design and scientific research of mechatronic systems.	
Course description	There are presented overview of experimental research of mechatronic systems, defined methods of scientific research, introduced with experimental design. There are discussed modelling of experiment and simulation of mechatronic systems.	

MERSM17153	EXPERIMENTAL RESEARCH OF MECHATRONIC SYSTEMS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 10 hours/semester
Laboratory works – N/A	**Individual work** – 105 hours/semester	
Course aim	To deliver fundamentals of modelling, experimental design and scientific research of mechatronic systems.	
Course description	There are presented overview of experimental research of mechatronic systems, defined methods of scientific research, introduced with experimental design. There are discussed modelling of experiment and simulation of mechatronic systems.	

MEMKM17341	FUNDAMENTALS OF RESEARCH AND INNOVATION	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 50 hours/semester	
Course aim	The course aims to provide students with knowledge of research methodology and techniques and abilities to make research andto predict how the research results could be used for innovation creation and implementation industry by solving engineerical andmanagerial problems.	
Course description	The module is about the methodological bases of science and innovations. The basic concept, structure and objectives ofresearch. The qualitative and quantitative research methods. The planning stages, planning validity, reliability and ethics ofresearch. The main strategies of research. Theoretical and empirical research methods. The importance of innovation andmodern business trends. Innovation concept and classification. Regional innovation clusters, government policies for innovation.Role of creativity in innovation, creative process.	

MEMKM17344	HUMAN RESOURCE MANAGEMENT AND LEADERSHIP	6 ECTS
Lectures – 45 hours/semester	**Practical works** – N/A	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To provide academic knowledge and abilities to apply human resource management and leadership in manufacturing practice, consultation activity, academic researches.	

Course description	Human Resource Management and Leadership course is provided human resources strategic management theoretic models, research on strategy formation stages and principles. Discovery of human resource management strategy and organization culture adjustment. Discuss of questions on personnel individual and collective behaviors, methods and principals of management. Analysis of group and team work in industrial enterprise, issues on employee integration in enterprise, group, team. Innovation team formation and management. To provide basic motivation conceptions and examines motivation system formation in enterprise. Analysis of issues on determination of expertise requirements for workers and qualification improvement.

MEMKM17342	IMPROVEMENT AND INNOVATION OF MANUFACTURING PROCESS (WITH COURSE WORK)	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	The course aims to provide students with the knowledge and skills necessary for improvement and innovation development of manufacturing process.	
Course description	This module presents key concepts and principles of improvement and innovation of manufacturing process. The models of innovation development of manufacturing process are analyzed. Students are introduced to the principles of TPS (Toyota production system), Lean, Theory of constrain, Six sigma and etc. Syllabus elements are: Continues improvement process - Kaizen; Ideas generation and creativity stimulation for improvement and innovation of manufacturing process; Process of Value Stream Mapping; Process mapping by F. Gilbreth; Process of Flow charting; Kanban system; Just-in-time inventory strategy; 5S method; Types of wastes (muda) in Lean manufacturing; Takt time, Lead time in Lean manufacturing; SMED (Single Minute Exchange of Die) in manufacturing; Poka-yoke in manufacturing; Autonomation and Jidoka; Production leveling; Workcells in Lean manufacturing; Fixed Repeating Schedule; Gemba in Lean manufacturing; Genchi Genbutsu in Lean manufacturing.	

MEMKM17369	INNOVATIVE PRODUCT DESIGN (WITH COURSE PROJECT)	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	To learn how to research, analyse, create, improve and apply innovative products which design based on results of scientific research.	

Course description	In the Innovative Product Design subject the main attention is paid to the implementation of created innovative product conception that is based on scientific research in the modern industrial environment. The process of innovative product design, methods of workability assurance and evaluation, PMBOK processes, CPM, PERT, planning models, application of the PRINCE2 method, practical use of the CAD/CAM/CAE in the innovative product prototypes producing are analysed in details.

MERSM17154	MECHANICS OF MECHATRONIC AND ROBOTIC SYSTEMS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 10 hours/semester
Laboratory works – N/A	**Individual work** – 90 hours/semester	
Course aim	To deliver knowledge about mechanics of mechatronic and robotic systems.	
Course description	There are presented overview of mechanics of mechatronic and robotic systems, delivered their design features and prescribed their implementations. There are discussed structure of mechanics of mechatronic and robotic systems, delivered their dynamic haracteristics and practical methods of their obtaining.	

MERSM17155	MECHANICS OF MECHATRONIC AND ROBOTIC SYSTEMS (WITH COURSE PROJECT)	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 10 hours/semester
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	To deliver knowledge about mechanics of mechatronic and robotic systems.	
Course description	There are presented overview of mechanics of mechatronic and robotic systems, delivered their design features and prescribed their implementations. There are discussed structure of mechanics of mechatronic and robotic systems, delivered their dynamic haracteristics and practical methods of their obtaining.	

MEBIM21064	MEDICAL WASTE MANAGEMENT	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 15 hours/semester
Laboratory works – N/A	**Individual work** – 180 hours/semester	

Course aim	To get acquainted with the normative regulation of medical waste: concepts, classification, impact on health and environment. Provide safe medical waste treatment methods and utilization technologies. To get acquainted with the research areas, methods and benefits. Apply knowledge to the analysis of medical waste situations.
Course description	Terms and concepts of medical waste, characteristics, classification, sources, impact on health and the environment. WHO guidelines, legal and regulatory aspects. Reduction, reuse and recycling of medical waste. Hygiene of medical institutions and safety of staff and work and the environment. Collection, sorting, packaging, marking, storage and transport of medical waste. Medical waste disposal and recovery technologies. Landfill, other treatment. Research into the effectiveness of technologies, analysis of the impact on human health and the environment. Waste management algorithms, comparison and analysis.

MERSM17175	PNEUMATIC AND HYDRAULIC SYSTEMS (WITH COURSE PROJECT)	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	To deliver knowledge about implementation of hydraulic and pneumatic systems in mechatronics.	
Course description	There are delivered overview of design of oneumatic and hydraulic systems, discussed possibilities of their their implementation in mechatronics and robotic systems.	

MEMKM18302	PRODUCTS AND SERVICE QUALITY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To give knowledges about possibilities of security of production and service quality in all stages of its existence. To train make qualitative technical project. To introduce with prime methods of products control and method of control performance. To determinate what is dependence between quality and price of production. To determinate what is dependence between quality and price of service.	
Course description	Quality conception. Quality notions and terms. Quality characteristics. Quality index. New product and service project process. Control of product quality. Methods of product submit to control. Methods of quality control. Marketing quality. Marketing notions and terms. Methodic of product submit to market. Cost of quality. Cost of poor quality. Cost of quality assurance. Product quality and profit. Optimization of quality charge. Conceptual service quality models with latent variables. Sampling techniques. Customer' satisfaction survey.	

MEMKM20101	RELIABILITY OF MECHANICAL SYSTEMS	6 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 15 hours/semester
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To obtain acquainted with the reliability theory science, its purposes, methods of estimation of technical objects reliability, of thereliability improvement ways.	
Course description	Object of the reliability theory, main conceptions and definitions. A methodology of the reliability theory. Basic probabilistic andstatistical (empirical) indexes of the reliability of the mechanical systems and basic random variables. Calculations of theseindexes. Calculation of reliability of the complex repairable and non-repairable technical systems. Reliability of the structuralelements and main calculation methodologies.	

MEMKM17365	SIMULATION OF MECHANICAL SYSTEMS (WITH COURSE PROJECT)	12 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 15 hours/semester
Laboratory works – N/A	**Individual work** – 245 hours/semester	
Course aim	Introducing students with various methods of mechatronic system modelling.	
Course description	Methods of modelling. Analysis of mechatronic systems on basis of their modelling possibility. Modelling of components of mechatronic systems. Jointed mechatronic systems, influence of control. Synthesizing of new mechatronic systems with desired properties in case of modelling new systems.	

MEMKM17343	SUPPLY CHAIN MANAGEMENT AND INTERNATIONAL MANUFACTURING	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	The course aims to provide students with the knowledge and skills necessary for the management of industrial enterprises'supply and distributional processes, and inventory management process as well. Also course aims to assess opportunities forinternational manufacturing development.	

Course description	The module is about strategic approach application for the management of supply chain activities. Design and improvement ofinbound and outbound sides of logistics. Aggregate planning for supply chain management. Inventory management. Managingdemand variability and volatility, its forecasting. Supply chain coordination. The process of strategy development for internationalmanufacturing. Offshoring, outsourcing, offshore outsourcing. Country's selection process for international manufacturing.Countries' comparison methods and process. The importance of the cultural differences perception for internationalmanufacturing.

MEMKM20302	THEORY OF FLOW	6 ECTS
Lectures – 15 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 15 hours/semester
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	Introducing students with complex, liquid-solid system flow.	
Course description	Classical liquid mechanics and sophisticated liquids. Navier -Stockes equations and their applications. Different mixtures of gas,liquid and solids, their stability and separation. Sophisticated mixture, found in nature and their overview. Measurement ofsophisticated liquid parameters and corresponding equipment.	

TRANSPORT ENGINEERING FACULTY

TIMGB17125	COMPUTER AIDED ENGINEERING FOR TRANSPORT MACHINERY	3 ECTS
Lectures – 6 hours/semester	**Practical works** – 10 hours/semester	**Consultations** – 2 hours/semester
Laboratory works – N/A	**Individual work** – 62 hours/semester	
Course aim	Introduction to computer-aided design applications (CAD, CAM and CAE), show their facilities. To teach basics of computer-aideddesign software, to use these commands for making, correcting and analyzing 3D model or whole equipments. To train studentswork in workgroups.	
Course description	Introducing to computer aided design applications (CAD, CAM and CAE) their possibilities. User environment, an introduction tothe creation of sketches, basic part modeling, model changes, using of drawings. Generated three-dimensional model errors andtheir correction. Models strength calculations, optimization of model dimensions. Standard profiles library, making own profileslibrary. 3D model kinematic and dynamic. Model visualization.	

TIMGB17124	HYDRAULIC AND PNEUMATIC SYSTEMS (WITH COURSE PROJECT)	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide the essential information about the properties of liquids, hydrostatic pressure, its force acting on the surface and laminar and turbulent liquid flows, as well as the structures of the elements of the hydraulic and pneumatic systems, principles of operation, calculation, design and application in drives used in creating new machines or improving them to ensure their safe operation and technical progress.	
Course description	The fundamentals of the elements and drives of hydraulic and pneumatic systems are provided. The classification of machines driven by these drives, according to Pascal's law, and the machines' and elements' notation in the schematic diagrams based on the EU and Lithuanian standards; their operation principles, structures and functions in hydraulic and pneumatic drives as well as calculation, design and selection for industrial use according to the functions performed by technological equipment, taking into account work safety requirements, are presented. The essential information about the dynamic machines, their structure, the main principles of calculation and use in the hydraulic drives is provided.	

TIAIB17051	INTERNAL COMBUSTION ENGINES (WITH COURSE PROJECT)	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – 15 hours/semester	**Individual work** – 96 hours/semester	
Course aim	To provide knowledge about internal combustion engines construction, operation, design, tests and teach theoretical knowledge use in practice.	
Course description	Module provides information about the internal combustion engine (ICE) classification, structure and functioning, thermal calculation of working cycles and the resistance of basic details. Introducing ICE kinematics and dynamics of mechanisms, engine tests and their characteristics. Examine ICE dynamic, economic and environmental rate improvement methods.	

TIMGB17126	VEHICLE DYNAMICS	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – 4 hours/semester
Laboratory works – N/A	**Individual work** – 96 hours/semester	

Course aim	Provide theoretical background of vehicle dynamics and learn to apply, to interpret, to analyze and to solve practical problems of vehicle dynamics.
Course description	A dynamic model, generalized coordinates and forces. Kinetic and potential energy, dissipative function. Oscillations and their characteristics. Road pavement. Basic characteristics of road unevenness. Modeling of road coating unevenness. Modeling of mechanical systems. Natural frequencies and shapes. The theory of the deformed wheel rolling. The motion equations of vehicle. Vehicle movement on the plane and in space. Vehicle vibration. Mathematical models of ABS systems. The dynamics of vehicle braking. The dynamics of rail vehicles, their mathematical models, forced and stochastic oscillations, level of comfort. Rail vehicles with electromagnetic chassis, their control system and stability. Mathematical models of road-building machines and dynamic processes.

TIMGM18169	RESEARCH IN TRANSPORT ENGINEERING	3 ECTS
Lectures – 30 hours/semester	**Practical works** – N/A	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 50 hours/semester	
Course aim	To learn how to apply scientific methods in the research.	
Course description	During lectures students are introduced to the scientific methods, methods of decision-making, funding system and levels oftechnical preparation of research and experimental development. It contains information about the data collection andvisualization techniques, design of experiment, statistical, AHP and other methods to scientific tools.	

TIMGM18166	THE FINITE ELEMENTS METHOD	9 ECTS
Lectures – 30 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 180 hours/semester	
Course aim	To provide the profound knowledge about the theory of finite elements methods, types of finite elements and to develop skills to comprehend physical processes, their mathematical expression and to choose the appropriate methods and algorithms of solution.	

Course description	The main concepts of the finite elements method, its strengths and weaknesses. Systems of coordinates, Lagrange interpolation formula, polynomials of Hermite and Chebyshev. Types of finite elements, approximation functions and their characteristics. Variational calculation, functional extremum. Derivation methods of FEM equations; methods of introducing boundary conditions. Methods of solving linear and non-linear systems of algebraic equations of high order. Integrating the systems of differential equations. Solving the main mechanical problems by FEM: elasticity problems; non-stationary problems of elastic and viscous materials, problems of the stability of structures; problems of hydrodynamic lubrication; electrodynamical problems; analysis of standard finite elements.

TIMGM17165	THE USE OF THE FINITE ELEMENTS METHOD IN CONTINUUM MECHANICS	6 ECTS
Lectures – 15 hours/semester	**Practical works** – 30 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To provide the profound knowledge about the theory of finite elements methods, types of finite elements and to develop skills to comprehend physical processes, their mathematical expression and to choose the appropriate methods and algorithms of solution.	
Course description	The main concepts of the finite elements method, its strengths and weaknesses. Systems of coordinates, Lagrange interpolation formula, polynomials of Hermite and Chebyshev. Types of finite elements, approximation functions and their characteristics. Variational calculation, functional extremum. Derivation methods of FEM equations; methods of introducing boundary conditions. Methods of solving linear and non-linear systems of algebraic equations of high order. Integrating the systems of differential equations. Solving the main mechanical problems by FEM: elasticity problems; non-stationary problems of elastic and viscous materials, problems of the stability of structures; problems of hydrodynamic lubrication; electrodynamical problems; analysis of standard finite elements.	

TIAIM17100	THEORY OF RELIABILITY OF TRANSPORT MACHINERY	6 ECTS
Lectures – 30 hours/semester	**Practical works** – 15 hours/semester	**Consultations** – N/A
Laboratory works – N/A	**Individual work** – 115 hours/semester	
Course aim	To introduce students to the main transport machinery reliability theory terms, to define the basic quality of the machine defining reliability indicators, examine the physical processes taking place in transport machinery units. Provide the most important mathematical statistical methods for the qualitative parameters of vehicle modeling and predict.	

Course description	The most important vehicles theory of reliability terms and definitions. Physical machinery reliability basics, the vehicle unit processes analysis. Reliability indicators and forecasting. Statistical models (empirical and theoretical distributions), for transport machinery qualitative indicators, and their conclusion and practical application.