

Courses taught in foreign languages in academic year 2023/24

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INSTITUTE OF MACHINES AND POWER ENGINEERING

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Additive Technology
Course code:	USE/EA116
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	František Klimenda, Ing., Ph.D.
Term:	summer/ winter
Language of instruction:	English
Lectures/exercises:	1/2
Completion:	exam
Course goal:	The aim of the course is to introduce students with the basic of Additive technology.
Abstract:	<ol style="list-style-type: none">1. History of additive technology2. 3D printing technology3. Materials for 3D printing.4. 3D modeling.5. Preprocessing of 3D models before printing6. 3D printing of parts.7. Post Processing after 3D printing
Notice:	<i>This course will be opened in agreement with the teacher. frantisek.klimenda@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Automation
Course code:	USE/EA117
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Jan Sterba, Ing., Ph.D.
Term:	summer/ winter
Language of instruction:	English
Lectures/exercises:	1/2
Completion:	exam
Course goal:	The aim of the course is to introduce students with the basic principles of the automation, logic functions, PLC, HMI elements and robotics in real tasks.
Abstract:	<ol style="list-style-type: none"> 1. Introduction to the automation 2. Logic functions 3. Practical use of binary logic. 4. Logic circuits and functions. 5. Control systems in industrial automation, PLC and HMI elements 6. Programming languages for PLC. 7. Algorithmization and basic programming for PLC and HMI 8. Variable types and data types in PLC programming. 9. Visualization and HMI interface in control systems. 10. Using robots in real tasks, communication Robot - Control system.
Notice:	<i>This course will be opened in agreement with the teacher. jan.sterba@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	CAD
Course code:	USE/EA080
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Martin Svoboda, Ing., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	3/0 per week
Completion:	exam
Course goal:	The aim of the course is to introduce CAD systems in the branch of mechanical engineering, to explain the principles of engineering projection and drawing, to learn the creation of 2D engineering drawing in AutoCAD system and to outline the creation of 3D drawing and solid modelling in Autodesk Inventor system.
Abstract:	<p>Introduction, requirements. Basic terms. CAD systems - benefits, classification, utilization.</p> <p>2. AutoCAD - yesterday and today, HW, SW, formats, environment, drawing window, procedure of drawing creation, handling, motion in a drawing.</p> <p>3. AutoCAD - command selection, command line, short-cut menu, model and paper space, status bar, switches.</p> <p>4. AutoCAD - object selection, coordinate systems, layers a object attributes, object snap, zoom and pan functions.</p> <p>5. AutoCAD - basic functions - line, circle, trim/extend, offset.</p> <p>6. AutoCAD - basic functions - delete, mirror, rotate.</p> <p>7. AutoCAD - advanced functions - rectangle, polygon, spline, arc, ellipse, polyline.</p> <p>8. AutoCAD - advanced functions - copy, move, array, scale, break.</p> <p>9. AutoCAD - advanced functions - chamfer, trim, hatch, explode, inquiry.</p> <p>10. AutoCAD - text style settings, writing of single line text and multiline text.</p> <p>11. AutoCAD - dimension style settings, fundamentals of dimensioning.</p> <p>12. AutoCAD - operations with blocks - creation, insertion, export.</p> <p>13. AutoCAD - printing, data export, other frequently used and effective functions</p>
Notice:	<i>This course will be opened in agreement with the teacher. martin.svoboda@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Electrical Experiments
Course code:	USE/EA105
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Vladislav Sítař, Ing., Bc., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	0/3 per week
Completion:	credit
Course goal:	The aim of course is familiarization of students with the basic electrical variables measurement. Students are acquainted with the electric measurement apparatuses and their application within laboratory experiments in the field of electrical circuit theory.
Abstract:	<ol style="list-style-type: none"> 1. Laboratory safety rules 2. Apparatuses and elements for electric variables measurements 3. DC voltage and current measurement 4. AC voltage and current measurement 5. Voltage and current measurement in non-harmonic circuits 6. Measurement the frequency dependence of measuring instruments 7. Analysis of ideal passive elements behaviour 8. Quantity measurement of ideal passive elements 9. Verification the voltage and current divider rules 10. Verification the Kirchhoff's laws 11. Measurement the V/I characteristics of diodes 12. Power measurement in AC circuits
Notice:	<i>This course will be opened in agreement with the teacher.</i> <i>vladislav.sitar@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Electrical machines
Course code:	USE/EA124
ECTS:	5
Level of course:	bachelor/master degree
Teacher:	Pavel Koblre, Ing., Ph.D.
Term:	winter
Language of instruction:	English
Lectures/exercises:	2/2 per week
Completion:	exam (written and oral)
Course goal:	The goal of the course is to familiarize the students with the constructions, principles and applications of DC and AC machines that are commonly used in practice.
Abstract:	<ol style="list-style-type: none"> 1. Basic terminology and effects in electrical machines, sorting of electrical machines. 2. Transformers – construction, principle, types, applications. 3. Operational modes of transformers. 4. Transformers in electrical grid. 5. Induction machines – construction, principle, types, applications. 6. Operational modes of induction machines. The torque. 7. Operational characteristic of induction machines. 8. Synchronous machines – construction, principle, types, applications. 9. Operational modes of synchronous machines. 10. Operation of synchronous generators in electrical grid, synchronous motors. 11. DC machines – construction, principle, types, applications. 12. Operational modes of DC machines, commutation. 13. Operational characteristic of DC machines. 14. AC commutator motors, special electromotors.
Notice:	<p><i>The course will be opened in agreement with the teacher.</i> <i>pavel.koblre1@ujep.cz</i> <i>The prerequisites for the enrolment are knowledge of physics and fundamentals of electrical engineering.</i></p>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Fluid Dynamics
Course code:	USE/EA118
ECTS:	5
Level of course:	bachelor degree
Teacher:	Ludmila Nováková, doc., Ing., Ph.D.
Term:	summer/ winter
Language of instruction:	English
Lectures/exercises:	2/2
Completion:	exam
Course goal:	Students will solve problems of hydrostatic, ideal and real fluid flow in pipes and basic problems of potential flow and two-dimensional flow using Navier-Stokes equations.
Abstract:	<ol style="list-style-type: none"> 1. Introduction, basic properties, quantities and units, 2. Fluid statics, pressure variation, Euler equation. 3. Forces on submerged surfaces, buoyancy. Metacentre. 4. Ideal fluid in motion: basic laws - continuity equation. Bernoulli equation, linear momentum equation, discharges from vessels, one-dimensional pipe flow. 5. Frictional and local losses. Darcy-Weisbach equation. Empirical formulas. 6. Unsteady one-dimensional flow. U-tube, piston pump, water hammer. 7. Relative flows – basic concepts in turbo machinery. 8. Force action on fluid jet. Pelton turbine – optimal rotational speed. 9. Laminar flows. Couette flow. Hagen–Poiseuille flow. Turbulent flows. Reynolds shear stress. The logarithmic law. 10. Flow past bodies, boundary layer, drag and lift, wing theory. 11. Navier-Stokes equation.
Notice:	<i>This course will be opened in agreement with the teacher. ludmila.novakova@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Modelling in Electric Power System
Course code:	USE/EA125
ECTS:	4
Level of course:	master degree
Teacher:	Vladislav Sítař, Ing., Bc., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	0/4 per week
Completion:	exam
Course goal:	The aim of course is to acquaint the students with the basic modelling in electrical power system in chosen simulation tool. Students will model the selected devices and machines used in electrical transmission and distribution grids for the purpose of steady-states analysis.
Abstract:	<ol style="list-style-type: none"> 1. Introduction to the modelling basics 2. Modelling of electrical quantities indicators 3. Modelling of one-phases loads 4. Modelling of three-phases loads 5. Modelling of overhead lines 6. Modelling of cable lines 7. Modelling of two-winding and three-winding one-phases transformers 8. Modelling of three-phases transformers 9. Modelling of capacitor banks and reactors 10. Modelling of HVDC transmission 11. Load Flow Analysis
Notice:	<i>This course will be opened in agreement with the teacher.</i> <i>vladislav.sitar@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Model of Energy Flows
Course code:	USE/EA104
ECTS:	4
Level of course:	bachelor/master degree
Teacher:	Martin Kantor, Ing., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	0/4 per week
Completion:	Pre-exam credit
Course goal:	The aim of the course is to introduce students with the basic principles of the finite element method and Computational fluid dynamics method and its practical application to various problems in industry. Course is orientated on software systems ANSYS.
Abstract:	<ol style="list-style-type: none"> 1) Introduction to ANSYS, creating and editing geometry; 2) Pre-processing and defining boundary conditions; 3) Evaluation and processing of the result Solutions; 4) stress - strain analysis; 5) Heat Transfer analysis; 6) Fluid flow analysis.
Notice:	<i>This course will be opened in agreement with the teacher. martin.kantor@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Technical Drawing
Course code:	USE/EA113
ECTS:	3
Level of course:	bachelor
Teacher:	Martin Svoboda, Ing., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	1/2 per week
Completion:	exam
Course goal:	The subject is an introduction to the creation and reading of the technical documentation, which is the main basis for the realization of the products. Students develop spatial imagination and acquire skills in manual drawing and dimensioning of basic geometric formations and structural components and assembly of components. The aim is to prepare students for the following subjects of structural and technological character.
Abstract:	<ol style="list-style-type: none"> 1. Introduction, requirements, drawing aids. Technical standardization and documentation. 2. Basic imaging methods - overview, rectangular and axonometric projection. 3. Technical drawings - lines, drawing formats, drawing drawings, scales, description field, technical font. 4. Basic rules for rendering machine parts - views, cuts, cross sections. 5. Basic rules for displaying machine parts - showing basic geometric elements of components. 6. Dimensioning - rules, execution, dimensions, dimensions of geometric and structural elements. 7. Tolerance and dimensional accuracy - tolerance writing, unattended dimensions. 8. Tolerance and dimensional accuracy - fitting system, storage, storage order. 9. Geometric accuracy - bases, types of geometric tolerances, meaning. 10. Surface roughness - meaning, current state of prescribing, location of marks. 11. Displays and dimensioning of machine parts and elements - threads, bolts and screw connections, springs, gears and gears. 12. Displays and dimensioning of machine parts and elements - grooving, bearings, sealing rings, centering pits, recesses, glued and solder joints, welds and welds, castings and forgings, heat treatment. 13. Drawing drawings - general principles, positioning, item lists (BOM), semi-finished products and their labeling.
Notice:	<i>The course will be opened with the attendance of 5 students min.</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Technical English
Course code:	UTM/EA098
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Pavla Čechalová
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	exam
Course goal:	This course covers essentials of technical language skills and aims to encourage fluency and active use of grammar and communicative structures in oral and written ways.
Abstract:	<p>I. Introductory part winter semester, bachelor Engineering, The History of Engineering, Civil Engineering, Main Branches of Civil Engineering, Engineering Functions,</p> <p>II. Main part summer semester, bachelor Material Engineering Properties – General Physical Properties, Material Engineering Properties – Mechanical Properties, Material Engineering Properties – Thermal Properties, Material Testing – Tensile Test, Manufacturing Processes</p> <p>III. Final part winter, summer semester – master Cast Iron, Non-Ferrous Metals, Corrosion, Plastics, Environmental Engineering</p>
Notice:	<i>This course will be opened in agreement with the teacher. pavla.cechalova@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Thermodynamics
Course code:	USE/EA119
ECTS:	5
Level of course:	bachelor degree
Teacher:	Jan Novotny, doc., Ing., Ph.D.
Term:	summer/ winter
Language of instruction:	English
Lectures/exercises:	2/2
Completion:	exam
Course goal:	Analyse thermodynamic systems, its equilibrium and energy transfer (work, heat) using First and Second Laws of Thermodynamic and determine the basic thermodynamic properties (internal energy, entropy) . Learn about measurements methods in Thermodynamic and work with diagrams, property tables and relations. Carry out thermodynamic analysis of engine cycles, heat pumps and refrigerator cycles.
Abstract:	<ol style="list-style-type: none"> 1. Fundamental concepts and laws of thermodynamics. Basic quantities of state. Equation of state of an ideal gas. 2. The First Law of Thermodynamics- heat, work, internal energy, enthalpy. The Second Law of thermodynamics, entropy. 3. Reversible and irreversible processes of ideal gases. Phase change. 4. Mixtures of ideal gases. Van der Waals model. The thermodynamics of vapour. Vapour tables and diagrams. The Clausius-Clapeyron Equation. 5. Thermodynamic processes in vapours. 6. Cycles in engineering application. 7. Psychrometry. Thermodynamics of humid air. Definitive quantities, tables, diagram. 8. Heat transfer by conduction, one-dimensional problems 9. Heat transfer by convection, The Similarity Theory in heat convection. 10. Heat transfer by radiation. The basic laws and applications. Heat exchangers. <p>Overall heat transfer, the mean temperature logarithmic gradient.</p> <ol style="list-style-type: none"> 11. One-dimensional isentropic compressible flow. Basic equations, Mach number. Isentropic flow.
Notice:	<i>This course will be opened in agreement with the teacher.</i> <i>novotny.jan@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Quality Control
Course code:	USE/EA107
ECTS:	4
Level of course:	Bachelor's/Master's degree
Teacher:	Milan Dian, Ing., Ph.D., MBA
Term:	Summer, Winter
Language of instruction:	English
Lectures/exercises:	1/2 per week
Completion:	exam
Course goal:	The fundamental objective of the course is to acquaint the students with modern systems of quality control, with top management function, tools and methods used in Quality Assurance System in all phases of manufacturing process and services.
Abstract/Topics:	<p>The principles of quality have long been known and used by professionals across the industry around the globe. The tools, methodologies, and rules of quality are inherently incorporated in each particular company process, product, and activity, being surely a competitive advantage on market place. On the other hand a plethora of discrepancies and problems still remains unsolved on the way to excellence and sustainability. The course presents up to date approach to modern Quality Assurance using a fundamental tools and methodologies in nowadays industrial processes and service. Moreover, it integrates knowledge and experience from contemporary field of Quality Assurance within automotive supply chain. Finally, the stress is put on Total Quality Management approach over the entire industry and service sector.</p> <ol style="list-style-type: none"> 1. A brief history and Introduction to the Management of Quality. 2. Methods and Quality tools I. (7 fundamental quality tools) and their application. 3. Methods and Quality tools II. (7 advanced quality tools) and their application. 4. Quality Assurance in Pre-serial Production. 5. Quality Assurance in Serial Production. 6. Quality Assurance in Post-production Phases and Aftermarket. 7. Economic Aspects of Quality. 8. Continuous Improvement in Quality Management Systems. 9. Systems of Quality Management based on ISO 9001, IATF 16949 and TQM. 10. Quality Awards, Model of Excellence and New Trends in Management of Quality.
Notice:	<i>This course will be opened in agreement with the teacher. milan.dian@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Industrial Processes
Course code:	USE/EA115
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Martin Svoboda, Ing., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	3/0 per week
Completion:	exam
Course goal:	The subject acquaints with the basic issues in the process technology field. It acquaints students with the basics of industrial processes, basic principles of machines and equipment used in industrial processes and their operation. It will enable students to use the acquired knowledge in chemical, food and consumer plants.
Abstract:	<ol style="list-style-type: none"> 1. Basic equations of fluid mechanics (Newtonian and non-Newtonian fluids, continuity equation, integral continuity equation, engineering Bernoulli equation), types of flow, pressure losses. Pipelines, pipe networks. Pumps, their distribution, construction, calculations, characteristics, use in production 2. Piston pumps, hydrodynamic pumps and pumps of other principles. Compression of gases. Division of compressors and blowers. Characteristics of compressors. Design and execution of compressors, examples of use. Liquefaction of gases. The principle of liquefaction, construction and design of liquefiers, examples of use. 3. Transmission phenomena. Transfer of momentum, heat and mass in homogeneous fluids. Navier - Stokes equation. Heat exchangers, distribution, calculation, construction and use. 4. Dryers. Basic division, design of dryers, their functions and use. Evaporators. Basic types of evaporators, their functions and uses. Autoclaves and reactors. Basic division, construction and use. Rectification. Principle of rectification, design of rectification columns, use. Stripping - principle, use. 5. Filtration. Principle, basic terms and definitions, characteristic quantities. Liquid flow through the filter cake layer. Settlement. Resistance of the environment, wrapping around particles, movement of particles in a fluid in a gravitational field. Settling of fine suspensions, coarse suspensions, continuous settling, separability of settling devices. 6. Production lines. The concept of construction of production lines (in the chemical, food and consumer industries). Basic types of production lines. Construction of apparatus and machinery. Examples of use. 7. Food production lines. Concept of construction of production lines. Examples of production lines (dairies, breweries, distilleries, seed oil production). 8. Chemical production lines. Construction concept, examples of production lines (production of ERO, MEĚO - methyl ester of vegetable oils, mixing of biofuels, production of polyester resins, production of permanganate, etc.)
Notice:	<i>This course will be opened in agreement with the teacher. martin.svoboda@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Mathematics I
Course code:	USE/EA129
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Vít Černohlávek, Ing.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	exam
Course goal:	Students will acquire basic knowledge of infinitesimal calculus in the sense that they will be able to solve special problems and problems of the real world by means of differential and integral calculus of functions of one variable.
Abstract:	<ol style="list-style-type: none"> 1. Numerical sequence and its limit, sum of numerical series. Convergence and divergence of sequences and series. 2. Elementary functions and their graphs (polynomial, rational, power, exponential, logarithmic, trigonometric, inverse trigonometric, hyperbolic, inverse hyperbolic). 3. Limit and continuity of function. Heine theorem. Properties of continuous functions. 4. Derivative of a function, its geometric and physical interpretation. Basic rules for differentiation, derivatives and differentials of higher order. Function increment theorem and its application. 5. Local and global extremes. Inflection points of the function, graph asymptotes, graphs of functions. 6. Extreme value theory and applications. 7. Antiderivative (primitive) functions, calculation of basic types of indefinite integrals (integration by parts and substitution methods). 8. Riemann integral, calculation of a definite integral, mean value of integral. 9. Geometric and physical applications of a definite integral (curve length, volume and surface of rotating bodies, center of gravity, angular momentum and inertia). Differential Equations - introduction and elementary methods of their solution. 10. Functional sequences, power series, differentiation and integration of power series. 11. Matrices, determinants, matrices of linear mappings. Eigenvalues and eigenvectors, quadratic form. Systems of linear equations and their solutions.
Notice:	<i>This course will be opened in agreement with the teacher. Vit.cernohlavek@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Mathematics II
Course code:	USE/EA130
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Vít Černohlávek, Ing.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	exam
Course goal:	Competence in the basics of mathematics; The student will be able to solve problems and problems of differential and integral calculus of functions of two and three variables independently and will understand relations with physical and technical applications.
Abstract:	<ol style="list-style-type: none"> 1. Functions of several real variables. Limit and continuity. Derivative in direction, partial and total derivative. 2. Differentiation of function, total differential. Increment theorems, higher order derivatives, Taylor theorem. 3. Local, global and bound extremes. Implicit functions. 4. Vector spaces. Linear dependence and independence, basis and dimension, subspace of vector space. 5. Scalar, vector and mixed product of vectors. Orthogonal coordinate system. Gauss plane. 6. Vector function, scalar function, vector field. First order operations (gradient, divergence, curl). 7. Second order operations (Laplace operator and its meaning). 8. Riemann integral in two and three-dimensional space, basic properties. Methods of integration, Fubini's theorem. 9. Geometric and physical applications of multivariate integrals. Line and surface integrals. 10. Green, Gauss and Stokes theorem. The use of line and surface integrals in physics and technology. 11. Analytical geometry in plane and space. General and parametric equations of lines and planes, their mutual positions, distances and deviations. Conic sections, technical curves (cycloids, spirals). Quadrics.
Notice:	<i>This course will be opened in agreement with the teacher. Vit.cernohlavek@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Selected Chapters of Mathematics
Course code:	USE/EA131
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Vít Černošlávěk, Ing.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	exam
Course goal:	The aim of the course is to summarize and revise the subject matter of secondary school mathematics so that students can better solve the problems in the subjects Mathematics I and Mathematics II. Another purpose of the course is to acquaint students with the basics of mathematics of students from various secondary schools.
Abstract:	<ol style="list-style-type: none"> 1. Basic knowledge of propositions and sets, basic types of equations and inequalities. 2. Equation with parameter. 3. Functions, exponential and logarithmic equations and inequalities. 4. Trigonometric functions and trigonometry. 5. Trigonometric equations and inequalities. 6. Power equations, linear function. 7. Sequences and series. 8. Vectors. 9. Conics. 10. Complex numbers. 11. Combinatorics and binomial theorem.
Notice:	<i>This course will be opened in agreement with the teacher.</i> <i>Vit.cernohlavek@ujep.cz</i>

INSTITUTE OF TECHNOLOGY AND MATERIALS

Institute:	Faculty of Mechanical Engineering
Course title:	Applied Physics
Course code:	UTM/EA089
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Novotný Jan, doc., PhDr., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	1/1 per week
Completion:	Exam
Course goal:	Good knowledge of physics is the basic prerequisite for understanding and design of technical equipment. The aim of the course is to deepen and level up students' secondary school knowledge, to be able to study successfully technical subject.
Abstract:	<ol style="list-style-type: none"> 1. Experimental and theoretical physics. Models and modelling in physics. Vector Calculus introduction: adding and subtraction of vectors. 2. Mass point (primary element) kinematics: reference-coordinate systems, displacement, speed, velocity, acceleration, straight-line, curvilinear and harmonic motions. 3. Kinematic quantities relations, graphs. 4. Mass point dynamics: laws of motion. Forces effects, work, energy, force impulse, momentum. 5. Rigid body (solid): forces and moments equilibrium, rotational motion, moment of momentum, inertia moment, energy. Sliding friction, rolling resistance, physical pendulum. 6. Matters deformation: elastic and plastic deformations, strain-stress diagram explanation. Loading of solids: tension, shear and torque. Hooke's law, Young's modulus, Poisson's ratio. 7. Perfectly and imperfectly elastic impacts: force impulse, momentum, momentum moment, energy. 8. Liquids. Hydrostatics: Pascal's law and Archimedean principle and hydrostatic paradox and their technical application. Hydrodynamics of ideal liquid, Bernoulli's equation, hydrodynamics paradox. 9. Ideal and real liquids. Movement of bodies in liquids. Aeromechanics, atmospheric pressure and pressure measurements. Technical application: compressors, vacuum pump, turbines, aviation. 10. Kinetic theory of gases, velocity distribution, root-mean-square speed of molecules. Pressure of gases. Ideal gas fundamental equation. 11. Electricity - Electrostatics, Electrical field strength E, Electric current, Single electrical circuit, Ohm's law for electrical circuit part. 12. Formation of the image, Plane mirror, Concave spherical mirror, Lenses, Dioptric power.
Notice:	<i>This course will be opened in agreement with the teacher. jan.novotny@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	CNC Programing
Course code:	UTM/EA111
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Pavel Kraus, Ing.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	exam
Course goal:	The aim of the course is to outline the usage of CNC programing in frame of using ISO code for turning and milling with practical demonstration of CNC systems and CNC machining.
Abstract:	<ol style="list-style-type: none"> 1. Fundamentals of CNC programming 2. NC, CNC, DNC, 3. ISO Code 4. CNC systems 5. CNC turning 6. CNC milling
Notice:	<i>This course will be opened in agreement with the teacher.</i> <i>pavel.kraus@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Corrosion and Protection of Material
Course code:	UTM/EA097
ECTS:	4
Level of course:	bachelor/master degree
Teacher:	Jaroslava Svobodová, doc., Ing., Ph.D.
Term:	winter semester
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	exam, semestral project
Course goal:	The material is exposed to a number of influences in technical practice that cause its deterioration, corrosion and other degradation. Knowledge of the degradation reason and reducing of the environment impact is an important factor in the design of structures, structural components and protection of goods prior to export from the factory. In the automotive and aerospace engineering are still solving this problems. Insight into the influence of environment on the product, material and methods of protection of materials and products are the object of this course.
Abstract:	<ol style="list-style-type: none"> 1. The Gist of the Corrosion 2. Types of Corrosion 3. The Distribution and Types of Corrosion Attack 4. Thermodynamic Stability and Corrosion Nobility of Metals 5. Corrosion Protection Methods 6. Metal coatings 7. Practical exercise
Notice:	<i>This course will be opened in agreement with the teacher.</i> <i>jaroslava.svobodova@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Degradation of materials
Course code:	UTM/EA101
ECTS:	5
Level of course:	bachelor/master degree
Teacher:	Sylvia Kuśmierczak, doc. Ing., PhD.
Term:	summer
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	exam, semestral project
Course goal:	The course approaches the issue of material degradation and introduces students with the classification of degradation processes, to give their reasons and their consequences. Student information obtained in this field.
Abstract:	<ol style="list-style-type: none"> 1. Classification of degradation processes. 2. Fractures materials: theoretical strength, the influence of defects etc. 3. Internal and external factors influencing the degradation processes. 4. Wear materials: abrasion, adhesion, erosion, cavitation, ... 5. Corrosion - principle, types, ... 6. Degradation of sudden temperature changes, chemical decomposition at high temperatures. 7. Degradation radiation: UV degradation, radiation damage Materials resistant to certain types of degradation. 8. Fatigue of materials: fatigue static, dynamic fatigue creepu.
Notice:	<i>The course will be opened in agreement with the teacher. sylvia.kusmierczak@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Fundamentals of Fractography
Course code:	UTM/EA120
ECTS:	4
Level of course:	bachelor/master degree
Teacher:	Jaroslava Svobodová, doc, Ing., Ph.D.
Term:	Summer/winter semester
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	Exam, semestral project
Course goal:	Fractography is an area of physical metallurgy dealing with evaluation of the fracture planes of fractures. The course is focused on the theory of different types of fractures, mechanism of this processes and methods of investigation. It also deals with concrete cases of fractography in steels, aluminium alloys and application of fractography in energetics.
Abstract:	<ol style="list-style-type: none"> 1. Introduction of Fractography 2. Selected notes on corrosion fractures 3. Criteria for evaluation of fracture faces 4. Selected notes on the theory of fatigue fractures 5. Selected notes on the theory of ductile fractures 6. Selected notes on the theory of brittle failures - cleavage fractures 7. Selected notes on the theory of creep fractures 8. Notes on the fractography of aluminium alloys 9. Notes on the fractography of stainless steels 10. Application of fractography in energetics
Notice:	<i>This course will be opened in agreement with the teacher.</i> <i>jaroslava.svobodova@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Jigs and Fixtures
Course code:	UTM/EA122
ECTS:	5
Level of course:	bachelor/master degree
Teacher:	Nataša Náprstková, doc. Ing., Ph.D.
Term:	winter/summer
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	exam, semestral project
Course goal:	The course introduces students to the basics of design and use of jigs and fixtures not only for machining. They will be introduced to the kinds of components and using of fixtures for different types of production.
Abstract:	<ol style="list-style-type: none"> 1. What is it fixture? 2. Types and dividing of jigs and fixtures 3. Components of fixtures 4. Jigs and fixtures for machining 5. Jigs and fixtures for assembly
Notice:	<i>The course will be opened in agreement with the teacher. natasa.naprstkova@ujep.cz</i>

Institute:	Faculty of Mechanical Engineering
Course title:	Mashing tools
Course code:	UTM/EA126
ECTS:	5
Level of course:	bachelor/master degree
Teacher:	Nataša Náprstková, doc. Ing., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	Seminar work, exam
Course goal:	The course introduces students to the basics of design and use machining tools for different types of machining technologies. They will be introduced to the kinds, construction and using of cutting tools.
Abstract:	<ol style="list-style-type: none"> 1. Machining technology 2. Geometry of machining tools. 3. Materials for cutting tools. 4. Tool wear. 5. Lathe cutting tools. 6. Cutting tools for milling. 7. Cutting tools for drilling. 8. Grinding tools. 9. Tools for machining broaches. 10. Other machining tools.
Notice:	<i>This course will be opened in agreement with the teacher. jan.novotny@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Materials in Energetics
Course code:	UTM/EA121
ECTS:	5
Level of course:	bachelor/master degree
Teacher:	Jaroslava Svobodová, doc., Ing., Ph.D.
Term:	summer semester
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	Exam, semestral project
Course goal:	The course aims to explain the characteristics of steels applied in power engineering. We will deal with the properties of materials and the processes that can affect the behaviour and the lifetime of the materials and products in this field. Students become acquainted with degradation processes, fractography and creep processes of materials used in energetics. They will also get an overview of trends and developments in this area.
Abstract:	<ol style="list-style-type: none"> 1. Introduction 2. Characteristics of steels applied in power engineering 3. Creep process 4. Degradation processes due to corrosion 5. Fractography in energetics 6. Material inspection, residual life prediction 7. The world trend of steel and its requirements 8. The world trend of research of nuclear reactors and applied steels in them 9. Overview of the most applied steels in heat power engineering 10. New stainless steels, research and application
Notice:	<i>This course will be opened in agreement with the teacher. jaroslava.svobodova@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Manufacturing Technology
Course code:	UTM/EA090
ECTS:	5
Level of course:	bachelor/master degree
Teacher:	Jaroslava Svobodová, doc., Ing., Ph.D.
Term:	summer semester
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	Exam, semestral project
Course goal:	The aim of the course is to obtain knowledge in the manufacturing processes that deal with the production of components used in engineering in the construction machinery and industrial equipment.
Abstract:	<ol style="list-style-type: none"> 1. Introduction into Manufacturing Technology 2. Production Technology of Metals 3. Casting Technology 4. Forming Technology 5. Machining Technology 6. Heat Treatment 7. Semestral Project
Notice:	<i>This course will be opened in agreement with the teacher.</i> <i>jaroslava.svobodova@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Non-cutting Technologies
Course code:	UTM/EA095
ECTS:	5
Level of course:	bachelor/master degree
Teacher:	Jaroslava Svobodová, doc., Ing., Ph.D.
Term:	winter semester
Language of instruction:	English
Lectures/exercises:	2/1 per week
Completion:	Exam, semestral project
Course goal:	The aim of the course is to explain the principle and technological processes of the non-cutting technologies. We will deal with the basic technologies of casting, progressive casting technology, forming, welding a powder metallurgy.
Abstract:	<ol style="list-style-type: none"> 1. Properties of Metals and Alloys 2. Partition of the Production Processes 3. Casting Methods 4. Casting Technology 5. Progressive Casting Technology 6. Forming – thermo forming and cold forming 7. Technological Forming Processes 8. Welding Technology 9. Welding Methods 10. Powder Metallurgy
Notice:	<i>This course will be opened in agreement with the teacher. jaroslava.svobodova@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	The Physics of Metals
Course code:	UTM/EA114
ECTS:	5
Level of course:	bachelor/master degree
Teacher:	Jan Novotný, doc., Dr., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	2/2 per week
Completion:	exam
Course goal:	Good knowledge of physics of metals as the basic prerequisite for understanding and design of technical materials. Subjects presents a definitive account of a major field of modern physics and will be of value to both experimental and theoretical solid state physicists and metallurgists seeking a clear explanation of the physical phenomena occurring in metals
Abstract:	<p>Internal structure of metals and alloys</p> <ol style="list-style-type: none"> 1. Fundamentals of crystallography 2. Dislocations and between dislocations and plastic deformation during forming 3. Ways of strengthening metals. 4. Precipitation hardened alloy 5. Solidification of metals and their alloys 6. Grain boundaries: definition and description. Properties of grain boundaries. 7. Diffusion 8. Chemical treatment of metal surfaces and diffusion processes in metal heat treatment 9. Ways and nature of the surface wear of materials. 10. Violation of the fracture, the mechanism of fracture, fracture types and their origin.
Notice:	<i>This course will be opened in agreement with the teacher. jan.novotny@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Project Management
Course code:	UTM/EA127
ECTS:	3
Level of course:	bachelor/master degree
Teacher:	Daniela Vysloužilová, Ing., Ph.D.
Term:	summer, winter
Language of instruction:	English
Lectures/exercises:	2/0 per week
Completion:	exam
Course goal:	The aim of the course is to gain knowledge of methods and basic skills of application of these methods in the management of project activities. Graduates can use the knowledge gained by studying the subject in their business practice as a member of the project team or as a project team manager.
Abstract:	<p>Course contents</p> <ol style="list-style-type: none"> 1. What tasks can be solved in the company using project management. 2. Project and project management. 3. Project preparation and project planning. 4. Structural decomposition of the project, time implementation plan and resource plan. 5. Cost plan and risk plan. 6. Methods applicable to project planning. 7. Project organization and management, leadership in team project management. 8. Relationships, communication, motivation and conflicts in leading a project team. 9. Project implementation management, EVA method, critical chain method.
Notice:	<i>This course will be opened in agreement with the teacher. daniela.vyslouzilova@ujep.cz</i>

Faculty/Institute:	Faculty of Mechanical Engineering
Course title:	Welding
Course code:	UTM/EA132
ECTS:	5
Level of course:	bachelor degree
Teacher:	Sylvia Kuśmierczak, assoc. prof. Ing., PhD.
Term:	winter
Language of instruction:	english
Lectures/exercises:	2/1 per week
Completion:	exam , semestral project
Course goal:	The course introduces students to individual welding methods. Basic concepts from the field of welding are introduced here and the principles of individual methods are described. Furthermore, basic information on the weldability of the construction materials used, defects in weld joints, and inspection of welds is presented.
Abstract:	<ol style="list-style-type: none"> 1. Welding, weldability, metallurgical processes in electric fusion welding 2. Fusion welding methods - electric arc welding - manual welding with covered electrode, submerged welding, MAG, MIG, TIG, eElectroslag welding. Flame welding. 3. Pressure resistance welding - Spot resistance welding, seam resistance welding, butt welding. 4. Special welding methods - cold pressure welding, friction welding, plasma welding and welding, laser welding. 5. Weld structure, thermal cycle, stress and deformation. 6. Defects in welding joints. 7. Heat treatment of welded structures. 8. Inspection of welded joints - destructive and non-destructive methods.
Notice:	<i>The course will be opened in agreement with the teacher. sylvia.kusmierczak@ujep.cz</i>