List of courses in English held for 2008/2009
at the Faculty of Production Technology and Management
University of J. E. Purkyně in Ústí nad Labem

1. CAD

Course code : KSM/P080
3 credits
Course leader : Hrala Tomáš, Ing.
Labs : 2 hours per week

Course description :

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 modeling in Autodesk Inventor system.

Course programme :

1. Introduction, requirements. Basic terms. CAD systems - benefits, classification, utilization.
2. AutoCAD - yesterday and today, HW, SW, formats, environment, drawing window, procedure of drawing creation, handling, motion in a drawing.
3. AutoCAD - command selection, command line, short-cut menu, model and paper space, status bar, switches.
4. AutoCAD - object selection, coordinate systems, layers a object attributes, object snap, zoom and pan functions.
5. AutoCAD - basic functions - line, circle, trim/extend, offset.
6. AutoCAD - basic functions - delete, mirror, rotate.
7. AutoCAD - advanced functions - rectangle, polygon, spline, arc, ellipse, polyline.
8. AutoCAD - advanced functions - copy, move, array, scale, break.
9. AutoCAD - advanced functions - chamfer, trim, hatch, explode, inquiry.
10. AutoCAD - text style settings, writing of single line text and multiline text.
11. AutoCAD - dimension style settings, fundamentals of dimensioning.
12. AutoCAD - operations with blocks - creation, insertion, export.
13. AutoCAD - printing, data export, other frequently used and effective functions.

Teching Methods:

Teaching is presented in the form of lectures and seminars.

Examination:

Practical examination consists in creation of complete engineering drawing.

Admission requirements:

The minimum academic requirement for international admission is proof of graduation from an accredited secondary (high) school. Students submit **original** credentials or **certified** true copies from secondary (high) school **plus** official transcripts from any colleges or universities previously attended. Students coming by Erasmus or another students' mobility program are also accepted. Advanced knowledge of English language is required.

2. CAM

Course code : KTMI/P081
3 credits
Course leader : Náprstková Nataša, Ing.
Labs : 2 hours per week

Course description :

To outline the usage of 3D drawing and solid modeling in Autodesk Inventor system, to explain the connections between machine, workpiece, coordinate system etc., to approach the numerical control and to develop the processing knowledge for CAM system.

Course programme :

" NC, CNC, DNC, ISO Code
" Manual Part Programming
" CA Part Programming
" CAM
" CAD/CAM

Teaching Methods:

Teaching is presented in the form of lectures and seminars.

Examination:

Examination consists of the written test, project work, practical exam.

Admission requirements:

The minimum academic requirement for international admission is proof of graduation from an accredited secondary (high) school. Students submit original credentials or certified true copies from secondary (high) school, optionally official transcripts from any colleges or universities previously attended. Advanced knowledge of English language is required.

3. General Economics

Course code : KMEP/P082
5 credits
Course leaders : Ritschelová Iva, doc. Ing. CSc. , Sidorov Egor, Ing.
Lectures : 2 hours per week
Labs : 2 hours per week

Course description :

The microeconomics theory is focused on market structure analysis, consumer and company behavior (production, costs, prices of input / output, profit, investments). The macroeconomics theory provides the students with macroeconomics aggregates, problems of economic growth, money supply, unemployment and inflation. Students will also be able to understand monetary and fiscal policy of the state, international market theory and balance of payments.

Teaching Methods:

Teaching is presented in the form of lecturers and seminars focused on the practical application of theories and project work.

Examination:

Examination consists of the project work evaluation, written and oral exams.

Contents:

1. Subject of economic investigation
2. Supply and Demand
3. Function of economical mechanisms
4. Economical behavior of consumer and producer
5. Costs analysis
6. Company in conditions of perfect competition
7. Company in conditions of imperfect competition
8. Economic policy
9. The expenses of national economics
10. Money and monetary policy
11. Unemployment
12. Inflation
13. Fiscal policy
14. Economic growth and economic cycles
15. Global market and economic integration

Admission requirements:

The minimum academic requirement for international admission is proof of graduation from an accredited secondary (high) school. Students submit original credentials or certified true copies from secondary (high) school, optionally official transcripts from any colleges or universities previously attended. Advanced knowledge of English language is required.

4. Design of Machine Parts

Course code : KSM/P083
5 credits
Course leader: Grečenko Alexandr, prof. Ing. DrSc.
Lectures : 2 hours per week
Labs : 2 hours per week

Course description :

The aim of the subject is to provide students with facts about the basic kinds of machine components in context to their standardization and dimensioning, about their function and properties. The students should also obtain skills needed for reading and evaluating the drawings and in producing the design documents assisted by computation.

Course programme :

T1: Construction materials and their properties after heat treatment.
T2: Mechanical properties of steel in tension, twisting and bending. Factor of safety.
T3: Technical drawing and representation. Design documentation and conventions.
T4: Dimensioning with tolerances, dimensional loops.
T5: ISO system of limits and fits.
T6: Surface roughness and geometrical tolerances.
T7: Material joints: welding, brazing and bonding.
T8: Thread fasteners and pins.
T9: Shafts and bearings, keys and splines.
T10: Gears spur with straight and helical teeth, bevel and worm gears.
T11: Flexible drives - chain, belt, steel rope.
T12: Basic clutches, universal joints and basic coil springs.

Teaching Methods:

Teaching of this course comprises lectures, seminars and dimensioning exercises and may include a simple design project.

Examination:

Examination consists of the written and oral parts.

Prerequisite courses:

Mathematics and geometry, Mechanics of rigid bodies, Structural mechanics (stress and strain), Technical drawing.

Admission requirements:

The minimum academic requirement for international admission is proof of graduation from an accredited secondary (high) school. Students submit original credentials or certified true copies from secondary (high) school, optionally official transcripts from any colleges or universities previously attended. Advanced knowledge of English language is required.

5. Dynamics in Practice (Applied Mechanics)

Course code : KSM/P086
3 credits
Course leader : Dr. George Trmal
Lectures : 2 hours per week

Objective:

This module educates the students in dealing with detailed analysis and the calculation needed in practical and everyday life examples, using the basic knowledge of Statistics, Dynamics and Kinematics.

Contents:

Analysis of practical examples, e.g. sporting disciplines as Long jump, Pole vaulting and Hammer throw, taking into account different conditions, including air resistance. Analysis of other cases, as sport motorbike or aircraft in action. The analysis for aircraft is a step by step calculation of all its phases, from the airplane start, ground run, take-off and the airplane climb and landing.   .

Teaching Methods:

Teaching is presented in the form of lectures, seminars and project work.

Examination:

Oral examination and project evaluation

Admission requirements:

The minimum academic requirement for international admission is proof of graduation from an accredited secondary (high) school. Students submit original credentials or certified true copies from secondary (high) school, optionally official transcripts from any colleges or universities previously attended. Advanced knowledge of English language is required.

6. Applied Physics

Course code : KAD/P089
3 credits
Course leader : Novotný Jan, PhDr. Ph.D.
Lectures : 1 hour per week
Labs : 1 hour per week

Course description :

Good knowledge of physics as the basic prerequisite for understanding and design of technical equipments. The aim is to deepen and level up the student?s secondary school knowledge, to be able to study successfully the technical subject. Requirements on students :

Course programme :

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 strenght E, Electric current, Single electrical circuit, Ohm s law for elecrical circuit part.
12. Formation of the image, Plane mirror, Concave spherical mirror, Lenses, Dioptric power

7. Experiments

Course code : KSM/P084
3 credits
Course leader : Hrala Michal, Ing.
Labs : 2 hours per week

Course description :

The subject provides the students with measurement methods concerning selected parameters used in technical practise. Students should get familiar with the design of the measuring equipment, data acquiring, data processing and resulting in the presentation using statistical tools.

Course programme :

1. Procession of Acquired Data
Introduction into the measurement, statistical tools to the data processing
2. Length Gauges
Measuring of the length, distance and angle, an experiment
3. Shapes and Relative Positions of Functional Faces
Theory and measuring shapes and relative positions of functional faces, an experiment
4. Roundness
Theory and measuring of roundness and waviness, an experiment
5. Roughness of Surface
Theory and measuring of roughness (Ra, Ry, Rmax,?.), an experiment
6. Hardness
Theory and measuring of hardness (HRA, HRB, HRC, HV), an experiment
7. Tensile and compressive tests
Theory and measuring of tensile and compressive stress of material, an experiment
8. Impact Properties
Theory and measuring of impact properties (impact value, impact strength), an experiment
9. Force Measurement
Principles of force measuring, an experiment
10. Introduction into the research work of FPTM
Measuring system used to the research testing on the centreless grinding machine BU 16.
Measuring of the surface integrity parameters. Processing of the acquired data.
11. Written test

Teaching Methods:

Teaching is presented in the form of seminars, experiments, measurements and project works.

Examination:

Examination consists of the project work evaluation, written and oral exams.

Admission requirements:

The minimum academic requirement for international admission is proof of graduation from an accredited secondary (high) school. Students submit original credentials or certified true copies from secondary (high) school, optionally official transcripts from any colleges or universities previously attended. Advanced knowledge of English language is required.

8. Manufacturing Technology

Course code : KTMI/P090
5 credits
Course leaders : Holešovský František, prof. Dr. Ing.; Sylvia Kuśmierczak, Ing., Ph.D.
Lectures : 2 hours per week
Labs : 2 hours per week

Course description :

- Non-cutting technologies–basic methods,principles,comparison with cutting operation
- Casting process – methods, principles, usage of materials, usage
- Welding process – methods, principles, usage, progressive methods
- Forming process - methods, principles, usage, progressive methods, plastic moulding
- Machining – basic terms
- Tool, tool planes and geometry
- Kinematics of process
- Machining methods
- Finishing methods
- Excursion
- Project work

Teaching Methods:

Teaching of this course comprises lectures, seminars and excursions.

Examination:

Written examination and project work.

Admission requirements:

The minimum academic requirement for international admission is proof of graduation from an accredited secondary (high) school. Students submit original credentials or certified true copies from secondary (high) school, optionally official transcripts from any colleges or universities previously attended. Advanced knowledge of English language is required.

9. Bussines English (or Technical English)

Course code : KAD/P092
3 credits
Course leader: Filatová Olga, Mgr.
Labs : 2 hours per week

Course description :

This course covers essentials of business language skills and aims to encourage fluency and active use of grammar and communicative structures in oral and written ways.

Course programme :

Visiting Company.
Present Simple Active&Passive, Necessity: must, have to
Useful nouns&expressions
Letter of Introduction
When Dream Became a Business.
Past Simple Active&Passive, Regular&Irregular Verbs
Useful verbs, Linking words
CV, Cover Letter
Feeling Changes.
Future Simple, to be going to do smth. Giving advice: should
Expressing opinions, agreement&disagreement, reasoning
Complaint Letter
Money Talks.
Present Perfect
Basic financial vocabulary (nouns, expressions, verbs)
Response to a Complaint Letter
Business Communication.
Mixed Tenses
Business contract basic vocabulary
Useful expressions for business socializing
Draft contract

10. Mechanical Vibrations and Control

Course code : KTMI/P095
3 credits
Course leader : Segľa Štefan, doc. Ing., CSc.
Lectures : 2 hours per week

Annotation:

The subject serves as an introduction to the field of vibration in engineering. Not only theory, but also computational aspects, and applications of vibrations are presented in as simple a manner as possible. Expanded explanation of the fundamentals are given emphasizing physical significance and interpretation. Numerous examples and problems are used to illustrate principles and concepts.

Contents of the subject:

1. Introduction and Background.
2. Single Degree of Freedom Vibration – Introduction to Discrete Models.
3. Single Degree of Freedom Vibration – Control.
4. Multidegree of freedom Vibration.
5. Modal Analysis.
6. Continuous Systems. Continuous Limit of a Discrete Formulation. Vibration of Strings
7. Longitudinal (Axial) Vibration of Beams. Torsional Vibration of Shafts.
8. Transverse Vibration of Beams. Beam Vibration: Special Problems
9. Vibration of Membranes. Vibration of Plates.
10. Approximate Methods for Continuous Structures.
11. Numerical Integration Methods in Vibration Analysis – Finite difference Method.
12. NIM – Runge-Kutta Methods.
13. NIM – Wilson Method, Newmark Method.

11. Selected Chapters of Mechanics

Course code : KSM/P091
5 credits
Course leader: Segľa Štefan, doc. Ing., CSc.
Lectures : 2 hours per week
Labs : 2 hours per week
Semester : winter

Annotation:

Mechanics is that branch of physical science, which deals with the state of rest or motion of bodies under the action of forces. No one subject plays a greater role in engineering analysis than mechanics. The subject of mechanics is devided into two parts: *statics*, which concerns the equilibrium of bodies, and *dynamics*, which concerns the motion of bodies. The primary purpose of the study of mechanics is to develop the capacity to predict the effects of force and motion in the course of carrying out the creative design function of engineering. The major emphasis is on basic principles, methods, and to show both the cohesiveness of the relatively few fundamental ideas and the great variety of problems that these few ideas will solve.

Contents – Lectures:

- Basic Concepts and Principles.
- Two-Dimensional Force Systems. Moment. Couple. Resultant.
- Three-Dimensional Force Systems. Moment. Couple. Resultant.
- Equilibrium of a Rigid Body in Two and Three Dimensions.
- Plane Trusses. Method of Joints. Frames and Machines.
- Friction. Types of Friction. Journal Bearings.
- Thrust Bearings. Flexible Belts. Rolling Resistance.
- Kinematics of Particles.
- Kinetics of Particles. Rectilinear and Curvilinear Motion.
- Work and Kinetic Energy. Impuls and Momentum.
- Plane Kinetics of Rigid Bodies. Translation. Fixed-Axis Rotation.
- General Plane Motion.
- Free and Forced Vibration of Particles.
- Vibration of Rigid Bodies.

Contents - Exercises:

- Scalars and Vectors.
- 2D Force Systems – Moments, Couples, Resultants.
- 3D Force Systems – Moments, Couples, Resultants.
- Equilibrium: Jib Crane, Hoist.
- Trusses, Frames: Cantilever Truss – Method of Joints (MATLAB).
- Friction: Journal Bearings.
- Friction: Flexible Belts, Rolling Resistance.
- Kinematics of Particles.
- Rectilinear and Curvilinear Motion of Particles.

- Work, Kinetic Energy. Impuls, Momentum.
- Translation. Fixed-Axix Rotation.
- General Plane Motion.
- Free and Forced Vibration of Particles.
- Vibration of Rigid Bodies.

12. Wood and Plastics

Course code : KAD/P088
2 credits
Course leader: Novotný Jan, PhDr. Ph.D.
Labs : 2 hours per week

Objectives:

The main objective of this course is to provide the students with enhanced knowledge in the following area:Design of products made from wood and polymers, concerning their function and processing technology.

Teaching Methods:

Teaching is presented in the form of lecturers and seminars, including project work.

Examination:

Examination consists of the project work evaluation and written exam.

Contents:

- Wood as a natural source of material and energy, structural definition of wood, forest and wood usage
- Wood – macroscopic, microscopic and sub microscopic structures
- Physical and mechanical properties of wood – wood moisture, density, thermal properties, electrical properties, acoustical properties, hardness, consistency and elasticity
- Sawn wood, wooden slab-shaped materials, timber selection, scale boards and figured veneers, plywood and slabs
- Wood processing technologies, drying, machining, finishing, primers and other paints
- Polymers definition and classification, synthesis of polymers
- Chemical attributes of polymers – structure, reactivity, resistance, stabilization
- Physical attributes of polymers – molecular mass, state space, electrical and thermal properties
- Mechanical properties of polymers, viscoelasticity, deformations, static strength, wear resistance, testing of plastics
- List of essential kinds of plastics and their usage, thermoplastics, thermosets, elastomers
- Technology of engineering plastics processing, practical application, machining and combination
- Plastics depositions, cladding, overlays
- Coating technologies, testing and usage of synthetic resins, plastics as structural materials
- Adhesives, and other supporting products

Admission requirements:

The minimum academic requirement for international admission is proof of graduation from an accredited secondary (high) school. Students submit original credentials or certified true copies from secondary (high) school, optionally official transcripts from any colleges or universities previously attended. Advanced knowledge of English language is required.

13. Transportation and Environment in the Czech Republic

Course code : KMEP/P093
2 credits
Course leader : Moravec, Jiří, Ph.D.
Lectures/Labs : 2 hrs per week

Course description:

Transportation is an economic factor associated with both positive and negative impacts in the Czech Republic. Market economy and technological development bring up new opportunities and problems, which are followed with delay by public policy measures. The course considers environmental aspects of transportation in an economic context, energy and material requirements of transportation, and influence of transportation on health and environment. The students will also get acquainted with some ways of mitigating of negative impacts of transportation, alternative solutions, and with expected future development.

Teaching Methods:

Teaching is presented in the form of lecturers and guided discussions. Active participation of students is encouraged.

Examination:

Examination will consist in written and/ oral examination. In addition, small written tests may be given during the semestr, and/or homework assigned.

Contents:

1. The role of transportation in society and business
2. The transportation public policy and the environmental public policy
3. Economic and social aspects of transportation
4. Negative influences of transportation on the environment (air, water, soil, biodiversity, landscape character, accidents and wastes)
5. Health risks and transportation
6. Measures for mitigation of negative impacts of transportation (car and fuel modifications, noise abatement measures, roadway adaptations, incl. ecoducts, public support of environmentally favourable transportation, strategic landscape planning and zoning, business management measures)
7. Indicators of sustainable development of transportation
8. Best-case examples in the Czech Republic and in other countries

Admission requirements:

The minimum academic requirement for international admission is a proof of graduation from an accredited secondary (high) school. Students submit original credentials or certified true copies from secondary (high) school, optionally official transcripts from any colleges or universities previously attended. Advanced knowledge of English language is required.