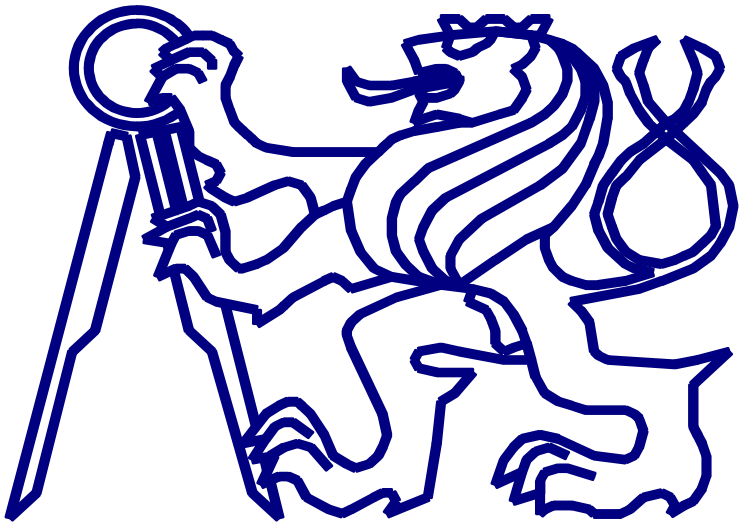
CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF MECHANICAL ENGINEERING



MASTER OF AUTOMOTIVE ENGINEERING

PROGRAM OF THE 1ST YEAR

Winter semester

Topics	Contact hours	Repartition L./E.	ECTS Credits
INTERNAL COMBUSTION ENGINES	91	4 + 3	7
MECHANICAL AND HYDRAULICAL TRANSMISSIONS	78	3 + 3	6
MULTIBODY MODELLING FOR VEHICLE SYSTEMS	52	3 + 1	5
TECHNOLOGY OF AUTOMOTIVE PRODUCTION	65	3 + 2	4
COMPUTATIONAL FLUID DYNAMICS	52	2 + 2	4
MARKETING, ECONOMY AND FINANCES	26	1 + 1	2
FOREIGN LANGUAGE I.	78	0 + 6	3
			31

Summer semester

Topics	Contact hours	Repartition L./E.	ECTS Credits
DESIGN OF TOOLS AND PLASTIC PARTS	39	2 + 1	3
VEHICLE CONCEPT, STRUCTURE, AGGREGATES AND SAFETY	39	2 + 1	3
VEHICLE DYNAMICS	78	4 + 2	6
VIBRATION OF VEHICLES	52	3 + 1	5
QUALITY	39	2 + 1	3
DESIGN AGAINST FATIGUE	26	1 + 1	2
MICROELECTRONICS IN VEHICLES	26	1 + 1	2
PROJECT AND 3D CAD	39	0 + 3	3
FOREIGN LANUAGE II.	52	0 + 4	3
			30

INTERNAL COMBUSTION ENGINES

Type		Compulsory	**Semester**		winter
Contact hours	(91) 4 + 3	**Number of credits**		7	
Type of termination		Assessment + Exam	**Form**		Lectures + exercises

Lecturers

Prof. Ing. Jan Macek, DrSc.
Ing. Antonín Mikulec

Anotation

TARGET
The course target is to provide fundamental information dealing with recent concepts of vehicle powertrains, especially combustion engines (ICE) and tools for their realization, especially considering mixture formation, combustion and gas 3ateriál principles.

CONTENTS
Fundamentals of internal combustion engines (ICE): principles of thermodynamics, principles of combustion, formation of pollutants, gas exchange, super- and turbocharging; description of tools for fuel injection, mixture formation, valve gears, combustion realization, exhaust aftertreatment.

- Thermodynamics of open system, types of engines, definition of main parameters.
- Engine torque control, stability of engine-load interaction, basic engine maps
- Thermodynamics of piston ICE, T-s diagram assessments of efficiency, Carnot cycle, real cycles
- Thermodynamics of piston ICE, T-s diagram assessments of efficiency, Carnot cycle, real cycles
- Fuels, thermochemistry and chemical kinetics
- Combustion processes and basic types of flames. Pollutant formation.
- Compression and expansion process and heat transfer to walls
- Charge Exchange process and parameters. Definition of ICE partial efficiencies.
- Mixture formation and control for SI and CI engines. Ignition and injection system design.
- Combustion chamber design. Valve trains and charge exchange equipment design
- Turbocharging and supercharging – devices and design
- Engine pollutants and exhaust gas aftertreatment
- Engine testing and ICE maps

Study materials

Lecturing material and hand-outs
Stone, R. Introduction to Internal Combustion Engines. SAE 1988-2003, ISBN 0-7680-0495-0 (basic textbook)
Heywood, J.B.: Internal Combustion Engine Fundamentals. Mac Graw Hill 1988, ISBN 0-07-028637-X
Texts of lectures at Moodle server.

MECHANICAL AND HYDRAULICAL TRANSMISSIONS

Type	Compulsory	**Semester**	winter
Contact hours	78 (3 + 3)	**Number of credits**	6
Type of termination	Assessment + Exam	**Form**	Lectures + exercises

Lecturers

Doc. Dr. Ing. Gabriela Achtenová

Anotation

TARGET

Educate the basis of design and calculation of frictional driveaway clutches and manually shifted transmissions and their elements

CONTENT

* Introduction

Longitudinal vehicle dynamics. Vehicle resistances, force equilibrium. Speed characteristics of vehicles. Optimal gear ratio definition.

* Friction elements

Friction elements

Clutches (driveaway clutches) – calculation, design

* Manually actuated transmissions

Mechanical transmissions – function, design and trends, determination of ratio

Gear shift systems (Design, calculation, innovations)

Calculation of geometry and stress of gears

Calculation for life of shafts and bearings (specific points for vehicles)

* Automatic transmissions + planetary trains

* Automatic transmissions – function, design and trends

Calculation of elementary gear sets: graphical method, Willis formulae for ratio determination. Energetic study. Calculation of efficiency.

Calculation of nested planetary gear trains: graphical method, Willis formulae and matrix method for ratio determination. Energetic study. Calculation of efficiency.

Conditions of assembly of planetary gear sets

* CVT – function, design and trends

* Hydraulic transmissions

Hydrodynamic torque converter – function, calculation. Laboratory measumerement of characteristic of torque converter.

Hydromechanic transmissions

Mechanisms with split of power flow. Mechanisms combining different transmission types, or different energy sources. Principle and calculation.

Hydrostatic transmissions

* Differentials and mechanisms with more degree of freedom

* 4 wheel drives

Study materials

1. Lecturing material and hand-outs
2. Lechner, Naunheimer: Automotive Transmissions, Springer Verlag (basis textbook)
3. Achtenová G.: Planetary Gear Sests in Automotive Transmissions. Study book. CTU in Prague. 2011

MULTIBODY MODELING FOR VEHICLE SYSTEMS

Type	Compulsory	**Semester**	winter
Contact hours	52 (3+1)	**Number of credits**	5
Type of termination	Assessment + Exam	**Form**	Lectures + exercises

Lecturers

Prof. Dr. Ing. Michael Valášek
Prof. Dr. Ing. Zbyněk Šika

Anotation

TARGET
Educate the basics of modeling of vehicle systems as multibody systems

CONTENT

1 – Development Process of Simulation Model
Ideal objects of engineering sciences. Conceptual model, physical model, simulation model
2 – Matrix Formulation of Kinematics
Matrix of directional cosines, transformation, velocity and acceleration matrices. Basic motions, basic transformation matrices. Method of basic matrices
3 – Different Coordinates for Description of Multibody Systems
Independent and dependent, relative, Cartesian and physical coordinates. Euler angles, Cardan angles, Euler parameters. Kinematical description of open kinematic chain
4 – Solution of Kinematical Loops
Kinematical solution of kinematical loops by method of closed loop, method of disconnected loop, method of removed body, method of natural coordinates, method of compartments (physical coordinates)
5 – Numerical Methods for Solution of Multibody Kinematics
Position, velocity and acceleration problems. Solution of over- and under-constrained system of linear and nonlinear algebraic equations. Special and singular cases of multibody systems
6 – Kinematical Synthesis of Multibody Systems
Engineering design process, formulation of kinematical synthesis, solving procedures, optimization. Synthesis of vehicle suspensions
7 – Dynamics of Multibody Systems by Lagrange Equations of Mixed Type
Lagrange equations of mixed type, assembly of particular expressions. Multibody dynamic formalism by physical coordinates. Interpretation of Lagrange multipliers. Force elements for vehicle modelling
8 – Numerical Methods of DAE Solution
Numerical problems of solution of differential-algebraic equations (DAE). Solution in indepenedent and dependent coordinates, Baumgarte stabilization, coordinate partitioning, projection into independent coordinates
9 – Advanced formulation of equations of motion of multibody systems
Equivalence of Newton-Euler and Lagrange equations. Equations of motion of small vibrations. Dynamics of flexible multibody systems.
10 – Practice of multibody modelling
Multibody modelling for different multibody dynamic formalisms. Example of modelling in Simpack. Modelling of vehicle suspension, modelling of vehicle dynamics

Study materials

1. Lecturing material and hand-outs
2. Stejskal, V., Valasek, M.: Kinematics and Dynamics of Machinery, Marcel Dekker, New York 1996 (basis textbook)

TECHNOLOGY OF AUTOMOTIVE PRODUCTION

Type	Compulsory	**Semester**	winter
Contact hours	65 (3+2)	**Number of credits**	4
Type of termination	Assessment + Exam	**Form**	Lectures + exercises

Lecturers

Ing. Lukáš Novák Ph.D.

Anotation

TARGET

Basic engine management system, design and select the components for an ignition system and implement a strategy for on-board diagnostics. In car network and embeded processor system for real time aplication with use of sophisticated peripheral devices.

CONTENT

- Electrical Power Supply in Vehicle Electrical Systems.
- Starter Motors and Circuits. Integrated Starter Generators.
- Semiconductor Devices and Power Electronic Circuits.
- Distributorless and Electronic Ignition Systems.
- Microcomputer Instrumentation and Control.
- Micro-actuators and microsensors, micromotors, accelerometers and pressure sensors.
- Magnetoelectric and Piezoelectric Actuators.
- Electronic Fuel Injection Systems.
- Diesel-Engine Management, Systems and Components.
- Emissions Control Systems. Advance Diagnostic Systems.
- Adaptive Operating and Prediction Strategy of the ECM.
- Vehicle Networking Systems.
- Future Automotive Electronic Systems.

Study materials

1. Ribbens, W.,B.: Understanding Automotive Electronics. Newnes 2003
2. Danton, T.: Automobile Electrical and Electronic Systems. Butterworth-Heinemann 2012
3. Bonnick, A.: Automotive computer Control Systems. Butterworth-Heinemann 2001.

DESIGN AGAINST FATIGUE

Type	Compulsory	**Semester**	summer
Contact hours	26 (1+1)	**Number of credits**	2
Type of termination	Assessment	**Form**	Lectures + exercises

Lecturers

Prof. Dr. Ing. Milan Růžička
Doc. Dr. Ing. Miroslav Španiel

Anotation

TARGET

1. Educate the basics of design and calculation of mechanical parts and structures against fatigue damage and fracture.
2. Educate the basic theory of the Finite Element Method, modeling and calculation of simple machine parts

CONTENT

- Static and cyclic characterization of materials, hysteresis loop.
- Fatigue stress-life curves, fatigue strain-life curves, mean stress effect – Haigh's and Smith's diagrams.
- Stress concentration, notch factor, cracks and stress intensity factor, other fatigue degradation factors.
- Design of machine parts for unlimited life, safety factor, probability of fracture.
- Decomposition of stochastic process, Rain-flow method, loading histograms (loading spectra), experimental verification of fatigue life.
- Fatigue damage, accumulation of damage, linear and nonlinear damage hypothesis (Miner's rule, Corten-Dolan, SWT – parameter)
- Approaches for fatigue life prediction. Design of machine parts for limited life, safety factor, probability of fracture.
- Basic of fracture mechanics and crack growth under cyclic loading.
- Thermal fatigue. Crack corrosion cracking. Creep and combination with fatigue.

- Minimum of potential energy approach in structural/continuum mechanics. Examples of rods and beams.
- Essentials of matrix algebra and matrix formulation of simple bar structure. Finite element formulation of the structure.
- General finite element method. Discretization of 2D continuum, element and global operators, mechanical and thermal loads.
- Finite element discretization of 2D and 3D continuum, axisymmetric structures.
- Utilization of FEA in modeling of parts and assemblies of structures.

Study materials

1. Suresh, S.: Fatigue of Materials. Cambridge Univ. Press, 2nd ed., 1998. ISBN 0 521 57046 8
2. Stephens, R.I-Fatemi, A.- Stephens R.R. and Fuchs, H.O: Metal fatigue in engineering, Wiley-Interscience, 2nd ed., 2000, ISBN:978-0471510598
3. Bathe, K. J.:Finite Element Procedures, Prentice Hall, New Jersey, 1996
4. Zienkiewicz, O.C.-Taylor, R.L.: The Finite Element Method. Fifth Edition, Butterworth-Heinemann, 2000, ISBN:0 7506 5049 4

MARKETING, ECONOMY AND FINANCES

Type	Compulsory	**Semester**	winter
Contact hours	26 (1 + 1)	**Number of credits**	2
Type of termination	Assessment + Exam	**Form**	Lectures + exercises

Lecturers

Prof. Dr. Ing. František Freiberg
Doc. Dr. Ing. Zralý

Anotation

TARGET

The course aim is to give students a glimpse on the marketing principles and rules, on the cost control, costing and budgeting, target costing and production and operations management

CONTENT

Marketing:

- The nature of business and consumer marketing.
- Portfolio analysis.
- Demand analysis and sales forecasting.
- Market segmentation, targeting and positioning
- Products and their lifecycle.
- Marketing mix.
- Advertising, sales promotion, PR.
- Pricing decision analysis.
- Competitive strategies.
- Developing market share

Economy and company finances:

- Characteristics and practical usage of economic theory. Theory of customer, Theory of market, Theory of company. Economic of scale.
- System of company control. Manager functions and techniques.
- Cost control. Cost structure and impact on manager decisions. Cost analysis. Calculations. Target costing.
- Financial and manager accounting.
- Characteristic of finance control.
- Financing with internal and external sources
- Specific financing manners: leasing, factoring
- Cash flow control
- Evaluation of investment projects

Study materials

1. Freiberg, Kavan, Zralý: Outline, solved cases...? In electronic form
2. Kavan M.: Management Study Guide, CTU, 2006, ISBN 80-01-03444-5
3. Atrill P: Financial Management for Non-specialists, Prentice Hall, London 1997

FOREIGN LANGUAGE I.

Type	Elective	**Semester**	winter
Contact hours	78 (0+6)	**Number of credits**	3
Type of termination	Assessment	**Form**	exercises

Lecturers

Externisté z Institut Francais de Prague (francouzština)
PhDr. Marie Černíková (čeština pro cizince)

Anotation

Pour FRANCAIS
OBJECTIF

L'objectif global de la formation au français lors de la première année est de faire acquérir aux étudiants, a priori non francophones au recrutement, un niveau de compréhension de la langue française,écrite et parlée, suffisant pour leur permettre de poursuivre la deuxième année d'études en France.

L'objectif du premier semestre est de familiariser les étudiants avec les bases de la langue française. Des enseignants français encadrent les étudiants par groupe de 15 maximum.

CONTENU

Grammaire de base
Orthographe
Prononciation et élocution
Vocabulaire de la vie courante
Enseignement à partir de textes et d'enregistrements, exercices écrits et de conversation…

For CZECH
TARGET

The course is aimed at students of all nationalities encountering Czech for the first time. It serves as a practical gateway to the language and forms a solid fondation for futher study. The students will learn the basic Czech quickly to be able to start using the language in everyday situations. The Czech grammer is simplified to the maximum while the objective is the communicative focus.

The course is organized into small group maximum 7 students.

CONTENT

Basic grammar
Orthography and pronunciation
Basic communication situations: for instance "Kde se sejdeme?", "V restauraci, hotelu, doma, v obchodě", "Transport", "Hledání cesty", "Moje rodina"...

Study materials

Lecturing material and hand-outs

COMPUTATION OF FLUID DYNAMICS

Type	Compulsory	**Semester**	winter
Contact hours	52 (2 + 2)	**Number of credits**	4
Type of termination	Assessment + Exam	**Form**	Lectures + exercises

Lecturers

Prof. Dr. Ing. Rudolf Žitný
Dr. Ing. Bohumil Mareš

Anotation

TARGET

Provide fundamentals of fluid dynamics and numerical solution of its equations

CONTENT

Introduction
From experiments to mathematical model – analytical and numerical solution. Example: one-dimensional transport equation.

Numerical solution
Finite element method, finite volume method. Numerical stability, convergence and consistency, Lax theorem.

Mathematical description of physical phenomena
Conservation of mass (including chemical kinetics), momentum and energy. Principles of solution of parabolic, elliptic and hyperbolic equations.

Heat conduction
Non-stationary heat conduction equation, boundary condition types, two- and three-dimensional problem.

Transport equation
Stationary one-dimensional case, solution of non-stationary transport equation. Solution technique: central scheme, upwind scheme, exponential scheme, combined schemes, numerical diffusion. Compressibility of gases, transonic problems.

Velocity fields
Difficulties of momentum equation solution, boundary conditions, pressure-correction methods, base and modified algorithm, application to solution.

Comments on turbulent flows
RANS, Reynolds stresses, turbulent viscosity, turbulence models, turbulent transport..

Study materials

Lecturing material and hand-outs

PROJECT AND 3D CAD

Type		Compulsory	**Semester**		Summer
Contact hours	39 (0 + 3)	**Number of credits**		3	
Type of termination		Classified Assessment	**Form**		exercises
Lecturers					

Ing. Václav Jirovský

Anotation

TARGET
Educate necessary basics for usage of 3D CAD software and its application in automotive engineering design.

CONTENT

1 - Instruction of two CAD programs possible (student choice) CATIA V5 or ProEngineer.

Modeling solids and surfaces
Assembly
Drawings
Geometric and material characteristics
Import, export of data
Standard parts
Basic geometry and stress analysis
User's adaptation of interface

2 – Project

Based of adopted knowledge design and calculated characteristics of assigned mechanisms.

Study materials

Electronic presentations for each lesson and computer – both available throughout the semester in the computer room at the faculty department.

VEHICLE DYNAMICS

Type	Compulsory	**Semester**	Summer
Contact hours	78 (4 + 2)	**Number of credits**	6
Type of termination	Assessment + Exam	**Form**	Exercises+lectures

Lecturers

Prof. Dr. Ing. Michael Valášek
Doc. Dr. Ing. Zbyněk Šika
Prof. Dr. Ing. Joop Pauwelussen + Dr. Ing. Saskia Monsma

Anotation

TARGET

The course 'Vehicle Dynamics' is aimed at gaining a basic understanding about vehicle horizontal and vertical performance. It offers a good balance between fundamentals and practical aspects of vehicle horizontal and vertical performance in relationship to its suspension components including tyres. With this basis, students will learn how to set up equations of motion and derive fundamental mathematical models to understand and experiment the basic phenomena of Vehicle Dynamics.

CONTENT

- Introduction into the theory of dynamic systems
- Forces acting between road and wheel
- Basics of longitudinal dynamics
- Basics of vertical dynamics
- Basics of lateral dynamics
- Wheel- and axle kinematics
- Modelling of vehicle components: tyres, springs, dampers
- Criteria of good handling performance
- Criteria of ride comfort
- Controlled subsystems of vehicle dynamics: suspension, braking, lateral stability

Study materials

1. Lecturing material and hand-outs
2. Genta, G.: Motor Vehicle Dynamics, World Scientific, Singapore 1997 (basic textbook)

VIBRATION OF VEHICLES

Type	Compulsory	**Semester**	Summer
Contact hours	52 (3 + 1)	**Number of credits**	5
Type of termination	Assessment + Exam	**Form**	Exercises + Lectures

Lecturers

Doc. Dr. Ing. Václav Bauma

Anotation

TARGET
Educate the basics of mechanical vibrations of vehicles

CONTENT
1 – Vibration of mechanical systems with one degree of freedom
Dynamic and characteristic equations
Free and forced, undamped and damped vibrations

2 – Vibration of discrete mechanical systems with N degrees of freedom
Dynamic and characteristic equations
Free and forced, undamped and damped vibrations. Modal analysis

3 – Methods of continuum discretization. Method of finite elements
FEM. Mathematical and engineering formulation. Shape functions, transformation matrices, local and global stiffness and mass matrices

4 – Excitation by unbalanced rotating mass and unbalanced mechanisms
Excitation of vibration of mechanical systems by unbalanced dynamic forces
Balancing of slider-crank mechanisms

5 – Torsional, bending vibrations. Rotor dynamics.
Modelling of torsional, beam and rotor mechanical systems
Design and optimization of parameters of vibrational mechanical systems

6 – Machine mounting
Modelling of machine mounting
Design of parameters of machine mounting

7 – Controlled vibration suppression
Vibration suprression by isolation, absorption and compensation. Actuators.
Synthesis of controlled vibration suppression

8 – Introduction into nonlinear vibrations
Nonlinear elements in mechanical vibration systems
New dynamic phenomena of nonlinear vibrations

Study materials

1. Lecturing material and hand-outs
2. Thomson, W.T., Dahleh, M.D.: Theory of Vibrations with Applications, Prentice Hall, Englewood Cliffs 1998
   Inmann, D.J.: Engineering Vibrations, Prentice Hall, Englewood Cliffs 1996 (basic textbooks)

DESIGN OF TOOLS AND PLASTIC PARTS

Type	Compulsory	**Semester**	Summer
Contact hours	39 (2 + 1)	**Number of credits**	3
Type of termination	Assessment + Exam	**Form**	Exercises + Lectures

Lecturers

Dr. Ing. Yann Marco

Anotation

TARGET

At the end of this course, students should demonstrate :

- general knowledge of the properties of polymeric materials in relation to typical engineering (automotive) applications.
- general knowledge associated with polymer transformation processes
- understanding of the interactions between polymer material and processing
- mastery of a methodology for the design of plastic parts and associated processing tools, including process optimization and economic analysis

CONTENT

1- Introduction ang global design approach (0.5 h)

2- General overview of polymeric materials (4 h)

Definitions, historical overview, chemistry basics, microstructure, blends, additives

3- Main plastic families and thermomechanical properties (4.5h)

Thermoplastics, thermosets, elastomeric materials, major applications, thermomechanical properties and characterisation, industrial material datasheets

4- Automotive applications (6h)

Majors fields of application, specific problems and associate materials, examples of part design and comparison with other materials

5- Main manufacturing processes (7h)

Classification, extrusion, injection, thermoforming, SMC process, basics for process choice and cost estimation

6- Rheological and thermal aspects (7 h)

Introduction, rheological properties, models, characterisation, processing point of view

7- Specific case of injection moulding process (10 h)

Description, specific problems, part design methodology and process optimization, moulds design and manufacturing, study of specific parts design, case of elastomeric and thermosets materials injection

8- Rheology of elastomeric materials (3h)

Description of the behaviour, basic rules for part design, models and charcaterisation

Study materials

Lecturing material and hand-outs

« Précis des matières plastiques (structure-propriétés, mise en oeuvre, normalisation) »

J.P. Trotignon, J. Verdu, A. Dobraczynski, M. Piperaud

« La mise en forme des matières plastiques »

J.F. Agassant, P. Avenas, J-P. Sergent, B. Vergnes, M. Vincent

Texts of lectures at Moodle server.

VEHICLE CONCEPT, STRUCTURE, AGGREGATES AND SAFETY

Type		Compulsory	**Semester**		Summer
Contact hours	39 (2 + 1)	**Number of credits**		3	
Type of termination		Assessment + Exam	**Form**		Exercises + Lectures

Lecturers

Ing. Michal Vašíček

Anotation

TARGET
To complete the knowledge of vehicle design and technology.

II – CONTENT

- Distribution of radial reactions. Adhesion.
- Braking. Force distribution. Design, disposition and calculation of brakes.
- Frames and bodies. Design, calculation.
- Safety. Dynamic of impact – basic formulas and its application to crash analysis, energy absorption during impact, examples of typical behaviour of vehicles during impact, compatibility of vehicles, occupant and pedestrian protection – biomechanics of injury, injury mechanisms, injury criteria, overview technical regulations relating to passive safety, Methodology of the most often used tests, safety restraint system used in now days vehicles – overview, explanation of function and its contribution to safety.

Study materials

Lecturing material and hand-outs

QUALITY

Type	Compulsory	**Semester**	Summer
Contact hours	39 (2 + 1)	**Number of credits**	3
Type of termination	Assessment + Exam	**Form**	Exercises + Lectures

Lecturers

Ing. Libor Beránek

Anotation

TARGET

Teach basic quality control terms, where is quality created, who is responsible for a quality. Basic statistical terms and distributions. Statistical methods: statistical process control, statistical sampling. Tools and methods for a quality assurance during product lifetime cycle. Standards ISO 9 000 and 14 000, certification of quality control systems.

CONTENT

- Basic quality terms, product properties, where is quality created, who is responsible for a quality.
- Development quality to Total Quality Management.
- Basic statistical terms, continuous and discrete distributions, production stability.
- Statistical process control, statictical sampling, standards.
- Quality control tools, quality control systems, quality control certification.
- Standards ISO 9 000 and 14 000.
- Some special quality control methods, quality control in the preproduction period.
- Metrology in quality control.
- Utilization of special software for analysis and process control.

Study materials

Automotive Quality Systems Handbook: ISO/TS 16949

The Certified Quality Engineer Hanbook

FOREIGN LANGUAGE II

Type	Elective	**Semester**	Summer
Contact hours	52 (0 + 4)	**Number of credits**	3
Type of termination	Classified Assessment	**Form**	

Lecturers

from Institut Francais de Prague (francouzština)
PhDr. Marie Černíková (čeština pro cizince)

Anotation

Pour Francais
OBJECTIF
Poursuite de l'objectif déjà fixé au premier semestre :
Faire acquérir aux étudiants, a priori non francophones au recrutement, un niveau de compréhension de la langue française,écrite et parlée, suffisant pour leur permettre de poursuivre la deuxième année d'études en France.
Le 2ème semestre est consacré à l'approfondissement des connaissances acquises lors du semestre précédent, avec accentuation du français technique.

CONTENU
Grammaire de base
Orthographe
Prononciation et élocution
Vocabulaire de la vie courante et vocabulaire technique en rapport avec la spécialité du Master

Les étudiants travailleront sur des documents variés : manuels de cours / cahiers d'exercices / enregistrements / documents écrits / extraits de journaux et revues/ livres techniques / l'étude de documents techniques et les aspects économiques et politiques.

For Czech
TARGET
This semester develops the objective fixed in the tirst section with accentuated communicatives focus and practica. It presents the most important grammatical principles, common conversation phrases and a basic vocabulary, which is more aimed at technical term. At the end of course the students should be able to communicate with Czech people and understand the basic technical text.

CONTENT
Basic grammar
Orthography and pronounciation
Basic general ("u lékaře", "mái vlast", "životopis", "cestování"...) and technical vocabulary.

Students will use the textbook (in English, German or French version), workbook, CD recording, extracts from newspapers and engineering papers. English-Czech glossary and complement exercices are available free charge on the internet.

Study materials

Lecturing material and hand-outs

MICROELECTRONICS IN VEHICLES

Type		Compulsory	**Semester**		Summer
Contact hours	26 (1 + 1)	**Number of credits**		2	
Type of termination		Assessment + Exam	**Form**		Exercises + Lectures

Lecturers

Doc. Dr. Ing. Kocourek
Doc. Dr. Ing. Jiří Novák

Anotation

TARGET

The subject is focused on the basics of microelectronics, its use in intelligent devices (sensors and actuators) and their applications in cars. The other topics like real-time software control, communication and EMC and are included as well.

CONTENT

Lectured topics

1.	Electronics basics	(2 hours)
2.	Microprocessor basics	(2 hours)
3.	Sensors of physical quantities	(3 hours)
4.	Intelligent sensors and actuators, their structure and functionality	(2 hours)
5.	Communication among intelligent devices (CAN, LIN, …)	(3 hours)
6.	Electronic Control Units, structure and functionality	(1 hour)
7.	EMC	(1 hour)

Laboratory Exercises
(Each exercise ≈ 2 hours)

1. DC measurement in clear and harsh environments
2. Pressure and temperature measurement
3. Microcontroller peripherals and their use
4. Simple ECU implementation
5. CAN communication
6. CAN behavior in a harsh environment
7. Electromagnetic compatibility of an intelligent sensor

Study materials

Lecturing material and hand-outs