# Study plan

## Name of study plan: 14 141 NSTI AME 2012 základ

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Welcome page
Type of study: unknown
Required credits: 132
Elective courses credits: -8
Sum of credits in the plan: 124
Note on the plan:

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Name of the block: Compulsory courses in the program
Minimal number of credits of the block: 91
The role of the block: P

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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 |
|---|---|---|---|---|---|---|
| 2013054 | **Mathematics for Mechanics** | Z | 4 | 3P+1C | * | P |
| 2311075 | **Mechanics of Mechanisms** *Jan Pelikán, Václav Bauma, Petr Beneš, Zdeněk Neusser, Zbyněk Šika, Michael Valášek, Jan Zavřel* ***Zbyněk Šika*** *Zbyněk Šika (Gar.)* | ZK | 4 | 3P+0C | * | P |
| 2141093 | **Microelectronics** *Lukáš Novák, Stanislava Papežová* ***Stanislava Papežová*** *Lukáš Novák (Gar.)* | Z,ZK | 3 | 2P+0C+1L | * | P |
| 2312017 | **Controlled mechanical systems I.** *Václav Bauma, Zdeněk Neusser, Zbyněk Šika, Michael Valášek, Ivo Bukovský, Pavel Steinbauer* ***Michael Valášek*** *Michael Valášek (Gar.)* | KZ | 3 | 3P+0C | * | P |
| 2121016 | **Theoretical Fluid Mechanics** *Tomáš Hyhlík Tomáš Hyhlík (Gar.)* | ZK | 4 | 3P+0C | * | P |

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

| | | | |
|---|---|---|---|
| 2013054 | Mathematics for Mechanics | Z | 4 |
| Summary: Tensor calculus. Introduction to functional analysis. Calculus of variations. Orthogonal transformation of coordinate systems. Afinne orthogonal tensors and tensor operations. Tensor as linear operator and bilinear form. Metrics and metric spaces. Convergence. Completness. 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. | | | |
| 2312017 | Controlled mechanical systems I. | KZ | 3 |
| 2121016 | Theoretical Fluid Mechanics | ZK | 4 |
| The study subject aim is to expand the students knowledge gained from the previous subject Thermomechanics Alfa. The attention is focussed namely on fluids characteristics, various description methods of fluid dynamics under low and high Re number values, boundary layer characteristics and its stability and complex flow characteristics for incompressible flow. | | | |

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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+0C+1L | * | P |
| 2311074 | **Vibrations of Mechanical Systems** *Václav Bauma, Zbyněk Šika, Michael Valášek, Jan Zavřel* ***Václav Bauma*** *Václav Bauma (Gar.)* | ZK | 4 | 3P+0C | * | P |
| 2123018 | **Heat and Mass Transfer** *Pavel Sláma* | Z | 2 | 2P+0C | * | P |
| 2311076 | **Simulation of Mechatronic Systems** *Jan Pelikán, Václav Bauma, Zbyněk Šika, Michael Valášek, Jan Zavřel* ***Zbyněk Šika*** *Zbyněk Šika (Gar.)* | ZK | 3 | 2P+0C | * | P |
| 2111049 | **Theory of elasticity** *Dušan Gabriel* ***Dušan Gabriel*** *Dušan Gabriel (Gar.)* | ZK | 4 | 3P+0C | * | P |
| 2121055 | **Thermodynamics** *Tomáš Hyhlík Tomáš Hyhlík (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 extends the knowledge gained in the subject Thermomechanics Alfa especially in the area of heat transfer. Attention is paid to more complex cases (non-stationary, multidimensional problems) as well as to processes where heat transfer is accompanied by simultaneous mass transfer (mixing exchangers). | | | |
| 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 andthe 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 distibution in a plate with small circular hole submitted to a uniform tension, the stress distibution for a concentrated vertical force action on a horizontal straight boundary, the stress distibution 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 aim of the course is to expand the students' knowledge gained from the previous course Thermomechanics Alfa in the areas of the real gas thermodynamics, irreversible process thermodynamics, multiphase- and multicomponent system characteristics and thermodynamics cycles of the real heat engines and machines also. | | | |

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*** | ZK | 4 | 3P+0C | * | P |
| 2311079 | **Statistical Mechanics** *Václav Bauma, Zbyněk Šika, Michael Valášek, Ivo Bukovský* ***Ivo Bukovský*** *Ivo Bukovský (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 |
| This course extends the knowledge gained in the course of Fluid Mechanics about the knowledge of computational fluid dynamics. Emphasis is placed on understanding the basic principles of computational fluid dynamics based on using commercial codes. Selected problems of internal and external aerodynamics are solved. | | | |
| 2311079 | Statistical Mechanics | ZK | 4 |

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<br>*(in case of groups of courses the list of codes of their members)*<br>*Tutors,* ***authors*** *and guarantors (gar.)* | Completion | Credits | Scope | Semester | Role |
|---|---|---|---|---|---|---|
| 2121056 | **Gas Dynamics**<br>*Michal Schmirler Michal Schmirler (Gar.)* | ZK | 4 | 3P+0C | * | P |
| 2311091 | **System Identification**<br>*Václav Bauma, Zdeněk Neusser, Zbyněk Šika, Michael Valášek, Jan Zavřel* ***Zbyněk Šika*** *Zbyněk Šika (Gar.)* | ZK | 3 | 2P+0C | * | P |
| 2111035 | **Finite Element Method II.**<br>*Miroslav Španiel* ***Miroslav Španiel*** *Miroslav Španiel (Gar.)* | ZK | 3 | 2P+0C | * | P |
| 2383062 | **Budget and Project Economic Assessment**<br>*František Freiberg, Miroslav Žilka* ***František Freiberg*** *František Freiberg (Gar.)* | Z | 2 | 1P+2C | * | P |
| 2311019 | **Synthesis and Optimization of Mechanical Systems**<br>*Václav Bauma, Petr Beneš, Zbyněk Šika, Michael Valášek, Jan Zavřel* ***Zbyněk Šika*** *Zbyněk Šika (Gar.)* | ZK | 3 | 2P+0C | * | P |
| 2311084 | **Advanced Dynamics**<br>*Václav Bauma, Zbyněk Šika, Michael Valášek, Jan Zavřel, Tomáš Vampola* ***Tomáš Vampola*** *Tomáš Vampola (Gar.)* | ZK | 3 | 2P+0C | * | P |
| 2113017 | **Basic of Engineering Experimentals**<br>*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 |
| The study subjects aim is to expand the students´ knowledge gained from the previous Alfa versions of the bachelors subjects Fluid Mechanics and Thermomechanics. It generalizes the findings in the scope of compressible fluid flow; the attention is focussed on the several non-isentropic cycles as well as fundaments of non-stationary and multidimensional flows. | | | |
| 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<br>*(in case of groups of courses the list of codes of their members)*<br>*Tutors,* ***authors*** *and guarantors (gar.)* | Completion | Credits | Scope | Semester | Role |
|---|---|---|---|---|---|---|
| 2043081 | **English - Preparatory Course / FME**<br>*Veronika Kratochvílová, Eliška Vítková, Ilona Šimice, Michaela Schusová, Hana Volejníková* ***Nina Procházková Ayyub*** | Z | 2 | 0P+2C | * | PV |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2043086 | **Czech - Preparatory Course**<br>*Michaela Schusová, Hana Volejníková, Petr Laurich* | Z | 2 | 0P+2C | * | PV |
| 2043083 | **French - Preparatory Course / FME**<br>*Michaela Schusová, Dušana Jirovská* ***Michaela Schusová*** *Dušana Jirovská (Gar.)* | Z | 2 | 0P+2C | * | PV |
| 2043082 | **German - Lower Intermediate Course**<br>*Eliška Vítková, Michaela Schusová, Petr Laurich, Jaroslava Kommová* ***Jaroslava Kommová*** *Jaroslava Kommová (Gar.)* | Z | 2 | 0P+2C | * | PV |
| 2043085 | **Russian - Preparatory Course / FME**<br>*Michaela Schusová, Hana Volejníková, Dušana Jirovská* ***Eliška Vítková*** | Z | 2 | 0P+2C | * | PV |
| 2043084 | **Spanish - Preparatory Course / FME**<br>*Michaela Schusová, Jaime Andrés Villagómez* ***Eliška Vítková*** | Z | 2 | 0P+2C | * | PV |

**Characteristics of the courses of this group of Study Plan: Code=12N**3Q--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. | | | |
| 2043086 | Czech - Preparatory Course | 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. | | | |
| 2043082 | German - Lower Intermediate Course | Z | 2 |
| 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 comprehesion 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. | | | |
| 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**<br>***(in case of groups of courses the list of codes of their members)***<br>*Tutors,* ***authors*** *and guarantors (gar.)* | **Completion** | **Credits** | **Scope** | **Semester** | **Role** |
|---|---|---|---|---|---|---|
| 2041081 | **English - Master Exam**<br>*Veronika Kratochvílová, Eliška Vítková, Ilona Šimice, Michaela Schusová, Hana Volejníková, Michele Le Blanc, Nina Procházková Ayyub* ***Nina Procházková Ayyub*** *Ilona Šimice (Gar.)* | ZK | 1 | 0P+0C | * | PV |
| 2041086 | **Czech- Master Exam**<br>*Michaela Schusová, Hana Volejníková, Petr Laurich* | ZK | 1 | 0P+0C | * | PV |
| 2041083 | **French - Master Exam / FME**<br>*Michaela Schusová, Dušana Jirovská* ***Dušana Jirovská*** *Dušana Jirovská (Gar.)* | ZK | 1 | 0P+0C | * | PV |
| 2041082 | **German - Master Exam / FME**<br>*Eliška Vítková, Michaela Schusová, Petr Laurich, Jaroslava Kommová* ***Jaroslava Kommová*** *Jaroslava Kommová (Gar.)* | ZK | 1 | 0P+0C | * | PV |
| 2041085 | **Russian - Master Exam / FME**<br>*Michaela Schusová, Hana Volejníková, Dušana Jirovská* ***Eliška Vítková*** | ZK | 1 | 0P+0C | * | PV |
| 2041084 | **Spanish - Master Exam / FME**<br>*Michaela Schusová, Jaime Andrés Villagómez* ***Eliška Vítková*** *Jaime Andrés Villagómez (Gar.)* | 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 comprehesion 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 comprehesion 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 comprehesion 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 comprehesion 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* ***Miroslav Španiel*** *Miroslav Španiel (Gar.)* | Z | 5 | 0P+5C | * | PV |
| 2313111 | **Project I.** *Václav Bauma, Zdeněk Neusser, Zbyněk Šika, Michael Valášek, Jan Zavřel* ***Zbyněk Šika*** *Zbyněk Šika (Gar.)* | Z | 5 | 0P+5C | * | PV |
| 2123111 | **Project I.** *Tomáš Hyhlík (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 |

The aim of the course for the students is to apply their knowledge of mechanics, elasticity and strength and fluid mechanics to a complex task consisting in design of controlled mechanism according to required function, dimensioning of selected member in terms of stiffness and durability, environmental assessment and control design. The student is led to master a suitable combination of analytical and numerical methods. At the same time, topics from subjects taught in the 1st semester of the program are discussed within the contact hours.

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.** *Miroslav Španiel, Karel Doubrava, Michal Bartošák, Karel Vítek, Martin Nesládek, Milan Růžička, Jiří Kuželka, Zdeněk Padovec, Tomáš Mareš, .....* ***Ctirad Novotný*** *Miroslav Španiel (Gar.)* | Z | 5 | 0P+5C | * | PV |
| 2313112 | **Project II.** *Jan Pelikán, Václav Bauma, Zbyněk Šika, Michael Valášek, Jan Zavřel, Pavel Steinbauer, Ctirad Novotný* ***Zbyněk Šika*** *Zbyněk Šika (Gar.)* | Z | 5 | 0P+5C | * | PV |
| 2123112 | **Project II.** *Michal Schmirler (Gar.)* | 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 |

The aim of the course for student is to solve the technical task assigned according to his specialization and focus. The task is focused on more advanced work with contemporary means of engineering analysis from commercial programs of FEM and fluid analysis, through Matlab to creation of in-house programs. The project continues and extends the knowledge acquired in subjects taught in the 2nd semester.

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.** *Miroslav Španiel, Karel Doubrava, Michal Bartošák, Karel Vítek, Martin Nesládek, Milan Růžička, Jiří Kuželka, Zdeněk Padovec, Tomáš Mareš, ..... Miroslav Španiel (Gar.)* | Z | 10 | 0P+10C | * | PV |
| 2313113 | **Project III.** *Jan Pelikán, Václav Bauma, Petr Beneš, Zdeněk Neusser, Zbyněk Šika, Michael Valášek, Jan Zavřel, Ivo Bukovský, Pavel Steinbauer, ..... **Zbyněk Šika** Zbyněk Šika (Gar.)* | Z | 10 | 0P+10C | * | PV |
| 2123113 | **Project III.** ***Michal Schmirler** Tomáš Hyhlík (Gar.)* | Z | 10 | 0P+10C | * | PV |

**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 asignment | | | |
| 2123113 | Project III. | Z | 10 |
| This project is understood as preparation for the diploma thesis. The topic of the project and the way of its realization and the scope of the work is given by the pre-determined head of the thesis so that the student can follow it in his / her thesis. Completion of the project must always be verified by submitting a written report. Typically the project work can include: state of the art research acquiring theoretical and practical materials by compilation of literature, by visiting optional lectures, taking from potential partners. mastering the means for numerical or experimental modeling preparation and realization of experiments preparation of numerical models programming and more | | | |

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)* *Tutors, **authors** and guarantors (gar.)* | Completion | Credits | Scope | Semester | Role |
|---|---|---|---|---|---|---|
| 2113998 | **Diploma Project** *Miroslav Španiel, Karel Doubrava, Michal Bartošák, Karel Vítek, Martin Nesládek, Milan Růžička, Jiří Kuželka, Zdeněk Padovec, Tomáš Mareš, ..... **Tomáš Mareš** Miroslav Španiel (Gar.)* | Z | 10 | 0P+10C | * | PV |
| 2313998 | **Diploma project** *Jan Pelikán, Václav Bauma, Petr Beneš, Zdeněk Neusser, Zbyněk Šika, Michael Valášek, Jan Zavřel, Ivo Bukovský, Pavel Steinbauer, ..... **Michael Valášek** Michael Valášek (Gar.)* | Z | 10 | 0P+10C+0L | * | PV |
| 2123998 | **Diploma Thesis** *Michal Schmirler **Michal Schmirler** Michal Schmirler (Gar.)* | Z | 10 | 0P+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 |
| The diploma thesis is a final independent work examining the ability of independent logical technical thinking, orientation in the given problem, work with technical documents and application of acquired theoretical knowledge of students, which ends by submitting a written work in the prescribed format. | | | |

## List of courses of this pass:

| Code | Name of the course | Completion | Credits |
|---|---|---|---|
| 2013054 | Mathematics for Mechanics | Z | 4 |
| Summary: Tensor calculus. Introduction to functional analysis. Calculus of variations. Orthogonal transformation of coordinate systems. Afinne orthogonal tensors and tensor operations. Tensor as linear operator and bilinear form. Metrics and metric spaces. Convergence. Completness. 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. | | | |

| | | | |
|---|---|---|---|
| 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. | | | |
| 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 comprehesion 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 comprehesion 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 comprehesion 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 comprehesion of simple texts. Improvement of professional language. | | | |
| 2041086 | Czech- Master Exam | ZK | 1 |
| 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. | | | |
| 2043082 | German - Lower Intermediate Course | Z | 2 |
| 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 comprehesion 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 |
| 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. | | | |
| 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 andthe 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 distibution in a plate with small circular hole submitted to a uniform tension, the stress distibution for a concentrated vertical force action on a horizontal straight boundary, the stress distibution 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 study subject aim is to expand the students knowledge gained from the previous subject Thermomechanics Alfa. The attention is focussed namely on fluids characteristics, various description methods of fluid dynamics under low and high Re number values, boundary layer characteristics and its stability and complex flow characteristics for incompressible flow. | | | |
| 2121043 | Computational Fluid Mechanics | ZK | 4 |
| This course extends the knowledge gained in the course of Fluid Mechanics about the knowledge of computational fluid dynamics. Emphasis is placed on understanding the basic principles of computational fluid dynamics based on using commercial codes. Selected problems of internal and external aerodynamics are solved. | | | |
| 2121055 | Thermodynamics | ZK | 4 |
| The aim of the course is to expand the students' knowledge gained from the previous course Thermomechanics Alfa in the areas of the real gas thermodynamics, irreversible process thermodynamics, multiphase- and multicomponent system characteristics and thermodynamics cycles of the real heat engines and machines also. | | | |
| 2121056 | Gas Dynamics | ZK | 4 |
| The study subjects aim is to expand the students´ knowledge gained from the previous Alfa versions of the bachelors subjects Fluid Mechanics and Thermomechanics. It generalizes the findings in the scope of compressible fluid flow; the attention is focussed on the several non-isentropic cycles as well as fundaments of non-stationary and multidimensional flows. | | | |
| 2123018 | Heat and Mass Transfer | Z | 2 |
| The course extends the knowledge gained in the subject Thermomechanics Alfa especially in the area of heat transfer. Attention is paid to more complex cases (non-stationary, multidimensional problems) as well as to processes where heat transfer is accompanied by simultaneous mass transfer (mixing exchangers). | | | |
| 2123111 | Project I. | Z | 5 |
| The aim of the course for the students is to apply their knowledge of mechanics, elasticity and strength and fluid mechanics to a complex task consisting in design of controlled mechanism according to required function, dimensioning of selected member in terms of stiffness and durability, environmental assessment and control design. The student is led to master a suitable combination of analytical and numerical methods. At the same time, topics from subjects taught in the 1st semester of the program are discussed within the contact hours. | | | |

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|---|---|---|---|
| 2123112 | Project II. | Z | 5 |
| The aim of the course for student is to solve the technical task assigned according to his specialization and focus. The task is focused on more advanced work with contemporary means of engineering analysis from commercial programs of FEM and fluid analysis, through Matlab to creation of in-house programs. The project continues and extends the knowledge acquired in subjects taught in the 2nd semester. | | | |
| 2123113 | Project III. | Z | 10 |
| This project is understood as preparation for the diploma thesis. The topic of the project and the way of its realization and the scope of the work is given by the pre-determined head of the thesis so that the student can follow it in his / her thesis. Completion of the project must always be verified by submitting a written report. Typically the project work can include: state of the art research acquiring theoretical and practical materials by compilation of literature, by visiting optional lectures, taking from potential partners. mastering the means for numerical or experimental modeling preparation and realization of experiments preparation of numerical models programming and more | | | |
| 2123998 | Diploma Thesis | Z | 10 |
| The diploma thesis is a final independent work examining the ability of independent logical technical thinking, orientation in the given problem, work with technical documents and application of acquired theoretical knowledge of students, which ends by submitting a written work in the prescribed format. | | | |
| 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. | Z | 10 |
| Individual asignment | | | |
| 2313998 | Diploma project | Z | 10 |
| individual assignment | | | |
| 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. | | | |

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