# Recomended pass through the study plan

## Name of the pass: Specialization Electrical Engineering and Management - Passage through study

Faculty/Institute/Others: Faculty of Electrical Engineering
Department:
Pass through the study plan: Electrical Engineering, Power Engineering and Management - Electrical Engineering and Management
Branch of study guranteed by the department: Welcome page
Guarantor of the study branch:
Program of study: Electrical Engineering, Power Engineering and Management
Type of study: Bachelor full-time
Note on the pass:

**Coding of roles of courses and groups of courses:**
**P - compulsory courses of the program, PO - compulsory courses of the branch, Z - compulsory courses, S - compulsory elective courses, PV - compulsory elective courses, F - elective specialized courses, V - elective courses, T - physical training courses**

**Coding of ways of completion of courses (KZ/Z/ZK) and coding of semesters (Z/L):**
**KZ - graded assesment, Z - assesment, ZK - examination, L - summer semester, Z - winter semester**

Number of semester: 1

| 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 |
|---|---|---|---|---|---|---|
| BEZB | **Safety in Electrical Engineering for a Bachelor´s Degree** *Ivana Nová, Radek Havlíček, Vladimír Kůla **Radek Havlíček** Vladimír Kůla (Gar.)* | Z | 0 | 2BP+2BC | Z,L | P |
| B0B01LAGA | **Linear Algebra** *Jiří Velebil, Jakub Rondoš, Martin Bohata, Alena Gollová, Natalie Žukovec, Daniel Gromada, Josef Dvořák, Matěj Dostál **Jiří Velebil** Jiří Velebil (Gar.)* | Z,ZK | 7 | 4P+2S | Z | P |
| B0B01MA1A | **Mathematical Analysis 1** *Martin Bohata, Josef Dvořák, Veronika Sobotíková, Karel Pospíšil **Veronika Sobotíková** Veronika Sobotíková (Gar.)* | Z,ZK | 6 | 4P+2S | Z | P |
| B0B99PRPA | **Procedural Programming** *Stanislav Vítek **Stanislav Vítek** Stanislav Vítek (Gar.)* | KZ | 4 | 2P+2C | Z | P |
| BEZZ | **Basic Health and Occupational Safety Regulations** *Ivana Nová, Radek Havlíček, Vladimír Kůla **Radek Havlíček** Vladimír Kůla (Gar.)* | Z | 0 | 2BP+2BC | Z | P |
| B1B14ZEL1 | **Fundamentals of Electrotechnical Engineering** *Ivana Nová, Jiří Beranovský, Vít Hlinovský **Ivana Nová*** | KZ | 4 | 2P+2C | Z | P |
| B1B16MME | **Macro and Microekonomics** *Helena Fialová, Lubomír Lízal, Josef Černohous, Jan Jandera, Blanka Kučerková, Miroslav Vítek **Helena Fialová** Lubomír Lízal (Gar.)* | Z,ZK | 5 | 2P+2S | Z | PZ |
| 2018_BEEMH | **Humanitní předměty** *B0B16ET1,B0B16FIL,..... (see the list of groups below)* | Min. cours. 1 Max. cours. 9 | Min/Max 4/28 | | | PV |

Number of semester: 2

| 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 |
|---|---|---|---|---|---|---|
| B0B01DRN | **Differencial Equations and Numerical Analysis** *Jakub Rondoš, Daniel Gromada, Josef Dvořák, Petr Habala, Jakub Staněk **Petr Habala** Petr Habala (Gar.)* | Z,ZK | 4 | 2P+2C | L | P |
| B1B02FY1 | **Physics 1** *Petr Koníček **Petr Koníček** Petr Koníček (Gar.)* | Z,ZK | 8 | 4P+1L+2C | L | P |
| B0B01MA2A | **Mathematical Analysis 2** *Veronika Sobotíková, Jaroslav Tišer, Martin Křepela, Miroslav Korbelář **Jaroslav Tišer** Jaroslav Tišer (Gar.)* | Z,ZK | 6 | 4P+2S | L | P |
| B1B13PPS | **Industrial computer systems** *Karel Künzel **Karel Künzel** Karel Künzel (Gar.)* | Z,ZK | 4 | 2P+2L | L | P |

| | | | | | | |
|---|---|---|---|---|---|---|
| B1B15VYA | **Computational Applications**<br>*Jan Kyncl Jan Kyncl (Gar.)* | KZ | 4 | 2P+2C | L | P |
| 2018_BEEMVOL | **Volitelné předměty** | Min. cours.<br>0 | Min/Max<br>0/999 | | | V |

## Number of semester: 3

| 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 |
|---|---|---|---|---|---|---|
| B1B31EOS | **Electric circuits**<br>*Martin Pokorný, Michal Šimek **Martin Pokorný** Martin Pokorný (Gar.)* | Z,ZK | 6 | 3P+2S | Z | P |
| B1B17EMP | **Electromagnetic Field**<br>*Vítězslav Pankrác **Vítězslav Pankrác** Vítězslav Pankrác (Gar.)* | Z,ZK | 5 | 2P+2C | Z | P |
| B1B34EPS | **Elektronics for Heavy-current engeneering**<br>*Vladimír Janíček, Adam Bouřa, Jan Novák, Tomáš Teplý, Tomáš Martan **Vladimír Janíček** Vladimír Janíček (Gar.)* | KZ | 4 | 2P+2L | Z | P |
| B1B02FY2 | **Physics 2**<br>*Petr Koníček, Marek Brothánek, Vojtěch Jandák **Petr Koníček** Petr Koníček (Gar.)* | Z,ZK | 7 | 3P+1L+2C | Z | P |
| B0B01KANA | **Complex Analysis**<br>*Zdeněk Mihula, Hana Turčinová **Zdeněk Mihula** Zdeněk Mihula (Gar.)* | Z,ZK | 4 | 2P+2S | Z | P |
| B1B13MVE1 | **Materials for Power Electrical Engineering**<br>*Jan Zemen, Pavel Mach, Josef Sedláček, Karel Dušek, Ivana Beshajová Pelikánová **Karel Dušek** Pavel Mach (Gar.)* | Z,ZK | 4 | 2P+2L | Z | P |

## Number of semester: 4

| 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 |
|---|---|---|---|---|---|---|
| B1B38EMA | **Electrical Measurements**<br>*Jakub Svatoš **Jakub Svatoš** Jakub Svatoš (Gar.)* | KZ | 5 | 2P+2L | L | P |
| B1B15EN11 | **Power Engineering 1**<br>*Ladislav Musil, Ivo Doležel* | Z,ZK | 5 | 3P+2S | L | P |
| B1B13TEP | **Electrical engineering technological processes**<br>*Pavel Mach, Karel Dušek, Petr Veselý, Jan Kuba, Radek Procházka **Karel Dušek** Pavel Mach (Gar.)* | Z,ZK | 4 | 3P+2L | L | P |
| B1B14ZSP | **Electric Machines and Apparatuses Basics**<br>*Pavel Kobrle, Pavel Mindl **Pavel Kobrle** Pavel Kobrle (Gar.)* | Z,ZK | 5 | 3P+2L | L | P |
| B1B01MEK | **Mathematics for Economy**<br>*Jakub Staněk, Miroslav Korbelář, Kateřina Helisová **Kateřina Helisová** Kateřina Helisová (Gar.)* | Z,ZK | 5 | 3P+2S | L | PZ |
| B1B13VEZ | **Manufacturing of Electronic Equipment**<br>*David Bušek, Jan Urbánek **David Bušek** David Bušek (Gar.)* | Z,ZK | 6 | 2P+2L | L | PZ |

## Number of semester: 5

| 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 |
|---|---|---|---|---|---|---|
| B1B15EN2 | **Power Engineering 2**<br>*Ivo Doležel, Zdeněk Müller* | Z,ZK | 5 | 2P+2L | Z | P |
| B1BPROJ4 | **Bachelor project**<br>*Josef Černohous, Miroslav Vítek, Jan Mikeš, Karel Künzel, Jan Kyncl, Ivana Beshajová Pelikánová, Zdeněk Müller, Jan Bauer, Stanislav Bouček, ..... **Jan Bauer** Jan Bauer (Gar.)* | Z | 4 | 4s | Z,L | P |
| B1B13VVZ1 | **Manufacturing of Power Devices**<br>*Radek Procházka, Jiří Hájek, Petr Gric **Jiří Hájek** Jiří Hájek (Gar.)* | Z,ZK | 4 | 2P+2L | Z | P |
| B1B14ZPO | **Fundametals of Electric Drives**<br>*Pavel Kobrle **Pavel Kobrle*** | Z,ZK | 5 | 2P+2L | Z | P |
| B1B14ZVE | **Power Electronics**<br>*Jan Bauer, Jiří Lettl **Jiří Lettl** Jiří Lettl (Gar.)* | Z,ZK | 4 | 2P+2L | Z | P |
| B1B16UEE1 | **Economy of Power Industry**<br>*Miroslav Vítek, Jiří Vašíček, Jaroslav Knápek **Miroslav Vítek** Jaroslav Knápek (Gar.)* | Z,ZK | 5 | 2P+2C | Z | PZ |
| B1B16ZPU | **Basics of Business Economics**<br>*Josef Černohous, Blanka Kučerková, Oldřich Starý **Josef Černohous** Oldřich Starý (Gar.)* | KZ | 5 | 2P+2C | Z | PZ |

Number of semester: 6

| 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 |
|---|---|---|---|---|---|---|
| BBAP15 | **Bachelor thesis** | Z | 15 | 15s | L,Z | P |
| B1B16PPP | **Business Law** *Jaroslav Knápek, Michal Briaský, Pavel Košťál, Martin Dobiáš* ***Martin Dobiáš*** *Jaroslav Knápek (Gar.)* | Z,ZK | 5 | 2P+2C | L | PZ |
| B1B16ZFM1 | **Basics of Financial Management** *Josef Černohous, Blanka Kučerková, Oldřich Starý* ***Oldřich Starý*** *Oldřich Starý (Gar.)* | Z,ZK | 5 | 2P+2C | L | PZ |
| 2018_BEEMPV2 | **Povinně volitelné předměty programu** *B1B16EOB,B1B13SSE1* | Min. cours. 1 Max. cours. 1 | Min/Max 5/5 | | | PV |

## List of groups of courses of this pass with the complete content of members of individual groups

| Kód | Name of the group of courses and codes of members of this group (for specification see here or below the list of courses) | Completion | Credits | Scope | Semester | Role |
|---|---|---|---|---|---|---|
| **2018_BEEMH** | **Humanitní předměty** | **Min. cours. 1 Max. cours. 9** | **Min/Max** 4/28 | | | **PV** |
| B0B16ET1 | Ethic 1 | B0B16FIL | Philosophy | B0B16FI1 | Philosophy 1 | |
| B0B16HTE | History of technology and econom ... | B0B16HT1 | History of science and technolog ... | B0B16HI1 | History 1 | |
| B0B16MPS | Psychology | B0B16MPL | Psychology for managers | A003TV | Physical Education | |
| **2018_BEEMPV2** | **Povinně volitelné předměty programu** | **Min. cours. 1 Max. cours. 1** | **Min/Max** 5/5 | | | **PV** |
| B1B16EOB | Lightning protection economy | B1B13SSE1 | Solar Systems and Electrochemica ... | | | |
| **2018_BEEMVOL** | **Volitelné předměty** | **Min. cours. 0** | **Min/Max** 0/999 | | | **V** |

## List of courses of this pass:

| Code | Name of the course | Completion | Credits |
|---|---|---|---|
| A003TV | Physical Education | Z | 2 |
| B0B01DRN | Differencial Equations and Numerical Analysis | Z,ZK | 4 |
| This course introduces students to the classical theory of ordinary differential equations (separable and linear ODEs) and also to bsics of numerical methods (errors in calculations and stability, numerical solutions of algebraic and differential equations and their systems). The course takes advantage of the synnergy between theoretical and practical point of view. | | | |
| B0B01KANA | Complex Analysis | Z,ZK | 4 |
| The course is an introduction to the fundamentals of complex analysis and its applications. The basic principles of Fourier, Laplace, and Z-transform are explained, including their applications, particularly to solving differential and difference equations. | | | |
| B0B01LAGA | Linear Algebra | Z,ZK | 7 |
| The course covers introductory topics of linear algebra. It begins with fundamental concepts related to vector spaces and linear transform (such as linear dependence and independence of vectors, bases, coordinates of vectors, etc.). The next part of the course is devoted to matrix theory (determinants, inverse matrix, matrices of linear transformation, eigenvalues and eigenvectors). Applications include solving systems of linear equations, geometry in three-dimensional space (including dot and cross products), and the singular value decomposition of a matrix. | | | |
| B0B01MA1A | Mathematical Analysis 1 | Z,ZK | 6 |
| This is an introductory course to differential and integral calculus of functions of one real variable. | | | |
| B0B01MA2A | Mathematical Analysis 2 | Z,ZK | 6 |
| The subject covers an introduction to the differential and integral calculus in several variables and basic relations between curve and surface integrals. Other part contains function series and power series with application to Taylor and Fourier series. | | | |

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|---|---|---|---|
| B0B16ET1 | Ethic 1 | KZ | 4 |
| Aim of this subject is to provide the students an orientation not only in general problems of ethics but above all to offer instructions for solving various situations of human life. Essential parts of the subject are discussions in which students can react to lectures but also to actual questions coming with news and look for the communal answers. | | | |
| B0B16FI1 | Philosophy 1 | KZ | 4 |
| We deal with the most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy and connection of old philosophical thoughts with recent problems of science, technology, economics and politics. | | | |
| B0B16FIL | Philosophy | ZK | 2 |
| We deal with the most important persons, schools and ideas of ancient philosophy. We are concerned especially on transdisciplinary nature of philosophy and connection of old philosophical thoughts with recent problems of science, technology, economics and politics. | | | |
| B0B16HI1 | History 1 | KZ | 4 |
| B0B16HT1 | History of science and technology 1 | KZ | 4 |
| B0B16HTE | History of technology and economic | ZK | 2 |
| B0B16MPL | Psychology for managers | ZK | 2 |
| B0B16MPS | Psychology | Z,ZK | 4 |
| B0B99PRPA | Procedural Programming | KZ | 4 |
| B1B01MEK | Mathematics for Economy | Z,ZK | 5 |
| The aim is to introduce the basic theory of probability and statistics, familiarise students with basic terms properties and methods used in working with random processes, especially with Markov chains, and show applications of these mathematical tools in economics and insurance. | | | |
| B1B02FY1 | Physics 1 | Z,ZK | 8 |
| The basic course of physics at the Faculty of Electrical Engineering - Physics 1, is devoted to the introduction into two important areas of physics. The first one is a classical mechanics and the second one is the electric and magnetic field. Within the framework of the classical mechanics, the students study the particle kinematics; dynamics of the mass particle, system of mass particles and rigid bodies. The students should be able to solve basic problems dealing with the description of mechanical systems, which they can meet during their further studies. The classical mechanics is followed by the relativistic mechanics, electric and magnetic field - both stationary as well as non-stationary. The students can use the facts gained in this course in the study of electrical circuits, theory of electrotechnical materials or radioelectronics. Apart of this, the knowledge gained in this course is required for the study of the consecutive course Physics 2. | | | |
| B1B02FY2 | Physics 2 | Z,ZK | 7 |
| The course Physics 2 is closely linked with the course Physics 1. Within the framework of this course the students will first of all learn foundations of thermodynamics. Following topic - the theory of waves - will give to the students basic insight into the properties of waves and will help to the students to understand that the presented description of the waves has a universal character in spite of the waves character. Particular types of waves, such as acoustic or optical waves are the subjects of the following section. Quantum mechanics and nuclear physics will complete the student?s general education in physics. The knowledge gained in this course will help to the students in study of such modern areas as robotics, computer vision, measuring technique and will allow them to understand the principles of novel technologies and functioning of new electronic devices. | | | |
| B1B13MVE1 | Materials for Power Electrical Engineering | Z,ZK | 4 |
| At first a physical description of basic properties and basic types of materials for electrical engineering is carried out. Types of conductors, superconductors, insulators, magnetic materials and semiconductors, which are used in power electrical engineering, are presented. The stress is put on relationships between properties, technology and the use. The student will meet, in higher detail, with ceramics for electrical engineering, with properties of mica, glass and their applications, with environmental conductive joining, with materials for thin and thick films and with selected nanomaterials and their applications. | | | |
| B1B13PPS | Industrial computer systems | Z,ZK | 4 |
| The subject is focused on basic knowledges about computer control systems used in electrotechnic engineering and energetics. Students works with hardware for data acquisition and data processing, software tools and application examples. There are presented elementary digital circuits, the representation of numbers and their processing in microcomputer and fundamental block of microprocessor and microcomputer. The single chip microcomputer, embedded application, industrial PC and design to industrial condition are presented. | | | |
| B1B13SSE1 | Solar Systems and Electrochemical Sources | Z,ZK | 5 |
| The course familiarizes students with the basic principles of electrochemical sources and photovoltaic cells and systems. At the beginning, the emphasis is on understanding the basic principle using the equivalent circuits and mathematical description. In the next section, the basic types of electrochemical sources and their technical parameters are explored separately. Similarly, students become familiar with the technology of photovoltaic cells and modules. Another chapter is devoted to the basic applications such as solar-thermal. At the end of the course, students become familiar with economical and technological implications of the combination of solar systems and electrochemical sources. | | | |
| B1B13TEP | Electrical engineering technological processes | Z,ZK | 4 |
| Technologies used in electronics, laser, and other beam technologies and IC packaging will be characterized. There will also be discussed fundamentals of winding, drying and impregnation processes. The subject is also the basis for producing single-crystal Si. Technology using plasma technology, packaging, and basic assembly technologies are also presented. | | | |
| B1B13VEZ | Manufacturing of Electronic Equipment | Z,ZK | 6 |
| (obsolete text, currently valid is czech version) Mechanical and electrical design. The electric contact. Joining of conductors. Cooling of components and equipment. Printed circuit boards fabrication. Soldering in electronics. Electromagnetic compatibility of electronic equipment. Protection of components and equipment sensitive on electrostatic field. Certification, accreditation, quality control and quality assurance. | | | |
| B1B13VVZ1 | Manufacturing of Power Devices | Z,ZK | 4 |
| The topic of the subject is focused on manufacturing of power electrical machines and devices from construction and technological point of wiev. Main part of the subject is devoted to transformers and rotating machines, namely their magnetic circuits and windings. Second half of the subject is dedicated to manufacturing of power semiconductive devices and converters including diagnostics, reliable operation. Last part of lectures deals with layouts of manufactirung, lean management and planning of manufacturing. | | | |
| B1B14ZEL1 | Fundamentals of Electrotechnical Engineering | KZ | 4 |
| The course extends necessary knowledge of creating technical documentation, including oral and written presentation of technical information. The second half of the semester is focused on explaining and practicing the basic parts of electrical engineering, so that the students' initial knowledge is increased to the level needed in the following semesters. | | | |
| B1B14ZPO | Fundametals of Electric Drives | Z,ZK | 5 |
| The course provides the basic terms and knowledge in electric drives and in the issues related to this discipline as well. The lectures are focused on the basic of electric drives logic control, continuous control and also discrete control, and on the characteristics of used controllers in practice. Further, the basic control structures of drives with DC and AC machines are explained. | | | |
| B1B14ZSP | Electric Machines and Apparatuses Basics | Z,ZK | 5 |
| The course explains the principles of machines for convertsion of mechanical energy to electrical and back. It discusses the principles of basic functions and properties of rotating and non-rotating electric machines. Following the behavior of electrical machines are discussed basic devices for protection and switching, including behavioral and switching problems. | | | |
| B1B14ZVE | Power Electronics | Z,ZK | 4 |
| The course focuses on the basic types of power semiconductor converters, which are used to change the parameters of electricity. Students are introduced to the basic principles, properties and applications of power electronic converters, their advantages, disadvantages, and fuse sizing. | | | |
| B1B15EN11 | Power Engineering 1 | Z,ZK | 5 |

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|---|---|---|---|
| B1B15EN2 | Power Engineering 2 | Z,ZK | 5 |
| B1B15VYA | Computational Applications | KZ | 4 |
| B1B16EOB | Lightning protection economy | Z,ZK | 5 |
| The subject provides an introduction to lightning discharge physics and deals with protections against their effects. Students are familiarized with the design, testing, and implementation of protections. Risk management methods for lightning damage are discussed. The course includes an excursion to the production of lightning current arresters and a real study of the effects of lightning currents in the laboratory supported by numerical simulations. | | | |
| B1B16MME | Macro and Microekonomics | Z,ZK | 5 |
| Basic economic terms, market, law of demand, law of supply, market equilibrium, price regulation, price and income elasticities, consumer's behavior, producer's behavior, cost, revenue, profit, market failure, monopoly, government macroeconomic policy, gross domestic product, multipliers, money, inflation, banking system, monetary policy, labor market, business cycle, fiscal policy, foreign trade policy, comparative advantage, CR and EU, Euro. | | | |
| B1B16PPP | Business Law | Z,ZK | 5 |
| B1B16UEE1 | Economy of Power Industry | Z,ZK | 5 |
| B1B16ZFM1 | Basics of Financial Management | Z,ZK | 5 |
| B1B16ZPU | Basics of Business Economics | KZ | 5 |
| B1B17EMP | Electromagnetic Field | Z,ZK | 5 |
| This course gets its students acquinted with principles and applied electromagnetic field theory basics. | | | |
| B1B31EOS | Electric circuits | Z,ZK | 6 |
| The subject describes fundamental methods of electrical circuit analysis. The aim is to unify different level of knowledge of students coming from schools of different categories and form the basis of knowledge necessary for next subjects. It presents the difference among physical circuit and its models, and then it presents the behavior of basic ideal circuit elements in DC circuits and in sinusoidal steady state as well as transients, caused by changes in the circuit. Acquired knowledge should, among other things, also be used for critical assessment of the results of the analysis and simulation of electrical circuits by means of software tools. | | | |
| B1B34EPS | Elektronics for Heavy-current engeneering | KZ | 4 |
| Knowledge of current basic passive and active electronic components. Structure, physical and circuit properties of components. Component behavior when working with both small and large analog, digital and optical signals. More complex circuit systems and communication technologies. Measuring the most important applications of modern semiconductor devices. | | | |
| B1B38EMA | Electrical Measurements | KZ | 5 |
| The subject is focused to fundamentals of measurement and instrumentation. Based on the principle of the methods of electrical quantities measurement (voltage, current, power, frequency, resistance, capacitance and inductance) a structure and properties of measuring instruments are explained including principles of their correct application and an accuracy estimation. Fundamentals of magnetic measurements close the course. | | | |
| B1BPROJ4 | Bachelor project | Z | 4 |
| BBAP15 | Bachelor thesis | Z | 15 |
| BEZB | Safety in Electrical Engineering for a Bachelor´s Degree | Z | 0 |
| The purpose of the safety course is to give the students basic knowledge of electrical equipment and installation as to avoid danger arising from operation of it. This introductory course contains fundamentals of Safety Electrical Engineering. In this way the students receive qualification of instructed person that enables them to work on electrical equipment. | | | |
| BEZZ | Basic Health and Occupational Safety Regulations | Z | 0 |
| The guidelines were worked out based on The Training Scheme for Health and Occupational Safety designed for employees and students of the Czech Technical University in Prague, which was provided by the Rector´s Office of the CTU. Safety is considered one of the basic duties of all employees and students. The knowledge of Health and Occupational Safety regulations forms an integral and permanent part of qualification requirements. This program is obligatory. | | | |

For updated information see http://bilakniha.cvut.cz/en/f3.html
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