

Study plan

Name of study plan: 14 141 NSTI AME 2012 základ

Faculty/Institute/Others:

Department: Department of Mechanics, Biomechanics and Mechatronics

Branch of study guaranteed by the department: Applied Mechanics

Garantor of the study branch: prof. Ing. Milan Růžička, CSc.

Program of study: Mechanical Engineering

Type of study: Follow-up master

Required credits: 132

Elective courses credits: -8

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: 91

The role of the block: P

Code of the group: 12NS*1P-AME

Name of the group: 2012 NSTI 1.sem povinné AME

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 7 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) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
2121027	Aerodynamics Tomáš Hyhlík Tomáš Hyhlík (Gar.)	ZK	3	2P+0C	*	P
2013054	Mathematics for Mechanics Petr Sváček Petr Sváček (Gar.)	Z	4	3P+1C	*	P
2311075	Mechanics of Mechanisms Zdeněk Neusser, Michael Valášek, Zbyněk Šika, Václav Bauma, Jan Zavřel, Petr Beneš Michael Valášek Michael Valášek (Gar.)	ZK	4	3P+0C	*	P
2141093	Microelectronics Stanislava Papežová Stanislava Papežová Stanislava Papežová (Gar.)	Z,ZK	3	2P+1L	*	P
2121016	Theoretical Fluid Mechanics Jiří Nožička Jiří Nožička (Gar.)	ZK	4	3P+0C	*	P
2312017	Controlled mechanical systems I. Zdeněk Neusser, Michael Valášek, Zbyněk Šika, Václav Bauma, Ivo Bukovský, Pavel Steinbauer Michael Valášek Michael Valášek (Gar.)	KZ	3	3P+0C	*	P

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

2121027	Aerodynamics	ZK	3	The subject is oriented on study of flowing fluids behavior with applications in technical praxis with emphasizes on flow of air. Lectures are focused on flow stability, turbulence, flow around bodies and interaction of flow with surfaces.
2013054	Mathematics for Mechanics	Z	4	Summary: Tensor calculus. Introduction to functional analysis. Calculus of variations. • Orthogonal transformation of coordinate systems. • Affine orthogonal tensors and tensor operations. • Tensor as linear operator and bilinear form. • Metrics and metric spaces. Convergence. Completeness. • Linear normed space. Banach space. • Linear space with scalar product (unitary space). Hilbert space. • Contractive operators and Banach fixed point theorem. • Function spaces in examples. • Operators and functionals. Linear, continuous and bounded operator/functional. • Derivative of a functional in the given direction. Gateaux differential and derivative. • Necessary and sufficient conditions for extremes of a functional. • Convex set and convex functional. Minimum of convex functional. • Extremes of functional of different types. Euler equation. Necessary and sufficient conditions for extrema. • Discrete methods for approximation of the minima of an functional. Ritz method.
2311075	Mechanics of Mechanisms	ZK	4	
2141093	Microelectronics	Z,ZK	3	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.
2121016	Theoretical Fluid Mechanics	ZK	4	The physical concept of fluid mechanics and analysis methods, beginning from basic principles are emphasized. The mathematical level is based on the previous mathematical courses.
2312017	Controlled mechanical systems I.	KZ	3	

Code of the group: 12NS*2P-AME

Name of the group: 2012 NSTI 2.sem povinné AME

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 8 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) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
2142027	Electrical Engineering for Applied Mechanics Stanislava Papežová Stanislava Papežová Stanislava Papežová (Gar.)	KZ	3	2P+1L	*	P
2311074	Vibrations of Mechanical Systems Michael Valášek, Zbyněk Šika, Václav Bauma, Jan Zavřel Michael Valášek Michael Valášek (Gar.)	ZK	4	3P+0C	*	P
2123018	Heat and Mass Transfer Jiří Polanský Jiří Polanský Jiří Polanský (Gar.)	Z	2	2P+0C	*	P
2311076	Simulation of Mechatronic Systems Michael Valášek, Zbyněk Šika, Václav Bauma, Jan Pelikán Michael Valášek Michael Valášek (Gar.)	ZK	3	2P+0C	*	P
2111049	Theory of elasticity Karel Doubrava, Dušan Gabriel Dušan Gabriel Dušan Gabriel (Gar.)	ZK	4	3P+0C	*	P
2121055	Thermodynamics Jiří Nožička Jiří Nožička (Gar.)	ZK	4	3P+0C	*	P

Characteristics of the courses of this group of Study Plan: Code=12NS*2P-AME Name=2012 NSTI 2.sem povinné AME

2142027	Electrical Engineering for Applied Mechanics	KZ	3	The purpose of the course is to give the student knowledge about different types of electrical drives for mechatronic systems and their practical use. Method for electromagnetic field approximative solution. The theory of linear and rotating drivers. Electromagnets supplied by AC and DC power. Static and dynamics parameters of electromagnets. Drives for rotating motion. DC motors. Mathematical description of their static and dynamic properties. Principle and function of stepper motor. AC induction motors. Mathematical description of their static and dynamic properties. Using MATLAB for drivers behaviour modelling.		
2311074	Vibrations of Mechanical Systems	ZK	4			
2123018	Heat and Mass Transfer	Z	2	The course deal with: 1-D and 2-D, steady-state and unsteady state conduction, convection heat and mass transfer, boiling, condensation and heat exchangers analysis.		
2311076	Simulation of Mechatronic Systems	ZK	3			
2111049	Theory of elasticity	ZK	4	The objective of this course is an introduction to the theory and applications of linear elasticity. It also provides the foundation for pursuing other solid mechanics courses such as theory of plasticity, fracture mechanics, composite structures, theory of plates and shells or continuum mechanics. This course introduces the basic definitions of stress and strain tensors used in the linear theory of elasticity, determines the principal stress and strain, derives equilibrium equations, compatibility conditions for strain tensor, postulates the constitutive relations for linear elastic material (generalized Hooke's law). The governing differential equations of elasticity are derived including the Navier's equation expressed in terms of the displacement vector and the Beltrami-Michell's equation expressed in terms of the stress tensor. Next, two-dimensional problems in cartesian and cylindrical coordinate systems is considered and the Airy stress function is introduced for the solution of these problems. A few useful application are studied such as bending of a beam using the Airy stress function in the form of a polynomial, the stress distribution in a plate with small circular hole submitted to a uniform tension, the stress distribution for a concentrated vertical force action on a horizontal straight boundary, the stress distribution in a wedge due to a concentrated force at its apex. Finally, a brief introduction to the energy principles in solid mechanics is presented including the principles of virtual displacements and virtual forces.		
2121055	Thermodynamics	ZK	4	The extended course of thermodynamics dealing with the problems of mathematical theory of thermodynamics, non-equilibrium thermodynamics and thermodynamics of multicomponent thermodynamic systems. Mathematical theory of thermodynamics, non-equilibrium thermodynamics, thermodynamics of multicomponent systems.		

Code of the group: 12NS*3P-AME

Name of the group: 2012 NSTI 3.sem povinné AME

Requirement credits in the group: In this group you have to gain 18 credits

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

Credits in the group: 18

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
2111083	Continuum Mechanics Jiří Plešek Jiří Plešek Jiří Plešek (Gar.)	ZK	4	3P+0C	*	P
2121043	Computational Fluid Mechanics Tomáš Hyhlík Tomáš Hyhlík (Gar.)	ZK	4	3P+0C	*	P
2311079	Statistical Mechanics Michael Valášek, Zbyněk Šika, Václav Bauma, Ivo Bukovský Michael Valášek Michael Valášek (Gar.)	ZK	4	3P+0C	*	P

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

2111083	Continuum Mechanics	ZK	4			
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.		

2311079	Statistical Mechanics	ZK	4
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Code of the group: 12NS*4P-AME

Name of the group: 2012 NSTI 4.sem povinné AME

Requirement credits in the group: In this group you have to gain 21 credits

Requirement courses in the group: In this group you have to complete 7 courses

Credits in the group: 21

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
2121056	Gas Dynamics Michal Schmirler	ZK	4	3P+0C	*	P
2311091	System Identification Zdeněk Neusser, Michael Valášek, Zbyněk Šika, Václav Bauma Michael Valášek Zbyněk Šika (Gar.)	ZK	3	2P+0C	*	P
2111035	Finite Element Method II. Miroslav Španiel Miroslav Španiel Miroslav Španiel (Gar.)	ZK	3	2P+0C	*	P
2383062	Budget and Project Economic Assessment František Freiberg, Miroslav Žilka Miroslav Žilka František Freiberg (Gar.)	Z	2	1P+2C	*	P
2311019	Synthesis and Optimization of Mechanical Systems Michael Valášek, Zbyněk Šika, Václav Bauma, Petr Beneš Michael Valášek Michael Valášek (Gar.)	ZK	3	2P+0C	*	P
2311084	Advanced Dynamics Michael Valášek, Zbyněk Šika, Václav Bauma, Jan Zavřel, Tomáš Vampola Tomáš Vampola Tomáš Vampola (Gar.)	ZK	3	2P+0C	*	P
2113017	Basic of Engineering Experimentals Pavel Steinbauer, Karel Doubrava, Václav Uruba Karel Doubrava Karel Doubrava (Gar.)	Z	3	2P+1C	*	P

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

2121056	Gas Dynamics	ZK	4
2311091	System Identification	ZK	3
2111035	Finite Element Method II.	ZK	3
2383062	Budget and Project Economic Assessment	Z	2
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.			
2311019	Synthesis and Optimization of Mechanical Systems	ZK	3
2311084	Advanced Dynamics	ZK	3
2113017	Basic of Engineering Experimentals	Z	3

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 41

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 Kratochvilová, Hana Volejníková, Nina Procházková Ayyub Nina Procházková Ayyub	Z	2	0P+2C	*	PV

2043083	French - Preparatory Course / FME <i>Eliška Vítková, Dušana Jirovská Eliška Vítková Eliška Vítková (Gar.)</i>	Z	2	0P+2C	*	PV
2043082	German - Preparatory Course / FME <i>Eliška Vítková, Petr Laurich, Jaroslava Kommová Jaroslava Kommová</i>	Z	2	0P+2C	*	PV
2043085	Russian - Preparatory Course / FME <i>Eliška Vítková, Hana Volejníková, Dušana Jirovská Eliška Vítková</i>	Z	2	0P+2C	*	PV
2043086	Czech - Preparatory Course <i>Eliška Vítková, Petr Laurich, Jaroslava Kommová Jaroslava Kommová</i>	Z	2	0P+2C	*	PV
2043084	Spanish - Preparatory Course / FME <i>Eliška Vítková, Jaime Andrés Villagómez Jaime Andrés Villagómez</i>	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	Z	2			
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language. European level A1 - A2.						
2043083	French - Preparatory Course / FME	Z	2			
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.						
2043082	German - Preparatory Course / FME	Z	2			
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.						
2043085	Russian - Preparatory Course / FME	Z	2			
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.						
2043086	Czech - Preparatory Course	Z	2			
2043084	Spanish - Preparatory Course / FME	Z	2			
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.						

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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
2041081	English - Master Exam <i>Eva Pavlincová, Eliška Vítková, Ilona Šimice, Eva Končelíková, Zuzana Kalinová, Michaela Schusová, Veronika Kratochvílová, Hana Volejníková, Nina Procházková Ayyub Nina Procházková Ayyub</i>	ZK	1	0P+0C	*	PV
2041083	French - Master Exam / FME <i>Eliška Vítková, Dušana Jirovská Eliška Vítková Eliška Vítková (Gar.)</i>	ZK	1	0P+0C	*	PV
2041082	German - Master Exam / FME <i>Eliška Vítková, Petr Laurich, Jaroslava Kommová Jaroslava Kommová</i>	ZK	1	0P+0C	*	PV
2041085	Russian - Master Exam / FME <i>Eliška Vítková, Hana Volejníková, Dušana Jirovská, Petr Žitko Eliška Vítková</i>	ZK	1	0P+0C	*	PV
2041086	Czech- Master Exam <i>Eliška Vítková, Petr Laurich, Jaroslava Kommová Jaroslava Kommová</i>	ZK	1	0P+0C	*	PV
2041084	Spanish - Master Exam / FME <i>Eliška Vítková, Jaime Andrés Villagómez Jaime Andrés Villagómez</i>	ZK	1	0P+0C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12N3Q--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.						
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.						
2041086	Czech- Master Exam	ZK	1			
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*1Q-AME

Name of the group: 2012 NSTI 1.sem 1povvol AME Projekt I.

Requirement credits in the group: In this group you have to gain 5 credits

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

Credits in the group: 5

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
2113111	Project I. Miroslav Španiel, Milan Růžička Miroslav Španiel Miroslav Španiel (Gar.)	Z	5	0P+5C	*	PV
2313111	Project I. Zdeněk Neusser, Michael Valášek, Zbyněk Šika, Václav Bauma, Jan Zavřel Michael Valášek Michael Valášek (Gar.)	Z	5	0P+5C	*	PV
2123111	Project I. Tomáš Hyhlík, Jiří Nožička Jiří Nožička (Gar.)	Z	5	0P+5C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12NS*1Q-AME Name=2012 NSTI 1.sem 1povvol AME Projekt I.

2113111	Project I.	Z	5
2313111	Project I.	Z	5
2123111	Project I.	Z	5

Code of the group: 12NS*2Q-AME

Name of the group: 2012 NSTI 2.sem 1povvol AME Projekt II.

Requirement credits in the group: In this group you have to gain 5 credits

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

Credits in the group: 5

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
2113112	Project II. Tomáš Hyhlík, Jan Zavřel, Jan Pelikán, Miroslav Španiel, Radek Sedláček, Ctírad Novotný, Zdeněk Horák, Matej Daniel, Lukáš Horný, Zdeněk Horák Miroslav Španiel (Gar.)	Z	5	0P+5C	*	PV
2313112	Project II. Michael Valášek, Zbyněk Šika, Václav Bauma, Jan Zavřel, Pavel Steinbauer, Jan Pelikán, Ctírad Novotný Michael Valášek Michael Valášek (Gar.)	Z	5	0P+5C	*	PV
2123112	Project II.	Z	5	0P+5C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12NS*2Q-AME Name=2012 NSTI 2.sem 1povvol AME Projekt II.

2113112	Project II.	Z	5
2313112	Project II.	Z	5
2123112	Project II.	Z	5

Code of the group: 12NS*3Q-AME

Name of the group: 2012 NSTI 3.sem 1povvol AME Projekt III.

Requirement credits in the group: In this group you have to gain 18 credits

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

Credits in the group: 18

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
2113113	Project III. Karel Doubrava, Dušan Gabriel, Miroslav Španiel, Milan Růžička, Ctírad Novotný, Petr Tichý, Michal Bartošák, Martin Nesládek, Tomáš Mareš, Zdeněk Horák Miroslav Španiel (Gar.)	Z	10	0P+10C	*	PV
2313113	Project III. Zdeněk Neusser, Michael Valášek, Zbyněk Šika, Václav Bauma, Jan Zavřel, Petr Beneš, Ivo Bukovský, Pavel Steinbauer, Jan Pelikán, Michael Valášek Michael Valášek (Gar.)	Z	10	0P+10C	*	PV

2123113	Project III. <i>Jiří Nožička Jiří Nožička (Gar.)</i>	Z	10	OP+10C	*	PV
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Characteristics of the courses of this group of Study Plan: Code=12NS*3Q-AME Name=2012 NSTI 3.sem 1povvol AME Projekt III.

2113113	Project III.	Z	10
2313113	Project III.	Z	10
Individual assignment			
2123113	Project III.	Z	10

Code of the group: 12NS*4Q-AME

Name of the group: 2012 NSTI 4.sem 1povvol AME Diplomová práce

Requirement credits in the group: In this group you have to gain 10 credits

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

Credits in the group: 10

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
2113998	Diploma Project <i>Karel Doubrava, Miroslav Španiel, Milan Růžička, Radek Sedláček, Ctirad Novotný, Matej Daniel, Lukáš Horný, Petr Tichý, Michal Bartošák,</i> Miroslav Španiel Milan Růžička (Gar.)	Z	10	OP+10C	*	PV
2313998	Diploma project <i>Michael Valášek, Zbyněk Šika, Václav Bauma, Jan Zavřel, Petr Beneš, Ivo Bukovský, Pavel Steinbauer, Jan Pelikán, Tomáš Vampola,</i> Michael Valášek Michael Valášek (Gar.)	Z	10	OP+10C	*	PV
2123998	Diploma Thesis <i>Jiří Nožička Jiří Nožička (Gar.)</i>	Z	10	OP+10C	*	PV

Characteristics of the courses of this group of Study Plan: Code=12NS*4Q-AME Name=2012 NSTI 4.sem 1povvol AME Diplomová práce

2113998	Diploma Project	Z	10
2313998	Diploma project	Z	10
individual assignment			
2123998	Diploma Thesis	Z	10

List of courses of this pass:

Code	Name of the course	Completion	Credits
2013054	Mathematics for Mechanics Summary: Tensor calculus. Introduction to functional analysis. Calculus of variations. • Orthogonal transformation of coordinate systems. • Affine orthogonal tensors and tensor operations. • Tensor as linear operator and bilinear form. • Metrics and metric spaces. Convergence. Completeness. • Linear normed space. Banach space. • Linear space with scalar product (unitary space). Hilbert space. • Contractive operators and Banach fixed point theorem. • Function spaces in examples. • Operators and functionals. Linear, continuous and bounded operator/functional. • Derivative of a functional in the given direction. Gateaux differential and derivative. • Necessary and sufficient conditions for extremes of a functional. • Convex set and convex functional. Minimum of convex functional. • Extremes of functional of different types. Euler equation. Necessary and sufficient conditions for extrema. • Discrete methods for approximation of the minima of a functional. Ritz method.	Z	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	Z	2
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.			
2043083	French - Preparatory Course / FME	Z	2
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.			
2043084	Spanish - Preparatory Course / FME	Z	2
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.			
2043085	Russian - Preparatory Course / FME	Z	2
Aim: Understanding clearly what is spoken about everyday situations which a student meets at school or in his/her free time and speaking about them. Writing in a simple way about familiar topics. Reading and comprehension of simple texts. Improvement of professional language.			
2043086	Czech - Preparatory Course	Z	2
2111035	Finite Element Method II.	ZK	3
2111049	Theory of elasticity	ZK	4
The objective of this course is an introduction to the theory and applications of linear elasticity. It also provides the foundation for pursuing other solid mechanics courses such as theory of plasticity, fracture mechanics, composite structures, theory of plates and shells or continuum mechanics. This course introduces the basic definitions of stress and strain tensors used in the linear theory of elasticity, determines the principal stress and strain, derives equilibrium equations, compatibility conditions for strain tensor, postulates the constitutive relations for linear elastic material (generalized Hooke's law). The governing differential equations of elasticity are derived including the Navier's equation expressed in terms of the displacement vector and the Beltrami-Michell's equation expressed in terms of the stress tensor. Next, two-dimensional problems in cartesian and cylindrical coordinate systems is considered and the Airy stress function is introduced for the solution of these problems. A few useful applications are studied such as bending of a beam using the Airy stress function in the form of a polynomial, the stress distribution in a plate with small circular hole submitted to a uniform tension, the stress distribution for a concentrated vertical force action on a horizontal straight boundary, the stress distribution in a wedge due to a concentrated force at its apex. Finally, a brief introduction to the energy principles in solid mechanics is presented including the principles of virtual displacements and virtual forces.			
2111083	Continuum Mechanics	ZK	4
2113017	Basic of Engineering Experimentals	Z	3
2113111	Project I.	Z	5
2113112	Project II.	Z	5
2113113	Project III.	Z	10
2113998	Diploma Project	Z	10
2121016	Theoretical Fluid Mechanics	ZK	4
The physical concept of fluid mechanics and analysis methods, beginning from basic principles are emphasized. The mathematical level is based on the previous mathematical courses.			
2121027	Aerodynamics	ZK	3
The subject is oriented on study of flowing fluids behavior with applications in technical praxis with emphasizes on flow of air. Lectures are focused on flow stability, turbulence, flow around bodies and interaction of flow with surfaces.			
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.			
2121055	Thermodynamics	ZK	4
The extended course of thermodynamics dealing with the problems of mathematical theory of thermodynamics, non-equilibrium thermodynamics and thermodynamics of multicomponent thermodynamic systems. Mathematical theory of thermodynamics, non-equilibrium thermodynamics, thermodynamics of multicomponent systems.			
2121056	Gas Dynamics	ZK	4
2123018	Heat and Mass Transfer	Z	2
The course deal with: 1-D and 2-D, steady-state and unsteady state conduction, convection heat and mass transfer, boiling, condensation and heat exchangers analysis.			
2123111	Project I.	Z	5
2123112	Project II.	Z	5
2123113	Project III.	Z	10
2123998	Diploma Thesis	Z	10
2141093	Microelectronics	Z,ZK	3
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.			
2142027	Electrical Engineering for Applied Mechanics	KZ	3
The purpose of the course is to give the student knowledge about different types of electrical drives for mechatronic systems and their practical use. Method for electromagnetic field approximative solution. The theory of linear and rotating drivers. Electromagnets supplied by AC and DC power. Static and dynamics parameters of electromagnets. Drives for rotating motion. DC motors. Mathematical description of their static and dynamic properties. Principle and function of stepper motor. AC induction motors. Mathematical description of their static and dynamic properties. Using MATLAB for drivers behaviour modelling.			
2311019	Synthesis and Optimization of Mechanical Systems	ZK	3
2311074	Vibrations of Mechanical Systems	ZK	4
2311075	Mechanics of Mechanisms	ZK	4
2311076	Simulation of Mechatronic Systems	ZK	3
2311079	Statistical Mechanics	ZK	4
2311084	Advanced Dynamics	ZK	3
2311091	System Identification	ZK	3
2312017	Controlled mechanical systems I.	KZ	3
2313111	Project I.	Z	5
2313112	Project II.	Z	5
2313113	Project III. Individual assignment	Z	10

2313998	Diploma project individual assignment	Z	10
2383062	Budget and Project Economic Assessment	Z	2
<p>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.</p> <p>The quality of realization and presentation of the task's outputs together with the results of the test decides on granting / denial of credit.</p>			

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

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