

Study plan

Name of study plan: 05 109 NSTI DLTT 2012 zam ení SM

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Transportation, Aerospace and Handling Technology

Garantor of the study branch: prof. Ing. Jan Macek, DrSc.

Program of study: Mechanical Engineering

Type of study: Follow-up master

Required credits: 120

Elective courses credits: 4

Sum of credits in the plan: 124

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 109

The role of the block: P

Code of the group: 12NS*1P-DLT-SM

Name of the group: 2012 NSTI 1.sem povinné DLTT - SM

Requirement credits in the group: In this group you have to gain 25 credits

Requirement courses in the group: In this group you have to complete 6 courses

Credits in the group: 25

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
2142008	Microelectronics	KZ	2	2P+1L	*	P
2211131	Powertrains of Motor Vehicles 1	Z,ZK	5	3P+2C	*	P
2211083	Vehicle Fundamentals <i>Josef Kolář</i>	Z,ZK	4	3P+1C	*	P

Characteristics of the courses of this group of Study Plan: Code=12NS*1P-DLT-SM Name=2012 NSTI 1.sem povinné DLTT - SM

2142008	Microelectronics	KZ	2	Basic characteristics of logic circuits and programmable logical systems, input and output circuits - voltage and current matching, D/A and A/D converters, coding, lines and protocols of communications, electronic and optoelectronic parts for microelectronics, microprocessor system applications.		
2211131	Powertrains of Motor Vehicles 1	Z,ZK	5	The subject clarifies the design and basic calculations of aggregates of mechanical powertrains of passenger cars, trucks and motorcycles.		
2211083	Vehicle Fundamentals	Z,ZK	4	Characteristics of transportation systems, propulsion units and energy transport in car powertrains. Basic principles of car driving mechanics, driving and car control in curve and car braking.		

Code of the group: 12NS*2P-DLT-MV+SM

Name of the group: 2012 NSTI 2.sem povinné DLTT - MV a SM

Requirement credits in the group: In this group you have to gain 26 credits

Requirement courses in the group: In this group you have to complete 5 courses

Credits in the group: 26

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
2311074	Vibrations of Mechanical Systems <i>Michael Valášek</i>	ZK	4	3P+0C	*	P
2213112	Project II.	Z	5	0P+5C	*	P
2211132	Powertrains of Motor Vehicles 2	Z,ZK	5	3P+2C	*	P

2211050	Internal Combustion Engines Fundamentals	Z,ZK	6	4P+2C	*	P
2211054	Theory of Vehicles <i>Josef Kolář, Jan Baněk, Jan Kalivoda Jan Kalivoda Jan Baněk (Gar.)</i>	Z,ZK	6	4P+2C	*	P

Characteristics of the courses of this group of Study Plan: Code=12NS*2P-DLT-MV+SM Name=2012 NSTI 2.sem povinné DLTT - MV a SM

2311074	Vibrations of Mechanical Systems	ZK	4
2213112	Project II. Project training for solution of R&D problems based on simulation, design and/or experiments aiming to elaboration of semester report and presentation of results in front of the board of reviewers. Topics are based on industry requirements and research practice of the department.	Z	5
2211132	Powertrains of Motor Vehicles 2 The subject clarifies the design and basic calculations of automatic aggregates of powertrains of passenger cars, trucks and motorcycles. 1 - Hydrodynamic transmissions 2 - Single planetary sets (JPS) - introduction, graphical method 3 - JPS - kinematics, torques, efficiency 4 - JPS - calculation of JATCO 40 transmission 5 - Nested planetary gear sets (SPS) - graphical and analytical method 6 - Nested planetary gear set (SPS) - matrix method 7 - SPS - example calculation, conditions of assembly 8 - Planetary gearboxes - calculation of basic elements 9 - Variators (CVT) 10 - Powersplit transmissions, IVT 11 - Differential, behavior when driving in a curve, efficiency 12 - Differential with more degree of freedom 13 - Hydrostatic transmissions 14 - Powertrains of hybrid vehicles	Z,ZK	5
2211050	Internal Combustion Engines Fundamentals Fundamentals of internal combustion engines (ICE): principles of performance, combustion processes, flame types, formation of pollutants, gas exchange, super- and turbo-charging; description of tools for fuel injection, mixture formation, valve gears, combustion realization, exhaust aftertreatment, lubrication and cooling. Engine maps and testing	Z,ZK	6
2211054	Theory of Vehicles Description of theoretical sources for longitudinal, vertical and directional dynamics of vehicles. Detailed description of interactions between road (railway) and body. Especially from view point of transmission of longitudinal and lateral forces and stability.	Z,ZK	6

Code of the group: 12NS*3P-DLT-SM

Name of the group: 2012 NSTI 3.sem povinné DLTT - SM

Requirement credits in the group: In this group you have to gain 23 credits

Requirement courses in the group: In this group you have to complete 4 courses

Credits in the group: 23

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
2311078	Controlled Mechanical Systems <i>Václav Bauma, Zdeněk Neusser, Pavel Steinbauer, Zbyněk Šíka, Michael Valášek Michael Valášek Michael Valášek (Gar.)</i>	Z,ZK	4	3P+1C	*	P
2211058	Computational Methods of Transport Machinery <i>Jan Kalivoda, Ladislav Rus, Václav Zoul, Radek Tichánek, Michal Vašíček Václav Zoul Ladislav Rus (Gar.)</i>	Z,ZK	5	3P+2C	*	P

Characteristics of the courses of this group of Study Plan: Code=12NS*3P-DLT-SM Name=2012 NSTI 3.sem povinné DLTT - SM

2311078	Controlled Mechanical Systems	Z,ZK	4
2211058	Computational Methods of Transport Machinery Methods for both analysis and synthesis of 3D mechanisms. Computation of elastic joining components. Effects of non-linearities. Development of both mechanical and mathematical models of vehicles. Basic usage of FEM. Local and global coordinate system, matrices of mass, stiffness and damping. Both explicit and implicit solver. Models of materials. Torsional vibration in combustion engines and transmissions, methods of computation. Measurement of torsional vibration. Engine valve train (both kinematics and dynamics). Engine balancing	Z,ZK	5

Code of the group: 12NS*4P-DLT-SM

Name of the group: 2012 NSTI 4.sem povinné DLTT - SM

Requirement credits in the group: In this group you have to gain 35 credits

Requirement courses in the group: In this group you have to complete 9 courses

Credits in the group: 35

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
2213998	Masters Thesis <i>Jan Macek</i>	Z	10	0P+3C	*	P
2141123	Engine Electrical Equipment	Z,ZK	3	2P+1L	*	P
2212046	Fuels and Lubricants	KZ	2	2P+0C	*	P
2211048	Accessories of Internal Combustion Engines	ZK	2	2P+0C	*	P
2383062	Budget and Project Economic Assessment <i>Miroslav Žilka Miroslav Žilka Miroslav Žilka (Gar.)</i>	Z	2	1P+2C	*	P
2211170	Theory of Internal Combustion Engines <i>Marcel Diviš, Oldřich Vitek Oldřich Vitek Oldřich Vitek (Gar.)</i>	Z,ZK	5	4P+1C	*	P

Characteristics of the courses of this group of Study Plan: Code=12NS*4P-DLT-SM Name=2012 NSTI 4.sem povinné DLTT - SM

2213998	Masters Thesis	Z	10
2141123	Engine Electrical Equipment El. Source Power System - Dynamo, Control. Alternator, Construction, Theory. Alternator Control - Vibrating, and Electronic Way - Accumulator Battery. Start-Motors Types and Construction. Start - Motor Theory and Characteristics. Ignition Systems. Battery Ignition. Magneto Ignition and Electronic Ignition. Sensors and Converters. Servomotors and Electromagnets. Speed Motors Control and Contactless Switching of Power Load. (For Traffic Engineering Study).	Z,ZK	3
2212046	Fuels and Lubricants Characteristics and testing of gasolines, diesel a heavy fuels. Specific characteristics of alternative fuels. Engines tribology. Characteristics and testing of oils. Sediment formation in engine. Characteristics and testing of gear oils.	KZ	2
2211048	Accessories of Internal Combustion Engines Principles and layouts of fuel injection systems, electronic engine control, exhaust gas aftertreatment, noise of engines and its reduction.	ZK	2
2383062	Budget and Project Economic Assessment The goal of the course is to improve the knowledge gained within the basic bachelor's degree course Management and Economics of the Enterprise. The course focuses primarily on deepening of basic knowledge and skills in the creation and evaluation of the operational budget, proper preparation and evaluation of costing model for manufactured products and the economic evaluation of an investment project, as it corresponds to contemporary knowledge and the development of management methods and techniques. Students specify a simple fictional industrial or engineering company or its sub-section (preferably inspired by their practical experience, internships or training program in real company). The first student's task is to prepare a detailed plan and budget of a project (e.g. new product development, product or process innovation, etc.) focused on improvement of profitability, competitiveness or effectiveness of the company. The second task is cost calculation for chosen calculation unit. Last task within this course is the evaluation of economical effectiveness of the project described within the first task. The dynamic methods like Net Present Value (NPV), Internal Rate of Return (IRR) or Discounted Payback Period (DPP) are used for this evaluation. The quality of realization and presentation of the task's outputs together with the results of the test decides on granting / denial of credit.	Z	2
2211170	Theory of Internal Combustion Engines Theoretical description and analysis of processes at internal combustion engines. Definition of physical models and basics of engine cycle modeling.	Z,ZK	5

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 11

The role of the block: PV

Code of the group: 12N**3Q--JV

Name of the group: 2012 N 3.sem povinná jazyková výuka

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

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

Credits in the group: 2

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
2043081	English - Preparatory Course / FME Eliška Vítková, Ilona Šimice, Zuzana Kalinová, Michaela Schusová, Veronika Kratochvílová Nina Procházková Ayyub	Z	2	0P+2C	*	PV
2043086	Czech - Preparatory Course Petr Laurich Jaroslava Kommová	Z	2	0P+2C	*	PV
2043083	French - Preparatory Course / FME Eliška Vítková Eliška Vítková (Gar.)	Z	2	0P+2C	*	PV
2043082	German - Preparatory Course / FME Eliška Vítková Jaroslava Kommová	Z	2	0P+2C	*	PV
2043085	Russian - Preparatory Course / FME Eliška Vítková, Hana Volejníková Eliška Vítková	Z	2	0P+2C	*	PV
2043084	Spanish - Preparatory Course / FME Eliška Vítková Jaime Andrés Villagómez	Z	2	0P+2C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12N3Q--JV Name=2012 N 3.sem povinná jazyková výuka**

2043081	English - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language. European level A1 - A2.	Z	2
2043086	Czech - Preparatory Course	Z	2
2043083	French - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
2043082	German - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
2043085	Russian - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
2043084	Spanish - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2

Code of the group: 12N**3Q--JZ

Name of the group: 2012 N 3.sem povinná jazyková zkouška

Requirement credits in the group: In this group you have to gain 1 credit

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

Credits in the group: 1

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
2041081	English - Master Exam Eva Pavlincová, Eliška Vítková, Ilona Šimice, Eva Kon elíková, Zuzana Kalinová, Michaela Schusová, Veronika Kratochvílová, Hana Volejníková, Nina Procházková Ayyub Nina Procházková Ayyub	ZK	1	0P+0C	*	PV
2041086	Czech- Master Exam Petr Laurich Jaroslava Kommová	ZK	1	0P+0C	*	PV
2041083	French - Master Exam / FME Eliška Vítková, Dušana Jirovská Eliška Vítková Eliška Vítková (Gar.)	ZK	1	0P+0C	*	PV
2041082	German - Master Exam / FME Eliška Vítková, Petr Laurich, Jaroslava Kommová Jaroslava Kommová	ZK	1	0P+0C	*	PV
2041085	Russian - Master Exam / FME Eliška Vítková, Dušana Jirovská, Hana Volejníková, Petr Zitko Eliška Vítková	ZK	1	0P+0C	*	PV
2041084	Spanish - Master Exam / FME Eliška Vítková, Jaime Andrés Villagómez Jaime Andrés Villagómez	ZK	1	0P+0C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12N**3Q--JZ Name=2012 N 3.sem povinná jazyková zkouška

2041081	English - Master Exam	ZK	1	Mapped to the level of Common European Framework of Reference: A2. Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.		
2041086	Czech- Master Exam	ZK	1			
2041083	French - Master Exam / FME	ZK	1	Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.		
2041082	German - Master Exam / FME	ZK	1	Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.		
2041085	Russian - Master Exam / FME	ZK	1	Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.		
2041084	Spanish - Master Exam / FME	ZK	1	Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.		

Code of the group: 12NS*2Q-DLT-MV+SM

Name of the group: 2012 NSTI 2.sem 1povvol DLTT - MV a SM

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

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

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
2121043	Computational Fluid Mechanics Tomáš Hyhlík Tomáš Hyhlík (Gar.)	ZK	4	3P+0C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12NS*2Q-DLT-MV+SM Name=2012 NSTI 2.sem 1povvol DLTT - MV a SM

2121043	Computational Fluid Mechanics	ZK	4	The aim of the subject is to show basic principles of the numerical solution of the flow of fluid using commercial computer programs.		
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Code of the group: 12NS*3Q-DLT-SM

Name of the group: 2012 NSTI 3.sem 1povvol DLTT - SM

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

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

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
2011085	Numerical Methods for Engineering	Z,ZK	4	3P+1C	*	PV
2211160	Turbocharging and Cooling of Internal Combustion Engines <i>Old ich Vitek, Jan Macek Jan Macek Jan Macek (Gar.)</i>	Z,ZK	4	3P+1C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12NS*3Q-DLT-SM Name=2012 NSTI 3.sem 1povvol DLTT - SM

2011085	Numerical Methods for Engineering	Z,ZK	4
2211160	Turbocharging and Cooling of Internal Combustion Engines Thermodynamics and aerodynamics of turbomachines. Pressure charging of internal combustion engines. Theory and design of ICE cooling systems.	Z,ZK	4

List of courses of this pass:

Code	Name of the course	Completion	Credits
2011085	Numerical Methods for Engineering	Z,ZK	4
2041081	English - Master Exam Mapped to the level of Common European Framework of Reference: A2. Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	ZK	1
2041082	German - Master Exam / FME Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.	ZK	1
2041083	French - Master Exam / FME Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.	ZK	1
2041084	Spanish - Master Exam / FME Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.	ZK	1
2041085	Russian - Master Exam / FME Mapped to the level of Common European Framework of Reference A2 Aim: Understanding clearly spoken language about everyday situations which a student meets either at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. reading and comprehension of simple texts. Improvement of professional language.	ZK	1
2041086	Czech- Master Exam	ZK	1
2043081	English - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language. European level A1 - A2.	Z	2
2043082	German - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
2043083	French - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
2043084	Spanish - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
2043085	Russian - Preparatory Course / FME Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.	Z	2
2043086	Czech - Preparatory Course	Z	2
2121043	Computational Fluid Mechanics The aim of the subject is to show basic principles of the numerical solution of the flow of fluid using commercial computer programs.	ZK	4
2141123	Engine Electrical Equipment El. Source Power System - Dynamo, Control. Alternator, Construction, Theory. Alternator Control - Vibrating, and Electronic Way - Accumulator Battery. Start-Motors Types and Construction. Start - Motor Theory and Characteristics. Ignition Systems. Battery Ignition. Magneto Ignition and Electronic Ignition. Sensors and Converters. Servomotors and Electromagnets. Speed Motors Control and Contactless Switching of Power Load. (For Traffic Engineering Study).	Z,ZK	3
2142008	Microelectronics Basic characteristics of logic circuits and programmable logical systems, input and output circuits - voltage and current matching, D/A and A/D converters, coding, lines and protocols of communications, electronic and optoelectronic parts for microelectronics, microprocessor system applications.	KZ	2
2211048	Accessories of Internal Combustion Engines Principles and layouts of fuel injection systems, electronic engine control, exhaust gas aftertreatment, noise of engines and its reduction.	ZK	2
2211050	Internal Combustion Engines Fundamentals Fundamentals of internal combustion engines (ICE): principles of performance, combustion processes, flame types, formation of pollutants, gas exchange, super- and turbo-charging; description of tools for fuel injection, mixture formation, valve gears, combustion realization, exhaust aftertreatment, lubrication and cooling. Engine maps and testing	Z,ZK	6

2211054	Theory of Vehicles Description of theoretical sources for longitudinal, vertical and directional dynamics of vehicles. Detailed description of interactions between road (railway) and body. Especially from view point of transmission of longitudinal and lateral forces and stability.	Z,ZK	6
2211058	Computational Methods of Transport Machinery Methods for both analysis and synthesis of 3D mechanisms. Computation of elastic joining components. Effects of non-linearities. Development of both mechanical and mathematical models of vehicles. Basic usage of FEM. Local and global coordinate system, matrices of mass, stiffness and damping. Both explicit and implicit solver. Models of materials. Torsional vibration in combustion engines and transmissions, methods of computation. Measurement of torsional vibration. Engine valve train (both kinematics and dynamics). Engine balancing	Z,ZK	5
2211083	Vehicle Fundamentals Characteristics of transportation systems, propulsion units and energy transport in car powertrains. Basic principles of car driving mechanics, driving and car control in curve and car braking.	Z,ZK	4
2211131	Powertrains of Motor Vehicles 1 The subject clarifies the design and basic calculations of aggregates of mechanical powertrains of passenger cars, trucks and motorcycles.	Z,ZK	5
2211132	Powertrains of Motor Vehicles 2 The subject clarifies the design and basic calculations of automatic aggregates of powertrains of passenger cars, trucks and motorcycles. 1 - Hydrodynamic transmissions 2 - Single planetary sets (JPS) - introduction, graphical method 3 - JPS - kinematics, torques, efficiency 4 - JPS - calculation of JATCO 40 transmission 5 - Nested planetary gear sets (SPS) - graphical and analytical method 6 - Nested planetary gear set (SPS) - matrix method 7 - SPS - example calculation, conditions of assembly 8 - Planetary gearboxes - calculation of basic elements 9 - Variators (CVT) 10 - Powersplit transmissions, IVT 11 - Differential, behavior when driving in a curve, efficiency 12 - Differential with more degree of freedom 13 - Hydrostatic transmissions 14 - Powertrains of hybrid vehicles	Z,ZK	5
2211160	Turbocharging and Cooling of Internal Combustion Engines Thermodynamics and aerodynamics of turbomachines. Pressure charging of internal combustion engines. Theory and design of ICE cooling systems.	Z,ZK	4
2211170	Theory of Internal Combustion Engines Theoretical description and analysis of processes at internal combustion engines. Definition of physical models and basics of engine cycle modeling.	Z,ZK	5
2212046	Fuels and Lubricants Characteristics and testing of gasolines, diesel a heavy fuels. Specific characteristics of alternative fuels. Engines tribology. Characteristics and testing of oils. Sediment formation in engine. Characteristics and testing of gear oils.	KZ	2
2213112	Project II. Project training for solution of R&D problems based on simulation, design and/or experiments aiming to elaboration of semester report and presentation of results in front of the board of reviewers. Topics are based on industry requirements and research practice of the department.	Z	5
2213998	Masters Thesis	Z	10
2311074	Vibrations of Mechanical Systems	ZK	4
2311078	Controlled Mechanical Systems	Z,ZK	4
2383062	Budget and Project Economic Assessment The goal of the course is to improve the knowledge gained within the basic bachelor's degree course Management and Economics of the Enterprise. The course focuses primarily on deepening of basic knowledge and skills in the creation and evaluation of the operational budget, proper preparation and evaluation of costing model for manufactured products and the economic evaluation of an investment project, as it corresponds to contemporary knowledge and the development of management methods and techniques. Students specify a simple fictional industrial or engineering company or its sub-section (preferably inspired by their practical experience, internships or training program in real company). The first student's task is to prepare a detailed plan and budget of a project (e.g. new product development, product or process innovation, etc.) focused on improvement of profitability, competitiveness or effectiveness of the company. The second task is cost calculation for chosen calculation unit. Last task within this course is the evaluation of economical effectiveness of the project described within the first task. The dynamic methods like Net Present Value (NPV), Internal Rate of Return (IRR) or Discounted Payback Period (DPP) are used for this evaluation. The quality of realization and presentation of the task's outputs together with the results of the test decides on granting / denial of credit.	Z	2

For updated information see <http://bilakniha.cvut.cz/en/FF.html>

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