

Study plan

Name of study plan: 12 74 79 00 BTZSI 2012 A - prezen ní anglicky

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Theoretical Fundamentals of Mechanical Engineering

Type of study: Bachelor full-time

Required credits: 218

Elective courses credits: 0

Sum of credits in the plan: 218

Note on the plan: t etí pokus

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 210

The role of the block: P

Code of the group: 12B-KMENA TZI STR

Name of the group: 01 2012 souhrn skupin 12B*AiP-KMEN pro i od 1 do 6

Requirement credits in the group: In this group you have to gain 149 credits

Requirement courses in the group: In this group you have to complete 35 courses

Credits in the group: 149

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
E012035	Algorithmization and Programming Petr Svá ek, Marta ertíková, David Trdlí ka Marta ertíková Petr Svá ek (Gar.)	KZ	4	1P+2C	*	P
E371047	Automatic Control Jaromír Fišer Jaromír Fišer Jaromír Fišer (Gar.)	Z,ZK	5	3P+1C	Z,L	P
E182019	Chemistry Jaromír Štancl Jaromír Štancl Jaromír Štancl (Gar.)	KZ	3	2P+1C	*	P
E012037	Computer Graphics Nikola Pajeroová, Ivana Linkeová Ivana Linkeová Ivana Linkeová (Gar.)	KZ	3	1P+1C	*	P
E372041	Computer Support for Study Vladimír Hlavá Vladimír Hlavá Vladimír Hlavá (Gar.)	KZ	3	1P+1C	*	P
E011021	Constructive Geometry Ivana Linkeová	Z,ZK	6	3P+2C	Z	P
E141504	Electrical Circuits and Electronics Jan Chyský, Martin Novák Martin Novák Jan Chyský (Gar.)	Z,ZK	4	2P+0C+2L	*	P
E141505	Electrical Machines and Drives Jan Chyský, Martin Novák Martin Novák Jan Chyský (Gar.)	Z,ZK	4	2P+0C+2L	*	P
E132001	Engineering Design I.	KZ	2	1P+2C	1	P
E131002	Engineering Design II Martin Dub	Z,ZK	4	2P+3C	2	P
E133013	Engineering Design III. František Lopot, Jan Hoidekr Jan Hoidekr Jan Hoidekr (Gar.)	Z	2	0P+2C	*	P
E133014	Engineering Design IV. František Lopot, Jan Hoidekr Jan Hoidekr Jan Hoidekr (Gar.)	Z	2	0P+2C+0L	*	P
E121500	Fluid Dynamics	Z,ZK	5	3P+2C	*	P
E153005	Fundamentals of Energy Conversions Lukáš Pila , Tomáš Dlouhý, Michal Kolovratník, Ond ej Bartoš, Pavel Zácha, Jan Hrdlí ka, Pavel Skopec Ond ej Bartoš Tomáš Dlouhý (Gar.)	Z	1	1P+1C	*	P
E131005	History of Technology František Lopot	ZK	3	2P+0C	Z	P
E131512	Machine Elements and Mechanisms I. František Lopot, Daniel Hadraba František Lopot František Lopot (Gar.)	Z,ZK	6	3P+2C	*	P
E381054	Management and Economics of the Enterprise Michal Kavan Michal Kavan Michal Kavan (Gar.)	Z,ZK	4	2P+2C	*	P

E322029	Materials Science I. <i>Veronika Mazáková, Jana Sobotová, Jakub Horník Jana Sobotová Jana Sobotová (Gar.)</i>	KZ	3	2P+0C+1L	L	P
E321039	Materials Science II. <i>Jana Sobotová, Jakub Horník Jana Sobotová Jakub Horník (Gar.)</i>	Z,ZK	4	2P+2L	*	P
E011056	Mathematics I.	Z,ZK	8	4P+4C	Z	P
E011062	Mathematics II <i>Stanislav Kra mar</i>	Z,ZK	8	4P+4C	*	P
E011009	Mathematics III. <i>Olga Majlingová, Stanislav Kra mar Stanislav Kra mar (Gar.)</i>	Z,ZK	5	2P+2C	*	P
E372083	Measurement in Engineering <i>Martin Novák Martin Novák Martin Novák (Gar.)</i>	KZ	3	1P+0C+2L	*	P
E311101	Mechanics I. <i>Pavel Bastl, Václav Bauma, Petr Beneš, Ivo Bukovský, Martin Ne as, Zden k Neusser, Jan Pelikán, Pavel Steinbauer, Zbyn k Šika, Michael Valášek Michael Valášek (Gar.)</i>	Z,ZK	4	2P+2C	*	P
E311102	Mechanics II. <i>Pavel Bastl, Václav Bauma, Petr Beneš, Ivo Bukovský, Martin Ne as, Zden k Neusser, Jan Pelikán, Pavel Steinbauer, Zbyn k Šika, Michael Valášek Michael Valášek (Gar.)</i>	Z,ZK	4	2P+2C	*	P
E181026	Momentum, Heat and Mass Transfer <i>Martin Dostál, Vojt ch B lohlav</i>	Z,ZK	5	3P+1C	*	P
E011049	Numerical Mathematics <i>Marta ertíková, David Trdlík Marta ertíková</i>	Z,ZK	4	2P+2C	*	P
E021041	Physics I.	Z,ZK	7	4P+1C	*	P
E021025	Physics II.	Z,ZK	4	1P+2C	*	P
E331068	Technology I.	Z,ZK	5	2P+2C	*	P
E341014	Technology II.	Z,ZK	5	2P+2L	*	P
E121023	Thermomechanics	Z,ZK	5	3P+2C	*	P

Characteristics of the courses of this group of Study Plan: Code=12B-KMENATZI STR Name=01 2012 souhrn skupin 12B*AiP-KMEN pro i od 1 do 6

E012035	Algorithmization and Programming	KZ	4
Programming in MATLAB and its programming language. MATLAB command line. Elementary commands, variable, assignment and expression. Matrices, vectors and operations. Writing M-script. Input and output. Condition and cycle. Algorithmization of simple problems in MATLAB. Graphical commands. Matrix operations. Systems of linear equations. Scripts and functions. Structure of program. Variables, expressions, assignment, and input / output commands. switch. For cycle. Arrays and files. Pointers. Structures. Algorithmization of simple programs: minimum, mean, norm, numerical integration, bisection method, Newton method, matrix operations. Direct methods for solution of systems of linear equations.			
E371047	Automatic Control	Z,ZK	5
Automatic controllers are important part of many industrial processes. The goal of this course is to introduce students into basic knowledge of automatic control theory and practice like transfer functions, open versus closed loop control, design of controllers and frequency based analysis of control systems. The course also concentrates on logic control and control via programmable logic controllers. Some seminars are arranged in laboratories where practical skills and control engineering methods are trained. Students begin to work with MATLAB software as a common platform of control engineers (MATLAB is used on all including most of the laboratory classes).			
E182019	Chemistry	KZ	3
General chemistry from the point of view of mechanical and process engineering. Physical chemistry forms 2/3 of the course (structure and properties of matter, thermodynamics, phase equilibrium, chemical reactions, reaction engineering), the remaining 1/3 is devoted to organic chemistry (hydrocarbons, polymers) and biochemistry. Laboratory practice is oriented upon the material properties measurement.			
E012037	Computer Graphics	KZ	3
The subject is focused on the mathematical theory of the curves and surfaces in computer graphics and their visualisation. The Rhinoceros - NURBS modelling for Windows is used to demonstrate the geometrical properties of the curves and surfaces.			
E372041	Computer Support for Study	KZ	3
The course introduces students into creating technical and professional documents on computers or Web and into realizing technical computations with the use of computers. Students gain practical skills by creating an essay in a text editor, by realizing technical computations with a spreadsheet calculator, and by creating and presenting a web page.			
E011021	Constructive Geometry	Z,ZK	6
The subject is focused on geometric objects in the space - curves, surfaces and solids and their properties and mutual relations.			
E141504	Electrical Circuits and Electronics	Z,ZK	4
Introduction into theory of electrical circuits, analysis special types of electrical circuits as DC and AC. Transient states in circuits with accumulators of energy. Using Symbolic-Complex method and Fourier transformation for analysis AC circuits supplied with harmonic signal. El. Power and Energy. Introduction into electronics. Principle and typical parameters of basic semiconductor components. Application in electronic circuits (rectifier, stabilizer, power control, operational amplifier). Analogue and digital circuits. Principle of analogue and digital signal processing. Logical circuits, converters, microprocessor.			
E141505	Electrical Machines and Drives	Z,ZK	4
AC el. circuits. Electrical power and energy. Calculation, measurement, power factor. Magnetic circuit, materials, hysteresis loop. Electromagnet. Transformer, principle, construction, 3-phase transformer, operating conditions, rated (scheduled) values. Induction machine, principle, construction, operating conditions. Starting, speed-torque characteristic, speed control. Synchronous machines. DC-machines, principle, parameters, operating conditions, construction, starting, speed control, speed-torque characteristic. Low-voltage instruments. Low-voltage distribution system.			
E132001	Engineering Design I.	KZ	2
The course is focused on building up the ability of future designers to express their ideas through common communication language - technical drawing. During the course students train and improve their skills in spatial imagination and engineering way of thinking.			
E131002	Engineering Design II	Z,ZK	4
Theoretical fundamentals of GPS (Geometrical Product Specification). Students will get critical knowledge about ISO system of limits and fits, tolerancing, surface texture, geometrical tolerance, dimensional loops, tolerancing of angles and cones, tolerancing of threads. Integral part of course is a project where students apply and practice their knowledge from lectures.			
E133013	Engineering Design III.	Z	2

E133014	Engineering Design IV. Information about general principles of a new technical product design, stages of development of a new product, the designer fundamental assignment is to propose a rivalrous product including. Designing of a dribling jig. A drilling jig is a device by means of which holes on many duplicate parts may be drilled exactly alike.	Z	2
E121500	Fluid Dynamics The first course in Fluid Mechanics designed to provide the fundamental tools necessary to analyse a fluid systems and predict its behaviour.	Z,ZK	5
E153005	Fundamentals of Energy Conversions The subject FEC clarify the reasons, procedures and consequences of energy conversions from sources to applications. 1. Introduction. Energy, forms and transformations of energy. Structure of primary sources to cover world energy consumption. World reserves, advances and depletion of primary energy sources. Situation on the World, EU and Czechia 2. Fossil fuels, their types and properties. Secondary fuels. Combustion of fossil fuels. Combustion equipment and their efficiency. Ecological consequences of combustion. 3. I. and II. TD law. Thermal cycles. Carnot's comparison cycle. Thermal efficiency. 4. Rankine steam cycle, thermal and real efficiency. Steam circulation carnotization. Survey of steam turbines. 5 Brighton cycle, application. Internal heat transfer, carnotization. thermal and real efficiency. Combine cycle power plant. 6. Cooling cycles, heat pumps, organic Rankine cycles. Types, working fluid, efficiency x CoF. 7. Engines with internal combustion (Otto, Diesel, Atkinson, Miller, etc...), Stirling cycle, Family of Kalina cycles. 8. Renewable sources, application, importance, problems). Direct transformation (heat-&Electr.). Special applications.	Z	1
E131005	History of Technology Development of human knowledge in the domain of science and technology in the retrospective of the developement of our civilization. Emphasis is given upon new branches of technology with special attention to the contribution of mining, iron metallurgy, power engineering, transportation and of the machine industry in the narrower sense of the word.	ZK	3
E131512	Machine Elements and Mechanisms I. Joints and joining elements (screwed, clamped, splined, welded, riveted, soldered and adhesive joints; joints with use of feathers, pins, tenons, cotters, keys). Mechanical transmissions (belt, chain, friction, gear drives). Seminars are devoted to practical individual solution of simple design projects - tasks with motion screws, preloaded connecting bolts, clamped, pressed, splined and key joints between shafts and hubs and tasks with welded and riveted joints. Sketching of machine elements and their simple assembly units is also indispensable seminar work.	Z,ZK	6
E381054	Management and Economics of the Enterprise The study subject is intended for a wide range of students from all over the world who have successfully studied it for many previous years. The teaching goal is to acquaint technically educated foreign students with the basic procedures, methodologies and practice of management and economics of a modern, especially engineering company. The teaching concerns both the areas of finance, marketing and operational-production management and economics. The focus is on a prosperous enterprise operating within the framework of Lean Six Sigma and Industry 4.0. In addition to lectures and exercises, students also learn to be independent in their individual presentations, dedicated to the assigned professional topics of advanced business management.	Z,ZK	4
E322029	Materials Science I. History and present state of materials engineering, overview of technical materials, internal structure of metals, crystal lattices and their defects, deformation, recrystallization and fracture of materials, structure and properties of materials and their testing, fundamentals of thermodynamics, phases and phase transformations, iron-carbon phase diagram.	KZ	3
E321039	Materials Science II. Fundamentals of metallurgy, iron-carbon alloys and influence of other elements, phase transformations, thermal, combined chemical and thermal and thermo-mechanical processing, technical iron-carbon alloys, non-ferrous metals and their alloys, plastics, structural ceramics, composites, selection of materials.	Z,ZK	4
E011056	Mathematics I. In the course, greater emphasis is placed on the theoretical basis of the concepts discussed and on the derivation of basic relationships and connections between concepts. Students will also get to know the procedures for solving problems with parametric input. In addition, students will gain extended knowledge in some thematic areas: eigennumbers and eigenvectors of a matrix, Taylor polynomial, integral as a limit function, integration of some special functions.	Z,ZK	8
E011062	Mathematics II Open and closed set, boundary in E^k . Real function of k -variables. Partial derivatives and differentiability. Gradient and directional derivative. Differential operators div (divergence) and curl (rotation). Function given implicitly. Local and global (= absolute) extremes of a function of more variables. Double integral, volume (=triple) integral, Fubini theorem. Transformation of integrals to polar, cylindrical and spherical coordinates. A simple smooth curve and line integral of a scalar and vector function. Circulation and Green's theorem. A potential vector field, independence of a line integral on the path. Simple smooth surface and surface integral of a scalar function and a vector function. Flow of a vector field through a surface. The Gauss-Ostrogradskij theorem.	Z,ZK	8
E011009	Mathematics III. An introductory course in ordinary differential equation and infinite series.	Z,ZK	5
E372083	Measurement in Engineering Overview of sensor principles for measurement of non-electrical variables (temperature, position, force, speed, acceleration, torque). Calibration and verification of measurement instruments.	KZ	3
E311101	Mechanics I. Modeling of mechanical systems. Determination of force. Constraints and equilibrium of a point. Moment and Torque. Body constraints in 2D. Replacement and balance of general planar system of forces. The balance of the body in the plane - numerically. Body constraints in 3D. Replacement and general spatial equilibrium of a system of forces. The balance of the body in 3D. MBS - Multi Body Systems. Static determinacy and mobility, composition. Analytical solution of equilibrium for MBS systems. Truss systems. Center of gravity. Internal forces. The balance of the body and of multibody systems with friction. Mechanical work. Power. Efficiency. Equilibrium position.	Z,ZK	4
E311102	Mechanics II. Kinematics of point and of rigid bodies. Transformation matrix. Kinematics of concurrent movements. Motion: translation, rotation, general planar motion, spherical motion, screw motion, general spatial motion. Composition of mechanisms. Basic planar mechanisms. Analytical methods in kinematics of mechanisms - Trigonometric and vector method. Graphical methods in kinematics. Basic theory of gearing. Transmition mechanisms with geers. Strutting and seeing in mechanisms. Cable mechanisms.	Z,ZK	4
E181026	Momentum, Heat and Mass Transfer Fundamentals of transport phenomena balances in homogeneous fluids. Navier-Stokes equations. Momentum transport in turbulent flows. Mechanical energy equation. Residence time distributions in continuous systems. Conduction heat transfer. Forced and natural convection heat transfer. Heat transfer with phase changes and thermal radiation. Multicomponent systems. Mass transfer by molecular diffusion, convection, with chemical reactions and interphase mass transfer.	Z,ZK	5
E011049	Numerical Mathematics	Z,ZK	4
E021041	Physics I. Kinematics and dynamics of a particle motion. Principle of conservation of energy. System of particles, centre of mass. Rigid body. Continuum, elastic properties of bodies. Oscillations, waves. Fluid mechanics. Temperature and heat transfer. Kinetic theory of gases. Thermodynamics. Electric field, current, conductivity, resistance. Conductors, semiconductors, insulators. Magnetic field. Magnetic materials. Electromagnetic field. Laboratories - accuracy of measurements, systematic and random errors, uncertainty of direct and indirect measurements, regression, measurements of 11 various experiments related to the lectures.	Z,ZK	7
E021025	Physics II. Faraday's law of electromagnetic induction. Maxwell's equations, electromagnetic waves. Light, wave optics, geometrical optics. Quantum properties of electromagnetic waves. Interaction of radiation with matter. Photoelectric effect. Wave-particle mature of matter. Quantum-mechanical description of particle's motion. Hydrogen atom and periodic system of elements. Spectra, x-rays, ,laser. Band theory of solids, semiconductors. Nucleus, radioactivity, sources of nuclear energy. Laboratories - measurements of 6 experiments related to the lectures.	Z,ZK	4

E331068	Technology I. Foundry properties of metals. Treatment. Pouring. Casting solidification. Moulding and core making. Thermal treatment. Plastic deformation. Division of forming processes. Semi-products, heating-up. Cutting. Cold and hot forming. Welds. Weldability. Weldment testing. Thermal cutting. Brazing. Surface treatments.	Z,ZK	5
E341014	Technology II. Mechanics of chip formation, cutting processes, finishing operations, non-traditional machining processes. Production rates calculation, machining economics. Automation of processes, programming of manufacture. Engineering metrology. Assembly techniques. Introduction to process planing.	Z,ZK	5
E121023	Thermomechanics Subject covers fundamental knowledge in thermodynamics, heat tranfer and gas dynamics	Z,ZK	5

Code of the group: 12BTA*P-ALFA

Name of the group: 02 2012 ALFA povinné pro TZI anglicky

Requirement credits in the group: In this group you have to gain 38 credits

Requirement courses in the group: In this group you have to complete 14 courses

Credits in the group: 38

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
E01A021	Constructive Geometry A <i>Ivana Linkeová</i>	ZK	3	3P+2C	*	P
E12A500	Fluid Dynamics A	ZK	3	0P+0C	*	P
E01A056	Mathematics I.A	ZK	4	0P+0C	*	P
E01A062	Mathematics II.A <i>Stanislav Kra mar</i>	ZK	4	0P+0C	*	P
E01A009	Mathematics III.A <i>Stanislav Kra mar</i>	ZK	2	0P+0C	*	P
E31A101	Mechanics I.A <i>Michael Valášek</i>	ZK	2	0P+0C	*	P
E31A102	Mechanics II.A <i>Michael Valášek</i>	ZK	2	0P+0C	*	P
E31A107	Mechanics III.A <i>Michael Valášek</i>	ZK	4	0P+0C	*	P
E01A049	Numerical Mathematics A <i>Marta ertíková</i>	ZK	2	0P+0C	*	P
E02A041	Physics I.A	ZK	3	0P+0C	*	P
E02A025	Physics II.A	ZK	2	0P+0C	*	P
E12A023	Thermomechanics A	ZK	2	0P+0C	*	P

Characteristics of the courses of this group of Study Plan: Code=12BTA*P-ALFA Name=02 2012 ALFA povinné pro TZI anglicky

E01A021	Constructive Geometry A The subject is focused on geometric objects in the space - curves, surfaces and solids and their properties and mutual relations.	ZK	3
E12A500	Fluid Dynamics A The first course in Fluid Mechanics designed to provide the fundamental tools necessary to analyse a fluid systems and predict its behaviour.	ZK	3
E01A056	Mathematics I.A In the course, greater emphasis is placed on the theoretical basis of the concepts discussed and on the derivation of basic relationships and connections between concepts. Students will also get to know the procedures for solving problems with parametric input. In addition, students will gain extended knowledge in some thematic areas: eigennumbers and eigenvectors of a matrix, Taylor polynomial, integral as a limit function, integration of some special functions.	ZK	4
E01A062	Mathematics II.A Open and closed set, boundary in E^k . Real function of k-variables. Partial derivatives and differentiability. Gradient and directional derivative. Differential operators div (divergence) and curl (rotation). Function given implicitly. Local and global (= absolute) extremes of a function of more variables. Double integral, volume (=triple) integral, Fubini theorem. Transformation of integrals to polar, cylindrical and spherical coordinates. A simple smooth curve and line integral of a scalar and vector function. Circulation and Green's theorem. A potential vector field, independence of a line integral on the path. Simple smooth surface and surface integral of a scalar function and a vector function. Flow of a vector field through a surface. The Gauss-Ostrogradskij theorem.	ZK	4
E01A009	Mathematics III.A An introductory course in ordinary differential equation and infinite series.	ZK	2
E31A101	Mechanics I.A Modeling of mechanical systems. Determination of force. Constraints and equilibrium of a point. Moment and Torque. Body constraints in 2D. Replacement and balance of general planar system of forces. The balance of the body in the plane - numerically and graphically. Body constraints in 3D. Replacement and general spatial equilibrium of a system of forces. The balance of the body in 3D. MBS - Multi Body Systems. Static determinancy and mobility, composition. Analytical and graphical solution of equilibrium for MBS systems. Truss systems. Center of gravity. Internal forces. The balance of the body and of multibody systems with friction. Mechanical work. Power. Efficiency. Equilibrium position and its stability. Statics of fibers. Catenary.	ZK	2
E31A102	Mechanics II.A Kinematics of point and of rigid bodies. Transformation matrix. Kinematics of concurrent movements. Motion: translation, rotation, general planar motion, spherical motion, screw motion, general spatial motion. Composition of mechanisms. Basic planar mechanisms. Analytical methods in kinematics of mechanisms - Trigonometric, vector and matrix method. Graphical methods in kinematics. Basic theory of gearing. Transmition mechanisms with geers. Strutting and seeing in mechanisms. Cable mechanisms. The principle of virtual work and power. Synthesis of mechanisms. Cam mechanisms.	ZK	2

E31A107	Mechanics III.A	ZK	4
Modeling. Dynamics of systems of particles. Dynamics of body. Mass distribution in a body. Inertia tensor. D'Alembert principle. Inertial effects of motion. Balancing of rotating bodies. Free body diagram method. Newton-Euler equations. Dynamics of multibody systems. The principle of virtual work and power in dynamics. Lagrange equations of 2nd type. Reduction method. Vibrations of systems with 1 DOF. Free oscillations. Forced oscillations excited by harmonic force, by general periodic force and rotating unbalanced mass. Kinematic excitation. Forced oscillations of systems with 1 DOF freedom excited by general force - Duhamel integral. Introduction to nonlinear oscillation. Oscillation of systems with two DOFs, torsional oscillation. Bending vibration, determination of critical speed, dynamic absorber. Stability of motion. Hertz theory of impact. Approximate theory of flywheels.			
E01A049	Numerical Mathematics A	ZK	2
Numerical solution of linear and non-linear systems. Basics of interpolation and approximation of functions, least squares method. Numerical solution of ordinary differential equations. Solution of basic linear partial differential equations using finite differences method.			
E02A041	Physics I.A	ZK	3
Kinematics and dynamics of a particle motion. Principle of conservation of energy. System of particles, centre of mass. Rigid body. Continuum, elastic properties of bodies. Oscillations, waves. Fluid mechanics. Temperature and heat transfer. Kinetic theory of gases. Thermodynamics. Electric field, current, conductivity, resistance. Conductors, semiconductors, insulators. Magnetic field. Magnetic materials. Electromagnetic field. Laboratories - accuracy of measurements, systematic and random errors, uncertainty of direct and indirect measurements, regression, measurements of 11 various experiments related to the lectures.			
E02A025	Physics II.A	ZK	2
Faraday's law of electromagnetic induction. Maxwell's equations, electromagnetic waves. Light, wave optics, geometrical optics. Quantum properties of electromagnetic waves. Interaction of radiation with matter. Photoelectric effect. Wave-particle nature of matter. Quantum-mechanical description of particle's motion. Hydrogen atom and periodic system of elements. Spectra, x-rays, laser. Band theory of solids, semiconductors. Nucleus, radioactivity, sources of nuclear energy. Laboratories - measurements of 6 experiments related to the lectures.			
E12A023	Thermomechanics A	ZK	2
Subject covers fundamental knowledge in thermodynamics, heat transfer and gas dynamics			

Code of the group: 12B*A*P-ZT12

Name of the group: 03 2012 anglicky ZT v po adí 12

Requirement credits in the group: In this group you have to gain 6 credits

Requirement courses in the group: In this group you have to complete 2 courses

Credits in the group: 6

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
E333038	Fundamentals of Technology I.	Z	3	1P+1C	*	P

Characteristics of the courses of this group of Study Plan: Code=12B*A*P-ZT12 Name=03 2012 anglicky ZT v po adí 12

E333038	Fundamentals of Technology I.	Z	3
The study of manufacturing processes forms a core subject area for a majority of mechanical engineering students. It contains basic concept of three manufacturing technologies such as casting, forming and welding, including basic terms, methods and materials.			

Code of the group: 12B*A*P-TV

Name of the group: 04 2012 bakalářský povinný teoretický anglicky

Requirement credits in the group: In this group you have to gain 3 credits

Requirement courses in the group: In this group you have to complete 3 courses

Credits in the group: 3

Note on the group:

Code of the group: 12BTA5P-ME3

Name of the group: 07 2012 ME3 pro TZI anglicky

Requirement credits in the group: In this group you have to gain 7 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 7

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
E311107	Mechanics III. Pavel Bastl, Václav Bauma, Petr Beneš, Ivo Bukovský, Martin Nečas, Zdeněk Neusser, Jan Pelikán, Pavel Steinbauer, Zbyněk Šíka, Michael Valášek Michael Valášek (Gar.)	Z,ZK	7	2P+3C	*	P

Characteristics of the courses of this group of Study Plan: Code=12BTA5P-ME3 Name=07 2012 ME3 pro TZI anglicky

E311107	Mechanics III.	Z,ZK	7
Modeling. Dynamics of systems of particles. Dynamics of body. Mass distribution in a body. Inertia tensor. D'Alembert principle. Inertial effects of motion. Balancing of rotating bodies. Free body diagram method. Newton-Euler equations. Dynamics of multibody systems. Vibrations of systems with 1 DOF. Free oscillations. Forced oscillations excited by harmonic force and rotating unbalanced mass. Kinematic excitation. Oscillation of systems with two DOFs, torsional oscillation. Hertz theory of impact.			

Code of the group: 12BTA6P-CMS2

Name of the group: 08 2012 CMS2 pro TZI anglicky

Requirement credits in the group: In this group you have to gain 7 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 7

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
E131517	Machine Elements and Mechanisms II.	Z,ZK	7	3P+4C	*	P

Characteristics of the courses of this group of Study Plan: Code=12BTA6P-CMS2 Name=08 2012 CMS2 pro TZI anglicky

E131517	Machine Elements and Mechanisms II.	Z,ZK	7
Preliminary design, design calculations and application of axles and shafts, sliding and rolling bearings, shaft connections, elements of crank mechanism, pipelines and their accessories and fittings.			

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 8

The role of the block: PV

Code of the group: 12B*A4Q-BZJ

Name of the group: 06 2012 bakalá ské zkoušky z jazyk anglicky

Requirement credits in the group: In this group you have to gain 2 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 2

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
2041061	English-Bachelor Exam <i>Michele Le Blanc, Eliška Vítková, Michaela Schusová, Ilona Šimice, Nina Procházková Ayyub, Hana Volejníková, Veronika Kratochvílová Nina Procházková Ayyub</i>	Z,ZK	2	0P+2C	*	PV
2041066	Czech - Bachelor Exam <i>Eliška Vítková, Michaela Schusová, Jaroslava Kommová, Petr Laurich Jaroslava Kommová</i>	ZK	2	0P+2C	*	PV
2041063	French - Bachelor Exam /FME <i>Michaela Schusová, Dušana Jirovská Eliška Vítková Eliška Vítková (Gar.)</i>	Z,ZK	2	0P+2C	*	PV
2041062	German - Bachelor Exam / FME <i>Eliška Vítková, Michaela Schusová, Jaroslava Kommová, Petr Laurich Jaroslava Kommová</i>	Z,ZK	2	0P+2C	*	PV
2041065	Russian - Bachelor Exam / FME <i>Eliška Vítková, Michaela Schusová, Hana Volejníková, Dušana Jirovská Eliška Vítková</i>	Z,ZK	2	0P+2C	*	PV
2041064	Spanish - Bachelor Exam / FME <i>Eliška Vítková, Michaela Schusová, Jaime Andrés Villagómez Eliška Vítková</i>	Z,ZK	2	0P+2C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12B*A4Q-BZJ Name=06 2012 bakalá ské zkoušky z jazyk anglicky

2041061	English-Bachelor Exam	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041066	Czech - Bachelor Exam	ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041063	French - Bachelor Exam /FME	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041062	German - Bachelor Exam / FME	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041065	Russian - Bachelor Exam / FME	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			

2041064	Spanish - Bachelor Exam / FME	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			

Code of the group: 12BTA6Q-OP

Name of the group: 09 2012 BTZI 6. sem oborové projekty anglicky

Requirement credits in the group: In this group you have to gain 2 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 2

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
E012091	Project	KZ	2	0P+2C		PV
E222091	Project	KZ	2	0P+2C		PV
E322091	Project <i>Jana Sobotová</i>	KZ	2	0P+2C		PV
E332091	Project	KZ	2	0P+2C		PV
E362091	Project	KZ	2	0P+2C		PV
E382091	Project	KZ	2	0P+2C		PV
E112091	Project	KZ	2	0P+2C	*	PV
E132091	Project	KZ	2	0P+2C	*	PV
E152091	Project <i>Michal Kolovratník</i>	KZ	2	0P+2C	*	PV
E182091	Project	KZ	2	0P+2C	*	PV
E212091	Project	KZ	2	0P+2C	*	PV
E312091	Project <i>Michael Valášek</i>	KZ	2	0+2	*	PV
E352091	Project	KZ	2	2C	*	PV
E372091	Project <i>Vladimír Hlavá</i>	KZ	2	0P+2C	*	PV
E162091	Project	KZ	2	0P+2C	*	PV
E122091	Project	KZ	2	0P+2C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12BTA6Q-OP Name=09 2012 BTZI 6. sem oborové projekty anglicky

E012091	Project	KZ	2
E222091	Project	KZ	2
E322091	Project	KZ	2
E332091	Project	KZ	2
E362091	Project	KZ	2
E382091	Project	KZ	2
E112091	Project	KZ	2
Individual assignment			
E132091	Project	KZ	2
E152091	Project	KZ	2
E182091	Project	KZ	2
Absolvent se seznámí se základy oboru Procesní technika.			
E212091	Project	KZ	2
E312091	Project	KZ	2
Individual assignment. Condition of registration of this course is simultaneous registration of course E313991 Thesis (elaboration of bachelor thesis and its defense).			
E352091	Project	KZ	2
E372091	Project	KZ	2
An individual project from the branch of specialization (instrumentation, control engineering, informatics), or individual work, related to another subject.			
E162091	Project	KZ	2
Student will be informed about basics of environmental engineering and creation of thermal comfort.			
E122091	Project	KZ	2
As a part of the subject students individually improve their theoretical and practical knowledge in subject area closed to the theme of their bachelor project.			

Code of the group: 12BTA6Q-BP

Name of the group: 10 2012 BTZI 6. sem bakalářské práce anglicky

Requirement credits in the group: In this group you have to gain 4 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
E373991	Bachelor Thesis <i>Vladimír Hlavá</i>	Z	4	0P+0C	*	PV
E123991	Thesis	Z	4	0P+0C	*	PV
E153991	Thesis <i>Michal Kolovratník</i>	Z	4	0P+0C		PV
E183991	Thesis	Z	4	0P+0C		PV
E213991	Thesis	Z	4	0P+0C		PV
E223991	Thesis	Z	4	0P+0C		PV
E313991	Thesis <i>Michael Valášek</i>	Z	4	0+0		PV
E323991	Thesis <i>Jana Sobotová</i>	Z	4	0P+0C		PV
E333991	Thesis	Z	4	0P+0C		PV
E353991	Thesis	Z	4			PV
E363991	Thesis	Z	4	0P+0C		PV
E383991	Thesis	Z	4	0P+0C		PV
E133991	Thesis	Z	4	0P+0C		PV
E013991	Thesis	Z	4	0P+0C		PV
E113991	Thesis	Z	4	0P+0C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12BTA6Q-BP Name=10 2012 BTZI 6. sem bakalá ské práce anglicky

E373991	Bachelor Thesis	Z	4
Each student will solve his individual theme under guiding of his individual supervising department specialist. Result is his/her thesis.			
E123991	Thesis	Z	4
Students under skilled supervision prepare,consult, working and finalise their bachelory project.			
E153991	Thesis	Z	4
E183991	Thesis	Z	4
E213991	Thesis	Z	4
E223991	Thesis	Z	4
E313991	Thesis	Z	4
E323991	Thesis	Z	4
E333991	Thesis	Z	4
E353991	Thesis	Z	4
E363991	Thesis	Z	4
E383991	Thesis	Z	4
E133991	Thesis	Z	4
E013991	Thesis	Z	4
E113991	Thesis	Z	4
Individual assignment			

Name of the block: Elective courses

Minimal number of credits of the block: 0

The role of the block: V

Code of the group: 12B*A*V-DOP SEMI

Name of the group: 05 2012 doporu ené seminá e anglicky

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
E026002	Physics I. - Seminary <i>Petr Duchá ek, Jan Novák, Miroslav Jílek, Daniel Tischler</i>	Z	2	0P+2C	*	V

E026003	Physics II. - Seminary <i>Petr Duchá ek, Jan Novák Petr Duchá ek</i>	Z	2	0P+2C	*	v
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Characteristics of the courses of this group of Study Plan: Code=12B*A*V-DOP SEMI Name=05 2012 doporu ené seminá e anglicky

E026002	Physics I. - Seminary Solving of problems corresponding to the lectures of Physics I.	Z	2
E026003	Physics II. - Seminary The subject is intended for students who need more detailed practising and improvement (including knowledge from former physics courses, or high-school knowledge) necessary for successful finishing Physics II course. The instructions are analogical to seminars with a short corresponding theoretical background. The link between physical concepts and methods of solution of typical problems is underlying.	Z	2

Code of the group: 12B*A1V-DOP ZJK

Name of the group: 12 2012 doporu ené základní jazykové kurzy anglicky

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
E046117	Czech - Advanced <i>Jaroslava Kommová</i>	Z	2	0+2	Z	v
E046125	Czech - Lower Intermediate <i>Jaroslava Kommová</i>	Z	2	0+2	Z	v
E046128	Czech - Upper Intermediate <i>Jaroslava Kommová</i>	Z	2	0+2	L	v
E046118	Czech Advanced <i>Jaroslava Kommová</i>	Z	2	0+2	L	v
E046120	Czech for Beginners II. <i>Jaroslava Kommová</i>	Z	2	0+2	*	v
E046119	Czech Language for Beginners I. <i>Jaroslava Kommová</i>	Z	2	0+2	*	v
E046126	Czech Lower Intermediate <i>Petr Laurich</i>	Z	2	0+2	L	v
E046127	Czech Upper Intermediate <i>Jaroslava Kommová</i>	Z	2	0+2	Z	v
E046078	German - Lower Intermediate Course <i>Jaroslava Kommová</i>	Z	2	0+2	Z	v
E046079	German Lower Intermediate <i>Eliška Vítková, Michaela Schusová, Jaroslava Kommová, Petr Laurich Jaroslava Kommová Eliška Vítková (Gar.)</i>	Z	2	0+2	L	v
E046080	German Upper Intermediate <i>Eliška Vítková</i>	Z	2	0+2	Z	v
E046081	German Upper Intermediate <i>Eliška Vítková, Michaela Schusová, Jaroslava Kommová, Petr Laurich Jaroslava Kommová Jaroslava Kommová (Gar.)</i>	Z	2	0+2	L	v
E046082	German Advanced	Z	2	0+2	Z	v
E046083	German Advanced <i>Jaroslava Kommová</i>	Z	2	0+2	L	v
E046076	<i>Jaroslava Kommová</i>	Z	2	0+2	Z	v
E046077	German Beginners <i>Jaroslava Kommová</i>	Z	2	0+2	L	v

Characteristics of the courses of this group of Study Plan: Code=12B*A1V-DOP ZJK Name=12 2012 doporu ené základní jazykové kurzy anglicky

E046117	Czech - Advanced Comprehension of spoken language as well as lectures in Czech on topics familiar to the student. Communication with native speakers, participation in discussions. Expressing opinions. Written skills. Ability to write an essay or a report. Reading and understanding texts concerning current issues and popular scientific and technical articles.	Z	2
E046125	Czech - Lower Intermediate Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
E046128	Czech - Upper Intermediate Mapped to the Common European Framework of Reference Level A2-B1. The aim is to extend language skills taking into consideration professional Czech and common professional terminology. Comprehension of standard Czech speech and conversation about topics of everyday life - at school, at work, during free time, on intermediate level. Broadening the knowledge technical language.	Z	2
E046118	Czech Advanced Mapped to the level of Common European Framework of Reference: B1- B2 The aim: comprehension of spoken Czech as well as lectures given in Czech without great difficulties and active participation in a discussion. Written and oral skills on advanced level. Ability to write a summary, a report, an essay. Reading and comprehension of popular-scientific and scientific articles or texts from student's field of studies without difficulties. Grammar structures on advanced level.	Z	2

E046120	Czech for Beginners II.	Z	2
Mapped to the Common European Framework of Reference Level A1 Aim: Basic vocabulary of everyday life in a written and spoken form. Understanding and use of basic expressions of general scientific terminology (professional language).			
E046119	Czech Language for Beginners I.	Z	2
Basic vocabulary of everyday life in a spoken and written form. Understanding and use of basic expressions of general scientific terminology (professional language)			
E046126	Czech Lower Intermediate	Z	2
Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.			
E046127	Czech Upper Intermediate	Z	2
Understanding standard speech about familiar matters that a student meets at work, at school, during free time, and talking about these topics. Ability to describe experiences and events, briefly explain one's opinions and plans. Reading and understanding general and technical texts.			
E046078	German - Lower Intermediate Course	Z	2
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.			
E046079	German Lower Intermediate	Z	2
Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.			
E046080	German Upper Intermediate	Z	2
Understanding standard speech about familiar matters that a student meets at work, at school, during free time, and talking about these topics. Ability to describe experiences and events, briefly explain one's opinions and plans.			
E046081	German Upper Intermediate	Z	2
Mapped to the level of Common European Framework of Reference: A2 - B1 Understanding standard speech about familiar topics, that a student comes across at work, at school, during free time, and talking about these topics. Ability to describe experiences and events, explain one's opinions and plans. Reading and understanding general and technical texts.			
E046082	German Advanced	Z	2
Comprehension of spoken language as well as lectures in German on topics familiar to the student. Communication with native speakers, participation in discussions. Expressing opinions. Written skills. Ability to write an essay or a report. Reading and understanding texts concerning current issues and popular scientific and technical articles.			
E046083	German Advanced	Z	2
Mapped to the level of Common European Framework of Reference: B1 - B2 The aim: comprehension of spoken German as well as lectures given in German without great difficulties and active participation in a discussion. Written and oral skills on advanced level. Ability to write a summary, a report, an essay. Reading and comprehension of popular-scientific and scientific articles or texts from student's field of studies without difficulties. Grammar structures on advanced level.			
E046076		Z	2
E046077	German Beginners	Z	2
Mapped to the Common European Framework of Reference level A1. Basic vocabulary of everyday life in a written and spoken form. understanding and use of basic expressions of general scientific terminology.			

List of courses of this pass:

Code	Name of the course	Completion	Credits
2041061	English-Bachelor Exam	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041062	German - Bachelor Exam / FME	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041063	French - Bachelor Exam /FME	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041064	Spanish - Bachelor Exam / FME	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041065	Russian - Bachelor Exam / FME	Z,ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
2041066	Czech - Bachelor Exam	ZK	2
Mapped to the Common European Framework Level B2. The aim is to understand spoken language and lectures on technical topics without greater difficulties, to take part in discussions, to write a summary, a report and an essay, to read technical texts, to master grammar at advanced level.			
E011009	Mathematics III.	Z,ZK	5
An introductory course in ordinary differential equation and infinite series.			
E011021	Constructive Geometry	Z,ZK	6
The subject is focused on geometric objects in the space - curves, surfaces and solids and their properties and mutual relations.			
E011049	Numerical Mathematics	Z,ZK	4
E011056	Mathematics I.	Z,ZK	8
In the course, greater emphasis is placed on the theoretical basis of the concepts discussed and on the derivation of basic relationships and connections between concepts. Students will also get to know the procedures for solving problems with parametric input. In addition, students will gain extended knowledge in some thematic areas: eigenvalues and eigenvectors of a matrix, Taylor polynomial, integral as a limit function, integration of some special functions.			

E011062	Mathematics II Open and closed set, boundary in E^k . Real function of k-variables. Partial derivatives and differentiability. Gradient and directional derivative. Differential operators div (divergence) and curl (rotation). Function given implicitly. Local and global (= absolute) extremes of a function of more variables. Double integral, volume (=triple) integral, Fubini theorem. Transformation of integrals to polar, cylindrical and spherical coordinates. A simple smooth curve and line integral of a scalar and vector function. Circulation and Green's theorem. A potential vector field, independence of a line integral on the path. Simple smooth surface and surface integral of a scalar function and a vector function. Flow of a vector field through a surface. The Gauss-Ostrogradskij theorem.	Z,ZK	8
E012035	Algorithmization and Programming Programming in MATLAB and its programming language. MATLAB command line. Elementary commands, variable, assignment and expression. Matrices, vectors and operations. Writing M-script. Input and output. Condition and cycle. Algorithmization of simple problems in MATLAB. Graphical commands. Matrix operations. Systems of linear equations. Scripts and functions. Structure of program. Variables, expressions, assignment, and input / output commands. switch. For cycle. Arrays and files. Pointers. Structures. Algorithmization of simple programs: minimum, mean, norm, numerical integration, bisection method, Newton method, matrix operations. Direct methods for solution of systems of linear equations.	KZ	4
E012037	Computer Graphics The subject is focused on the mathematical theory of the curves and surfaces in computer graphics and their visualisation. The Rhinoceros - NURBS modelling for Windows is used to demonstrate the geometrical properties of the curves and surfaces.	KZ	3
E012091	Project	KZ	2
E013991	Thesis	Z	4
E01A009	Mathematics III.A An introductory course in ordinary differential equation and infinite series.	ZK	2
E01A021	Constructive Geometry A The subject is focused on geometric objects in the space - curves, surfaces and solids and their properties and mutual relations.	ZK	3
E01A049	Numerical Mathematics A Numerical solution of linear and non-linear systems. Basics of interpolation and approximation of functions, least squares method. Numerical solution of ordinary differential equations. Solution of basic linear partial differential equations using finite differences method.	ZK	2
E01A056	Mathematics I.A In the course, greater emphasis is placed on the theoretical basis of the concepts discussed and on the derivation of basic relationships and connections between concepts. Students will also get to know the procedures for solving problems with parametric input. In addition, students will gain extended knowledge in some thematic areas: eigennumbers and eigenvectors of a matrix, Taylor polynomial, integral as a limit function, integration of some special functions.	ZK	4
E01A062	Mathematics II.A Open and closed set, boundary in E^k . Real function of k-variables. Partial derivatives and differentiability. Gradient and directional derivative. Differential operators div (divergence) and curl (rotation). Function given implicitly. Local and global (= absolute) extremes of a function of more variables. Double integral, volume (=triple) integral, Fubini theorem. Transformation of integrals to polar, cylindrical and spherical coordinates. A simple smooth curve and line integral of a scalar and vector function. Circulation and Green's theorem. A potential vector field, independence of a line integral on the path. Simple smooth surface and surface integral of a scalar function and a vector function. Flow of a vector field through a surface. The Gauss-Ostrogradskij theorem.	ZK	4
E021025	Physics II. Faraday's law of electromagnetic induction. Maxwell's equations, electromagnetic waves. Light, wave optics, geometrical optics. Quantum properties of electromagnetic waves. Interaction of radiation with matter. Photoelectric effect. Wave-particle nature of matter. Quantum-mechanical description of particle's motion. Hydrogen atom and periodic system of elements. Spectra, x-rays, laser. Band theory of solids, semiconductors. Nucleus, radioactivity, sources of nuclear energy. Laboratories - measurements of 6 experiments related to the lectures.	Z,ZK	4
E021041	Physics I. Kinematics and dynamics of a particle motion. Principle of conservation of energy. System of particles, centre of mass. Rigid body. Continuum, elastic properties of bodies. Oscillations, waves. Fluid mechanics. Temperature and heat transfer. Kinetic theory of gases. Thermodynamics. Electric field, current, conductivity, resistance. Conductors, semiconductors, insulators. Magnetic field. Magnetic materials. Electromagnetic field. Laboratories - accuracy of measurements, systematic and random errors, uncertainty of direct and indirect measurements, regression, measurements of 11 various experiments related to the lectures.	Z,ZK	7
E026002	Physics I. - Seminary Solving of problems corresponding to the lectures of Physics I.	Z	2
E026003	Physics II. - Seminary The subject is intended for students who need more detailed practising and improvement (including knowledge from former physics courses, or high-school knowledge) necessary for successful finishing Physics II course. The instructions are analogous to seminars with a short corresponding theoretical background. The link between physical concepts and methods of solution of typical problems is underlying.	Z	2
E02A025	Physics II.A Faraday's law of electromagnetic induction. Maxwell's equations, electromagnetic waves. Light, wave optics, geometrical optics. Quantum properties of electromagnetic waves. Interaction of radiation with matter. Photoelectric effect. Wave-particle nature of matter. Quantum-mechanical description of particle's motion. Hydrogen atom and periodic system of elements. Spectra, x-rays, laser. Band theory of solids, semiconductors. Nucleus, radioactivity, sources of nuclear energy. Laboratories - measurements of 6 experiments related to the lectures.	ZK	2
E02A041	Physics I.A Kinematics and dynamics of a particle motion. Principle of conservation of energy. System of particles, centre of mass. Rigid body. Continuum, elastic properties of bodies. Oscillations, waves. Fluid mechanics. Temperature and heat transfer. Kinetic theory of gases. Thermodynamics. Electric field, current, conductivity, resistance. Conductors, semiconductors, insulators. Magnetic field. Magnetic materials. Electromagnetic field. Laboratories - accuracy of measurements, systematic and random errors, uncertainty of direct and indirect measurements, regression, measurements of 11 various experiments related to the lectures.	ZK	3
E046076		Z	2
E046077	German Beginners Mapped to the Common European Framework of Reference level A1. Basic vocabulary of everyday life in a written and spoken form. understanding and use of basic expressions of general scientific terminology.	Z	2
E046078	German - Lower Intermediate Course Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
E046079	German Lower Intermediate Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.	Z	2
E046080	German Upper Intermediate Understanding standard speech about familiar matters that a student meets at work, at school, during free time, and talking about these topics. Ability to describe experiences and events, briefly explain one's opinions and plans.	Z	2

E046081	German Upper Intermediate Mapped to the level of Common European Framework of Reference: A2 - B1 Understanding standard speech about familiar topics, that a students comes across at work, at school, during free time, and talking about these topics. Ability to describe experiences and events, explain one's opinions and plans. Reading and understanding general and technical texts.	Z	2
E046082	German Advanced Comprehension of spoken language as well as lectures in German on topics familiar to the student. Communication with native speakers, participation in discussions. Expressing opinions. Written skills. Ability to write an essay or a report. Reading and understanding texts concerning current issues and popular scientific and technical articles.	Z	2
E046083	German Advanced Mapped to the level of Common European Framework of Reference: B1- B2 The aim: comprehension of spoken German as well as lectures given in German without great difficulties and active participation in a discussion. Written and oral skills on advanced level. Ability to write a summary, a report, an essay. Reading and comprehension of popular-scientific and scientific articles or texts from student's field of studies without difficulties. Grammar structures on advanced level.	Z	2
E046117	Czech - Advanced Comprehension of spoken language as well as lectures in Czech on topics familiar to the student. Communication with native speakers, participation in discussions. Expressing opinions. Written skills. Ability to write an essay or a report. Reading and understanding texts concerning current issues and popular scientific and technical articles.	Z	2
E046118	Czech Advanced Mapped to the level of Common European Framework of Reference: B1- B2 The aim: comprehension of spoken Czech as well as lectures given in Czech without great difficulties and active participation in a discussion. Written and oral skills on advanced level. Ability to write a summary, a report, an essay. Reading and comprehension of popular-scientific and scientific articles or texts from student's field of studies without difficulties. Grammar structures on advanced level.	Z	2
E046119	Czech Language for Beginners I. Basic vocabulary of everyday life in a spoken and written form. Understanding and use of basic expressions of general scientific terminology (professional language)	Z	2
E046120	Czech for Beginners II. Mapped to the Common European Framework of Reference Level A1 Aim: Basic vocabulary of everyday life in a written and spoken form. Understanding and use of basic expressions of general scientific terminology (professional language).	Z	2
E046125	Czech - Lower Intermediate Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
E046126	Czech Lower Intermediate Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
E046127	Czech Upper Intermediate Understanding standard speech about familiar matters that a student meets at work, at school, during free time, and talking about these topics. Ability to describe experiences and events, briefly explain one's opinions and plans. Reading and understanding general and technical texts.	Z	2
E046128	Czech - Upper Intermediate Mapped to the Common European Framework of Reference Level A2-B1. The aim is to extend language skills taking into consideration professional Czech and common professional terminology. Comprehension of standard Czech speech and conversation about topics of everyday life - at school, at work, during free time, on intermediate level. Broadening the knowledge technical language.	Z	2
E112091	Project Individual assignment	KZ	2
E113991	Thesis Individual assignment	Z	4
E121023	Thermomechanics Subject covers fundamental knowledge in thermodynamics, heat transfer and gas dynamics	Z,ZK	5
E121500	Fluid Dynamics The first course in Fluid Mechanics designed to provide the fundamental tools necessary to analyse a fluid systems and predict its behaviour.	Z,ZK	5
E122091	Project As a part of the subject students individually improve their theoretical and practical knowledge in subject area related to the theme of their bachelory project.	KZ	2
E123991	Thesis Students under skilled supervision prepare, consult, working and finalise their bachelory project.	Z	4
E12A023	Thermomechanics A Subject covers fundamental knowledge in thermodynamics, heat transfer and gas dynamics	ZK	2
E12A500	Fluid Dynamics A The first course in Fluid Mechanics designed to provide the fundamental tools necessary to analyse a fluid systems and predict its behaviour.	ZK	3
E131002	Engineering Design II Theoretical fundamentals of GPS (Geometrical Product Specification). Students will get critical knowledge about ISO system of limits and fits, tolerancing, surface texture, geometrical tolerance, dimensional loops, tolerancing of angles and cones, tolerancing of threads. Integral part of course is a project where students apply and practice their knowledge from lectures.	Z,ZK	4
E131005	History of Technology Development of human knowledge in the domain of science and technology in the retrospective of the development of our civilization. Emphasis is given upon new branches of technology with special attention to the contribution of mining, iron metallurgy, power engineering, transportation and of the machine industry in the narrower sense of the word.	ZK	3
E131512	Machine Elements and Mechanisms I. Joints and joining elements (screwed, clamped, splined, welded, riveted, soldered and adhesive joints; joints with use of feathers, pins, tenons, cotters, keys). Mechanical transmissions (belt, chain, friction, gear drives). Seminars are devoted to practical individual solution of simple design projects - tasks with motion screws, preloaded connecting bolts, clamped, pressed, splined and key joints between shafts and hubs and tasks with welded and riveted joints. Sketching of machine elements and their simple assembly units is also indispensable seminar work.	Z,ZK	6
E131517	Machine Elements and Mechanisms II. Preliminary design, design calculations and application of axles and shafts, sliding and rolling bearings, shaft connections, elements of crank mechanism, pipelines and their accessories and fittings.	Z,ZK	7
E132001	Engineering Design I. The course is focused on building up the ability of future designers to express their ideas through common communication language - technical drawing. During the course students train and improve their skills in spatial imagination and engineering way of thinking.	KZ	2
E132091	Project	KZ	2

E133013	Engineering Design III.	Z	2
E133014	Engineering Design IV.	Z	2
Information about general principles of a new technical product design, stages of development of a new product, the designer fundamental assignment is to propose a rivalrous product including. Designing of a dribling jig. A drilling jig is a device by means of which holes on many duplicate parts may be drilled exactly alike.			
E133991	Thesis	Z	4
E141504	Electrical Circuits and Electronics	Z,ZK	4
Introduction into theory of electrical circuits, analysis special types of electrical circuits as DC and AC. Transient states in circuits with accumulators of energy. Using Symbolic-Complex method and Fourier transformation for analysis AC circuits supplied with harmonic signal. El. Power and Energy. Introduction into electronics. Principle and typical parameters of basic semiconductor components. Application in electronic circuits (rectifier, stabilizer, power control, operational amplifier). Analogue and digital circuits. Principle of analogue and digital signal processing. Logical circuits, converters, microprocessor.			
E141505	Electrical Machines and Drives	Z,ZK	4
AC el. curcuits. Electrical power and energy. Calculation, measurement, power factor. Magnetic circuit, materials, hysteresis loop. Electromagnet. Transformer, principle, construction, 3-phase transformer, operating conditions, rated (scheduled) values. Induction machine, principle, construction, operating conditions. Starting, speed-torque characteristic, speed control. Synchronous machines. DC-machines, principle, parameters, operating conditions, construction, starting, speed control, speed-torque characteristic. Low-voltage instruments. Low-voltage distribution system.			
E152091	Project	KZ	2
E153005	Fundamentals of Energy Conversions	Z	1
The subject FEC clarify the reasons, procedures and consequences of energy conversions from sources to applications. 1. Introduction. Energy, forms and transformations of energy. Structure of primary sources to cover world energy consumption. World reserves, advances and depletion of primary energy sources. Situation on the World, EU and Czechia 2. Fossil fuels, their types and properties. Secondary fuels. Combustion of fossil fuels. Combustion equipment and their efficiency. Ecological consequences of combustion. 3. I. and II. TD law. Thermal cycles. Carnot's comparison cycle. Thermal efficiency. 4. Rankine steam cycle, thermal and real efficiency. Steam circulation carnotization. Survey of steam turbines. 5 Brighton cycle, application. Internal heat transfer, carnotization. thermal and real efficiency. Combine cycle power plant. 6. Cooling cycles, heat pumps, organic Rankine cycles. Types, working fluid, efficiency x CoF. 7. Engines with internal combustion (Otto, Diesel, Atkinson, Miller, etc...), Stirling cycle, Family of Kalina cycles. 8. Renewable sources, application, importance, problems). Direct transformation (heat->Electr.). Special applications.			
E153991	Thesis	Z	4
E162091	Project	KZ	2
Student will be informed about basics of environmental engineering and creation of thermal comfort.			
E181026	Momentum, Heat and Mass Transfer	Z,ZK	5
Fundamentals of transport phenomena balances in homogeneous fluids. Navier-Stokes equations. Momentum transport in turbulent flows. Mechanical energy equation. Residence time distributions in continuous systems. Conduction heat transfer. Forced and natural convection heat transfer. Heat transfer with phase changes and thermal radiation. Multicomponent systems. Mass transfer by molecular diffusion, convection, with chemical reactions and interphase mass transfer.			
E182019	Chemistry	KZ	3
General chemistry from the point of view of mechanical and process engineering. Physical chemistry forms 2/3 of the course (structure and properties of matter, thermodynamics, phase equilibrium, chemical reactions, reaction engineering), the remaining 1/3 is devoted to organic chemistry (hydrocarbons, polymers) and biochemistry. Laboratory practice is oriented upon the material properties measurement.			
E182091	Project	KZ	2
Absolvent se seznámí se základy oboru Procesní technika.			
E183991	Thesis	Z	4
E212091	Project	KZ	2
E213991	Thesis	Z	4
E222091	Project	KZ	2
E223991	Thesis	Z	4
E311101	Mechanics I.	Z,ZK	4
Modeling of mechanical systems. Determination of force. Constraints and equilibrium of a point. Moment and Torque. Body constraints in 2D. Replacement and balance of general planar system of forces. The balance of the body in the plane - numerically. Body constraints in 3D. Replacement and general spatial equilibrium of a system of forces. The balance of the body in 3D. MBS - Multi Body Systems. Static determinancy and mobility, composition. Analytical solution of equilibrium for MBS systems. Truss systems. Center of gravity. Internal forces. The balance of the body and of multibody systems with friction. Mechanical work. Power. Efficiency. Equilibrium position.			
E311102	Mechanics II.	Z,ZK	4
Kinematics of point and of rigid bodies. Transformation matrix. Kinematics of concurrent movements. Motion: translation, rotation, general planar motion, spherical motion, screw motion, general spatial motion. Composition of mechanisms. Basic planar mechanisms. Analytical methods in kinematics of mechanisms - Trigonometric and vector method. Graphical methods in kinematics. Basic theory of gearing. Transmition mechanisms with gears. Strutting and seeing in mechanisms. Cable mechanisms.			
E311107	Mechanics III.	Z,ZK	7
Modeling. Dynamics of systems of particles. Dynamics of body. Mass distribution in a body. Inertia tensor. D'Alembert principle. Inertial effects of motion. Balancing of rotating bodies. Free body diagram method. Newton-Euler equations. Dynamics of multibody systems. Vibrations of systems with 1 DOF. Free oscillations. Forced oscillations excited by harmonic force and rotating unbalanced mass. Kinematic excitation. Oscillation of systems with two DOFs, torsional oscillation. Hertz theory of impact.			
E312091	Project	KZ	2
Individual assignment. Condition of registration of this course is simultaneous registration of course E313991 Thesis (elaboration of bachelor thesis and its defense).			
E313991	Thesis	Z	4
E31A101	Mechanics I.A	ZK	2
Modeling of mechanical systems. Determination of force. Constraints and equilibrium of a point. Moment and Torque. Body constraints in 2D. Replacement and balance of general planar system of forces. The balance of the body in the plane - numerically and graphically. Body constraints in 3D. Replacement and general spatial equilibrium of a system of forces. The balance of the body in 3D. MBS - Multi Body Systems. Static determinancy and mobility, composition. Analytical and graphical solution of equilibrium for MBS systems. Truss systems. Center of gravity. Internal forces. The balance of the body and of multibody systems with friction. Mechanical work. Power. Efficiency. Equilibrium position and its stability. Statics of fibers. Catenary.			
E31A102	Mechanics II.A	ZK	2
Kinematics of point and of rigid bodies. Transformation matrix. Kinematics of concurrent movements. Motion: translation, rotation, general planar motion, spherical motion, screw motion, general spatial motion. Composition of mechanisms. Basic planar mechanisms. Analytical methods in kinematics of mechanisms - Trigonometric, vector and matrix method. Graphical methods in kinematics. Basic theory of gearing. Transmition mechanisms with gears. Strutting and seeing in mechanisms. Cable mechanisms. The principle of virtual work and power. Synthesis of mechanisms. Cam mechanisms.			

E31A107	Mechanics III.A Modeling. Dynamics of systems of particles. Dynamics of body. Mass distribution in a body. Inertia tensor. D'Alembert principle. Inertial effects of motion. Balancing of rotating bodies. Free body diagram method. Newton-Euler equations. Dynamics of multibody systems. The principle of virtual work and power in dynamics. Lagrange equations of 2nd type. Reduction method. Vibrations of systems with 1 DOF. Free oscillations. Forced oscillations excited by harmonic force, by general periodic force and rotating unbalanced mass. Kinematic excitation. Forced oscillations of systems with 1 DOF freedom excited by general force - Duhamel integral. Introduction to nonlinear oscillation. Oscillation of systems with two DOFs, torsional oscillation. Bending vibration, determination of critical speed, dynamic absorber. Stability of motion. Hertz theory of impact. Approximate theory of flywheels.	ZK	4
E321039	Materials Science II. Fundamentals of metallurgy, iron-carbon alloys and influence of other elements, phase transformations, thermal, combined chemical and thermal and thermo-mechanical processing, technical iron-carbon alloys, non-ferrous metals and their alloys, plastics, structural ceramics, composites, selection of materials.	Z,ZK	4
E322029	Materials Science I. History and present state of materials engineering, overview of technical materials, internal structure of metals, crystal lattices and their defects, deformation, recrystallization and fracture of materials, structure and properties of materials and their testing, fundamentals of thermodynamics, phases and phase transformations, iron-carbon phase diagram.	KZ	3
E322091	Project	KZ	2
E323991	Thesis	Z	4
E331068	Technology I. Foundry properties of metals. Treatment. Pouring. Casting solidification. Moulding and core making. Thermal treatment. Plastic deformation. Division of forming processes. Semi-products, heating-up. Cutting. Cold and hot forming. Welds. Weldability. Weldment testing. Thermal cutting. Brazing. Surface treatments.	Z,ZK	5
E332091	Project	KZ	2
E333038	Fundamentals of Technology I. The study of manufacturing processes forms a core subject area for a majority of mechanical engineering students. It contains basic concept of three manufacturing technologies such as casting, forming and welding, including basic terms, methods and materials.	Z	3
E333991	Thesis	Z	4
E341014	Technology II. Mechanics of chip formation, cutting processes, finishing operations, non-traditional machining processes. Production rates calculation, machining economics. Automation of processes, programming of manufacture. Engineering metrology. Assembly techniques. Introduction to process planning.	Z,ZK	5
E352091	Project	KZ	2
E353991	Thesis	Z	4
E362091	Project	KZ	2
E363991	Thesis	Z	4
E371047	Automatic Control Automatic controllers are important part of many industrial processes. The goal of this course is to introduce students into basic knowledge of automatic control theory and practice like transfer functions, open versus closed loop control, design of controllers and frequency based analysis of control systems. The course also concentrates on logic control and control via programmable logic controllers. Some seminars are arranged in laboratories where practical skills and control engineering methods are trained. Students begin to work with MATLAB software as a common platform of control engineers (MATLAB is used on all including most of the laboratory classes).	Z,ZK	5
E372041	Computer Support for Study The course introduces students into creating technical and professional documents on computers or Web and into realizing technical computations with the use of computers. Students gain practical skills by creating an essay in a text editor, by realizing technical computations with a spreadsheet calculator, and by creating and presenting a web page.	KZ	3
E372083	Measurement in Engineering Overview of sensor principles for measurement of non-electrical variables (temperature, position, force, speed, acceleration, torque). Calibration and verification of measurement instruments.	KZ	3
E372091	Project An individual project from the branch of specialization (instrumentation, control engineering, informatics), or individual work, related to another subject.	KZ	2
E373991	Bachelor Thesis Each student will solve his individual theme under guiding of his individual supervising department specialist. Result is his/her thesis.	Z	4
E381054	Management and Economics of the Enterprise The study subject is intended for a wide range of students from all over the world who have successfully studied it for many previous years. The teaching goal is to acquaint technically educated foreign students with the basic procedures, methodologies and practice of management and economics of a modern, especially engineering company. The teaching concerns both the areas of finance, marketing and operational-production management and economics. The focus is on a prosperous enterprise operating within the framework of Lean Six Sigma and Industry 4.0. In addition to lectures and exercises, students also learn to be independent in their individual presentations, dedicated to the assigned professional topics of advanced business management.	Z,ZK	4
E382091	Project	KZ	2
E383991	Thesis	Z	4

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