# Study plan

## Name of study plan: Nuclear and Particle Physics

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Nuclear and Particle Physics
Type of study: Bachelor full-time
Required credits: 0
Elective courses credits: 180
Sum of credits in the plan: 180
Note on the plan:

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Name of the block: Compulsory courses in the program
Minimal number of credits of the block: 0
The role of the block: P

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Code of the group: BSPJCFAJ1
Name of the group: BS P_JČFBA 1st year
Requirement credits in the group: In this group you have to gain at least credits (at most 0)
Requirement courses in the group: In this group you have to complete at least 14 courses
Credits in the group: 0
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 |
|---|---|---|---|---|---|---|
| 02YELMA | **Electricity and Magnetism** | Z,ZK | 6 | 4+2 | L | P |
| 01YLAL | **Linear Algebra 1** | Z | 2 | 2P+2C | | P |
| 01YLALZ | **Linear Algebra 1, exam** | ZK | 2 | 0P+0C | | P |
| 01YLAL2 | **Linear Algebra 2** | Z,ZK | 4 | 2P+2C | | P |
| 01YMAN | **Calculus 1** | Z | 4 | 4+4 | | P |
| 01YMANZ | **Calculus 1, exam** | ZK | 4 | 0P+0C | | P |
| 01YMAN2 | **Calculus 2** | Z,ZK | 8 | 4P+4C | | P |
| 02YMECH | **Mechanics** | Z | 4 | 4+2 | Z | P |
| 02YMECHZ | **Mechanics - Examination** | ZK | 2 | - | Z | P |
| 00YPT | **Orientation Week** ***Petr Ambrož*** *Petr Ambrož (Gar.)* | Z | 2 | týden | Z | P |
| 02YTER | **Heat and Molecular Physics** | Z,ZK | 4 | 2+2 | L | P |
| 02YZM1 | **Foundations of Physical Measurements 1** | ZK | 2 | 2P+0C | Z | P |
| 02YZM2 | **Foundations of Physical Measurements 2** | KZ | 4 | 0P+4L | L | P |
| 18YZPRO | **Basics of Programming** ***Miroslav Virius*** *Miroslav Virius (Gar.)* | Z | 4 | 4C | Z | P |

**Characteristics of the courses of this group of Study Plan: Code=BSPJCFAJ1 Name=BS P_JČFBA 1st year**

| | | | |
|---|---|---|---|
| 02YELMA | Electricity and Magnetism | Z,ZK | 6 |
| Electric charge, Coulomb's law, electrostatic field, Gauss' law. Electric dipole, polarization. Conductors anddielectrics. Electric current and circuits, conductivity. Basics of the relativity theory. Electrodynamic forces,magnetic field. Magnetic dipole, magnetics. Electromagnetic induction, ac currents. Electromagnetic waves,Maxwell equations | | | |
| 01YLAL | Linear Algebra 1 | Z | 2 |
| 1. Vector space. 2. Linear dependence and independence. 3. Basis and dimension. 4. Subspaces of vector spaces. 5. Linear mappings. 6. Matrices of linear mappings. 7. Frobenius theorem. | | | |
| 01YLALZ | Linear Algebra 1, exam | ZK | 2 |
| 01YLAL2 | Linear Algebra 2 | Z,ZK | 4 |
| Outline: 1. Inverse matrix and operator. 2. Permutation and determinant. 3. Spectral theory (eigenvalue, eigenvector, diagonalization). 4. Hermitian and quadratic forms. 5. Scalar product and orthogonality. 6. Metric geometry. 7. Riesz theorem and adjoint operator. Outline of the exercises: 1. Methods for calculation of inverse matrices. 2. Methods of calculation of determinants. 3. Calculation of eigenvalues and eigenvectors. 4. Hermitian and quadratic forms. Canonical form. 5. Scalar product and orthogonality. Calculation of orthogonal complements. 6. Geometry exercises and examples. 7. Adjoint operators. | | | |

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|---|---|---|---|
| 01YMAN | Calculus 1 | Z | 4 |
| Basic calculus (real analysis, functions of one real variable, differential calculus). | | | |
| 01YMANZ | Calculus 1, exam | ZK | 4 |
| 01YMAN2 | Calculus 2 | Z,ZK | 8 |
| 1. Continuation of differential calculus: Taylor´s Polynomials, Taylor´s formula 2. Infinite series: criteria of convergence, operations on series, absolute and conditional convergence 3. Real and complex power series, the Cauchy-Hadamard theorem, expansion of function into power series, summation of infinite series. 4. Theory of integrals: primitives, definite integral (Riemann definition), techniques of integration and application of integrals, Generalized Riemann integral | | | |
| 02YMECH | Mechanics | Z | 4 |
| ntroduction to physics, physical quantities and units. Particle kinematics, basic types of motion and theirsuperposition. Particle dynamics, one-dimensional equations of motion, motion in central force field, forces innoninertial reference frames. Mechanics of system of free particles, two-body problem, collisions. Mechanics ofrigid body, rotation. Fundamentals of continuum mechanics, elasticity, hydrodynamics. Sound. | | | |
| 02YMECHZ | Mechanics - Examination | ZK | 2 |
| The content of the subject is the examination according to the plan of studies. | | | |
| 00YPT | Orientation Week | Z | 2 |
| The preparatory week is intended for incoming bachelor's students. It includes an introduction to the organizational requirements of university studies and introductory lectures for the first semester. | | | |
| 02YTER | Heat and Molecular Physics | Z,ZK | 4 |
| Thermal expansion of materials, heat transfer; stationary and non-stationary heat conduction, heat transfer and penetration; 1st and 2nd thermodynamic principle, ideal and real gas, entropy; non-chemical systems: dielectric and magnetic materials; Maxwell relations and thermodynamic potentials; kinetic theory: Maxwell's velocity distribution,equipartition theorem. | | | |
| 02YZM1 | Foundations of Physical Measurements 1 | ZK | 2 |
| The lecture is designed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however, it can be attended by students of other branches. The goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired data on a PC. Students learn the basic habits of work in a physics lab. | | | |
| 02YZM2 | Foundations of Physical Measurements 2 | KZ | 4 |
| The lecture is designed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however, it can be attended by students of other branches. The goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired data on a PC. Students learn the basic habits of work in a physics lab. | | | |
| 18YZPRO | Basics of Programming | Z | 4 |
| This course is intended mainly for students with little or no experience in programming. It familiarizes the students with the basic concepts in programming and with the Python programming language. | | | |

Code of the group: BSPJCFAJ2
Name of the group: BS P_JČFBA 2nd year
Requirement credits in the group: In this group you have to gain at least credits (at most 0)
Requirement courses in the group: In this group you have to complete at least 10 courses
Credits in the group: 0
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 |
|---|---|---|---|---|---|---|
| 02YEXF | **Experimental Physics**<br>***Barbara Antonina Trzeciak*** | ZK | 2 | 2P+0C | Z | P |
| 02YPRA1 | **Experimental Laboratory 1**<br>***Jaroslav Bielčík*** | KZ | 6 | 0+4 | Z | P |
| 02YPRA2 | **Experimental Laboratory 2**<br>***Jaroslav Bielčík*** | KZ | 6 | 0+4 | L | P |
| 01YANB3 | **Calculus B 3** | Z,ZK | 8 | 4P+4C | | P |
| 01YANB4 | **Calculus B 4** | Z,ZK | 6 | 2P+4C | | P |
| 12YNME1 | **Numerical Methods 1**<br>*Jan Vábek, Pavel Váchal* ***Pavel Váchal*** *Ivan Richter (Gar.)* | Z,ZK | 4 | 2+2 | L | P |
| 02YTEF1 | **Theoretical Physics 1**<br>*Petr Novotný, Jiří Hrivnák* ***Petr Novotný*** *Jiří Hrivnák (Gar.)* | Z,ZK | 4 | 2+2 | Z | P |
| 02YTEF2 | **Theoretical Physics 2**<br>***Petr Novotný*** | Z,ZK | 4 | 2+2 | L | P |
| 02YTSFA | **Thermodynamics and Statistical Physics** | Z,ZK | 4 | 2+2 | L | P |
| 02YVOAF | **Waves, Optics and Atomic Physics** | Z,ZK | 6 | 4+2 | Z | P |

**Characteristics of the courses of this group of Study Plan: Code=BSPJCFAJ2 Name=BS P_JČFBA 2nd year**

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|---|---|---|---|
| 02YEXF | Experimental Physics | ZK | 2 |
| The goal of this subject is to introduce the students the principles of physics measurements, their techniques, methods and instruments that are used for such measurements, and the analysis of measured data. | | | |
| 02YPRA1 | Experimental Laboratory 1 | KZ | 6 |
| Lecture is intended especially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nuclear Engineering). But it can be also attended by students interested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work with theliterature), the implementation of the measurement (acquire of different experimental procedures and routines), willteach writing the records of measurement, processing and evaluation of results. At the same time practically extendthe knowledge gained in lectures on physics. | | | |

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| 02YPRA2 | Experimental Laboratory 2 | KZ | 6 |

Lecture is intended especially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nuclear Engineering). But it can be also attended by students interested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work with theliterature), the implementation of the measurement (acquire of different experimental procedures and routines), willteach writing the records of measurement, processing and evaluation of results. At the same time practically extendthe knowledge gained in lectures on physics.

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|---|---|---|---|
| 01YANB3 | Calculus B 3 | Z,ZK | 8 |

1. Functional sequences and series - convergence range, criteria of uniform convergence, continuity, limit, differentiation and integration of functional series, power series, Series Expansion, Taylor´s theorem. 2. Ordinary differential equations - equations of first order (method of integration factor, equation of Bernoulli, separation of variables, homogeneous equation and exact equation) and equations of higher order (fundamental system, reduction of order, variation of parameters, equations with constant coefficients and special right-hand side, Euler differential equation). 3. Metric spaces - metric, norm, scalar product, neighborhood, interior and exterior points, boundary point, isolated and non-isolated point, boundary of set, completeness of space, Hilbert spaces. Orthogonal polynomials. Complete orthogonal systems. 4. Fourier series - expansion of functions into Fourier series, trigonometric Fourier series and their convergence. 5. Differential calculus of functions of several variables - limit, continuity, partial and directional derivative, gradient, total derivatives and tangent plane, Taylor series, elementary terms of vector analysis, Jacobi matrix. 6. Functions defined implicitly by one or several equations.

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|---|---|---|---|
| 01YANB4 | Calculus B 4 | Z,ZK | 6 |

[1] Diferenciální počet funkcí více proměnných a funkcionálních vektorů. [2] Funkce zadané implicitně. [3] Taylorovy řady funkce více proměnných. [4] Regulární zobrazení, záměna proměnných, nekartézské soustavy souřadnic. [5] Lokální, vázané a globální extrémy funkce více proměnných. [6] Základy teorie míry a obrys konstrukce Lebesgueovy míry. [7] Integrální počet funkce více proměnných - Riemannův a Lebesgueův integrál, základní vlastnosti, Fubiniova věta, věta o substituci. Leviho a Lebesgueova věta. Limita, spojitost a derivace integrálu podle parametru. [8] Integrály po křivkách a plochách. Integrální věty.

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|---|---|---|---|
| 12YNME1 | Numerical Methods 1 | Z,ZK | 4 |

There are explained the basic principles of numerical mathematics important for numerical solving of problems important for physics and technology. Methods for solution of tasks very important for physicists (ordinary differential equations, random numbers) are included in addition to the basic numerical methods. Integrated computational environment MATLAB is used as a principle programming language as a demonstration tool. The seminars are held in computer laboratory.

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| 02YTEF1 | Theoretical Physics 1 | Z,ZK | 4 |

The course is an introduction to analytical mechanics. The students acquire knowledge of the basic concepts of the Lagrange and Hamiltonian formalism as well as diferent approaches to description of dynamics (Newtons, Lagrange, Hamilton and Hamilton-Jacobi equations). The efficiency of these methods is illustrated on elementary examples like the two-body problem, the motion of a system of constrained mass points, and of a rigid body. Advanced parts of the course cover differential and integral principles of mechanics. The subject is the first part of the course of classical theoretical physics (02TEF1, 02TEF2).

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|---|---|---|---|
| 02YTEF2 | Theoretical Physics 2 | Z,ZK | 4 |

Tensors and transformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and classical field theory in the Minkowski space-time. Classical electrodynamics: Maxwell's equations in the Minkowski space-time, electromagnetic waves in dielectric media, electromagnetic radiation in the dipole approximation.

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|---|---|---|---|
| 02YTSFA | Thermodynamics and Statistical Physics | Z,ZK | 4 |

Foundation of thermodynamics and statistical physics. Thermodynamic potential, the Joule Thomson effect,conditions of equilibrium, the Braun-Le Chatelier principle. Statistical entropy. Basics of many body descriptionfrom a statistical point of view (classical and quasiclassical regime within the frame of a canonical and grand-canonical ensemble, Fermi gas, models of crystals and the black body radiation). The Boltzmann equation is usedto discusses simple transport phenomena.

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|---|---|---|---|
| 02YVOAF | Waves, Optics and Atomic Physics | Z,ZK | 6 |

Wave phenomena in mechanics and electromagnetism: modes, standing and travelling waves, wave packets indispersive media. Wave optics: polarization, interference, diffraction, coherence. Geometrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglie waves,the Schrodinger equation, stationary states and spectra of finite systems.

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Code of the group: BSPJCFAJ3
Name of the group: BS P_JČFBA 3rd year
Requirement credits in the group: In this group you have to gain at least credits (at most 0)
Requirement courses in the group: In this group you have to complete at least 10 courses
Credits in the group: 0
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 |
|---|---|---|---|---|---|---|
| 02BPJC1 | **Bachelor Project 1** ***Jaroslava Óbertová*** *Jaroslav Bielčík (Gar.)* | Z | 5 | 0P+5C | Z | P |
| 02BPJC2 | **Bachelor Project 2** ***Jaroslava Óbertová*** *Jaroslav Bielčík (Gar.)* | Z | 10 | 0P+10C | L | P |
| 02YDPD1 | **Detectors and Principles of Detection 1** | ZK | 2 | 2P+0C | Z | P |
| 02YDPD2 | **Detectors and Principles of Detection 2** | ZK | 4 | 4P+0C | L | P |
| 02YKM1 | **Quantum Mechanics 1** | Z,ZK | 6 | 4P+2C | Z | P |
| 02YKM2 | **Quantum Mechanics 2** | Z,ZK | 6 | 4P+2C | L | P |
| 01RMFB | **Equations of Mathematical Physics B** | Z,ZK | 5 | 2P+2C | | P |
| 02YSF | **Subatomic Physics** | Z,ZK | 6 | 4+2 | Z | P |
| 02YSF2 | **Subatomic Physics 2** ***Jaroslava Óbertová*** | Z,ZK | 6 | 4+2 | L | P |
| 02YVS1 | **Workshop 1** ***Jaroslav Bielčík*** | Z | 1 | 7D | Z | P |

**Characteristics of the courses of this group of Study Plan: Code=BSPJCFAJ3 Name=BS P_JČFBA 3rd year**

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|---|---|---|---|
| 02BPJC1 | Bachelor Project 1 | Z | 5 |

Abstract: The bachelor project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor during common regular meetings and discussions.

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|---|---|---|---|
| 02BPJC2 | Bachelor Project 2 | Z | 10 |
| Abstract: The bachelor project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor during common regular meetings and discussions. | | | |
| 02YDPD1 | Detectors and Principles of Detection 1 | ZK | 2 |
| Abstract: The lectures introduce the main forms of interaction of some particles with matter. The goal is that the student gets an overview of what type of processes are possible and in which situations they may be dominant. Some applications to Medicine and to study the fundamental structure of matter are presented. | | | |
| 02YDPD2 | Detectors and Principles of Detection 2 | ZK | 4 |
| Abstract: The lectures introduce the main ideas needed to understand how detector systems work. It will be focused on gaseous detecting principles, scintilating principles and semiconductor detecting principles. Basic information about various detector constructions is provided. | | | |
| 02YKM1 | Quantum Mechanics 1 | Z,ZK | 6 |
| Abstract: The lecture describes the birth of quantum mechanics and description of one particle and more particles by elements of the Hilbert space as well as its time evolution. Besides that it includes description of observable quantities by operators in the Hilbert space and calculation of their spectra. | | | |
| 02YKM2 | Quantum Mechanics 2 | Z,ZK | 6 |
| Abstract: The lecture expands the introduction to quantum mechanics with more general formalism of quantum theory, approximate methods and path integral. It summarizes the terminology and methods used in various applications of quantum mechanics and prepares the students for an effective scientific research and further study, in particular, of the modern formulations of quantum field theory. | | | |
| 01RMFB | Equations of Mathematical Physics B | Z,ZK | 5 |
| The subject of this course is solving integral equations, theory of generalized functions, classification of partial differential equations, theory of integral transformations, and solution of partial differential equations. | | | |
| 02YSF | Subatomic Physics | Z,ZK | 6 |
| The goal of these lectures is to present basic knowledge of particle physics. Students will become familiar with the structure of the matter, with elementary interactions and with basic laws of microcosmos. Lectures will include basics of quantum mechanics and the theory of relativity needed for the description of elementary particles behavior. Students will also become familiar with basic accelerating principles and with current particle physics experimental centers. | | | |
| 02YSF2 | Subatomic Physics 2 | Z,ZK | 6 |
| The aim of the course is to teach students the basics of physics of atomic nucleus. Students will acquire knowledgeabout the basic properties of atomic nuclei and the way they can be measured. They will learn basic models, whichdescribe the structure of the atomic nucleus and nuclear reactions. Part of the lectures is also getting familiar with thephysics of the cosmic radiation and applications of nuclear physics. | | | |
| 02YVS1 | Workshop 1 | Z | 1 |
| Abstract: Students will participate on annual Workshop JČF, where they will present results obtained during the work on their bachelor thesis. During other presentations from students and staff, they will also get familiar with scientific topics developed at the department and with methods other colleagues use for their scientific work. | | | |

Name of the block: Compulsory elective courses
Minimal number of credits of the block: 0
The role of the block: PV

Code of the group: BSSPOLVEDYAJ
Name of the group: BS - Social Sciences
Requirement credits in the group:
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 0
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 |
|---|---|---|---|---|---|---|
| 04YAPI | **Presentation Course**<br>***Jana Kovářová*** | Z | 2 | 2S | Z | PV |

**Characteristics of the courses of this group of Study Plan: Code=BSSPOLVEDYAJ Name=BS - Social Sciences**

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|---|---|---|---|
| 04YAPI | Presentation Course | Z | 2 |
| The course will prepare students for presenting issues in their field by mastering the strategies and techniques of oral presentation. The course includes discussions (expressing views, comments, agreement, disagreement). Students will be able to respond to comments on their presentation and answer questions addressed to them after the presentation, which is a skill required for the defence of the Bachelor Project. Students will learn the basic structure of a Bachelor Project and rules for writing a paper. | | | |

Code of the group: BSPJAZYKYZK
Name of the group: BS P languages
Requirement credits in the group:
Requirement courses in the group: In this group you have to complete at least 2 courses
Credits in the group: 0
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 |
|---|---|---|---|---|---|---|
| 04XAMZK | **English for Intermediate Students Examination**<br>*Jana Kovářová, Slavěna Brownová* ***Jana Kovářová*** *Jana Kovářová (Gar.)* | ZK | 4 | | Z | PV |

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| 04XAPZK | **English for Advanced Students Examination**<br>*Slavěna Brownová, Darren Copeland* ***Jana Kovářová*** *Darren Copeland (Gar.)* | ZK | 4 | | Z | PV |
| 04XCESZZK | **Czech for Foreigners Beginners - Examination**<br>*Slavěna Brownová* ***Jana Kovářová*** *Jana Kovářová (Gar.)* | ZK | 4 | | Z | PV |
| 04XCESMZK | **Czech for Intermediate Students Examination**<br>*Jana Kovářová* ***Jana Kovářová*** *Jana Kovářová (Gar.)* | ZK | 4 | | Z | PV |
| 04XCESPZK | **Czech for Foreign Students - Advanced Examination**<br>*Jana Kovářová* ***Jana Kovářová*** *Jana Kovářová (Gar.)* | ZK | 4 | | Z | PV |
| 04XFMZK | **French for Intermediate Students Examination**<br>*Věra Šlechtová* ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | ZK | 4 | | Z | PV |
| 04XFPZK | **French for Advanced Students Examination**<br>*Věra Šlechtová* ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | ZK | 4 | | Z | PV |
| 04XFZZK | **French for Beginners Examination**<br>*Věra Šlechtová* ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | ZK | 3 | | L | PV |
| 04XNMZK | **German for Intermediate Students Examination**<br>*Miloslava Čechová* ***Miloslava Čechová*** *Miloslava Čechová (Gar.)* | ZK | 4 | | Z | PV |
| 04XNPZK | **German for Advanced Students Examination**<br>*Miloslava Čechová* ***Miloslava Čechová*** *Miloslava Čechová (Gar.)* | ZK | 4 | | Z | PV |
| 04XRMZK | **Russian for Intermediate Students Examination**<br>*Zhanna Isaeva* ***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | ZK | 4 | | Z | PV |
| 04XRPZK | **Russian for Advanced Students Examination**<br>*Zhanna Isaeva* ***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | ZK | 4 | | Z | PV |
| 04XRZZK | **Russian for Beginners Examination**<br>*Zhanna Isaeva* ***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | ZK | 3 | | L | PV |
| 04XSMZK | **Spanish for Intermediate Students Examination**<br>*Beatriz Vadillo Gonzalo* ***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | ZK | 4 | | Z | PV |
| 04XSPZK | **Spanish for Advanced Students Examination**<br>*Beatriz Vadillo Gonzalo* ***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | ZK | 4 | | Z | PV |
| 04XSZZK | **Spanish for Beginners Examination**<br>*Beatriz Vadillo Gonzalo* ***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | ZK | 3 | | L | PV |

**Characteristics of the courses of this group of Study Plan: Code=BSPJAZYKYZK Name=BS P languages**

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|---|---|---|---|
| 04XAMZK | English for Intermediate Students Examination | ZK | 4 |

The course content is the examination as given by the study plan. The examination covers the AM1, AM2, and AM3 courses and consists of two parts - written (100 min) and oral (20-30 min). The student is expected to master the AM syllabus and demonstrate the ability to apply their knowledge gained in the three English courses.

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| 04XAPZK | English for Advanced Students Examination | ZK | 4 |

The course content is the examination as given by the study plan. The student is supposed to demonstrate mastering the AP3 syllabus and the ability to apply their knowledge obtained in the three AP courses. The examination consists of 2 parts - written (100 min) and oral (30 min) and includes also oral presentation of a topic from the student´s field of study.

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|---|---|---|---|
| 04XCESZZK | Czech for Foreigners Beginners - Examination | ZK | 4 |

The course content is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the 04XCESZ1,2,3 courses and can only be taken after successful completion of all three courses. Detailed information is to be obtained from the teacher.

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|---|---|---|---|
| 04XCESMZK | Czech for Intermediate Students Examination | ZK | 4 |

The course content is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the CESM1,2,3 courses and can only be taken after successful completion of the 3 courses. Detailed information is to be obtained from the teacher.

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|---|---|---|---|
| 04XCESPZK | Czech for Foreign Students - Advanced Examination | ZK | 4 |

The course content is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the CESP1,2,3 courses and can only be taken after successful completion of the 3 courses. Detailed information is to be obtained from the teacher.

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|---|---|---|---|
| 04XFMZK | French for Intermediate Students Examination | ZK | 4 |

The content is the examination as given by the study programme. The whole French programme is ended with an examination covering the contents of FM1-FM3. The examination consists of a written and oral part and is organized according to Examination Instructions, a document available on the web.

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|---|---|---|---|
| 04XFPZK | French for Advanced Students Examination | ZK | 4 |

The whole French program is ended with an examination covering the contents of FP1-FP3. The examination consists of a written and/or an oral part and is organized according to Examination Instructions, a document available on the web. Assessment of the presentation is included into the examination grading.

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|---|---|---|---|
| 04XFZZK | French for Beginners Examination | ZK | 3 |

The content is the examination as given by the study plan. The course is terminated with an examination consisting of oral and written part. The examination is ruled by the document Instruction for examination. Its content covers the levels FZ1 - FZ5.

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|---|---|---|---|
| 04XNMZK | German for Intermediate Students Examination | ZK | 4 |

The course content is the examination as given by the study plan. The whole German for Intermediate Students Course is completed by an examination consisting of two parts - written and oral, which cover the courses NM1 - NM3. The oral part follows after passing the written part successfully and after obtaining the 04NM3 assessment. More detailed information is to be obtained from the teacher.

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|---|---|---|---|
| 04XNPZK | German for Advanced Students Examination | ZK | 4 |

The course content is the examination as given by the study plan. The whole German for Advanced Students Course is completed by an examination consisting of two parts - written and oral, which cover the courses NP1 - NP3. The oral part follows after passing the written part successfully and after obtaining the 04NP3 ungraded assessment. More detailed information is to be obtained from the teacher.

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|---|---|---|---|
| 04XRMZK | Russian for Intermediate Students Examination | ZK | 4 |

The course content is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowledge and skills acquired in RM1 - RM3. Students are eligible for the oral examination only after a prior pass in RM3 and a successful written examination. Students are given instructions by the teacher.

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|---|---|---|---|
| 04XRPZK | Russian for Advanced Students Examination | ZK | 4 |

The course content is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowledge and skills acquired in RP1 - RP3. Students are eligible for the oral examination only after a prior pass in RP3 and a successful written examination. Students are given instructions by the teacher.

| | | | |
|---|---|---|---|
| 04XRZZK | Russian for Beginners Examination | ZK | 3 |
| The course content is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowledge and skills acquired in RZ1 - RZ5. Students are eligible for the oral examination only after a prior pass in RZ5 and a successful written examination. Students are given instructions by the teacher. | | | |
| 04XSMZK | Spanish for Intermediate Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. XSMZK examination consists of two parts: written and oral; to be eligible for the written part, students will have obtained non-graded assessment for course XSM3. Oral examination follows the written part. | | | |
| 04XSPZK | Spanish for Advanced Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. Examination XSPZK consists of two parts, namely oral and written. The prerequisite for admission to oral part is having passed the written test. Examination content is based on syllabi of courses XSP1, XSP2, and XSP3 or on an individual study plan of the student. | | | |
| 04XSZZK | Spanish for Beginners Examination | ZK | 3 |
| The course content is the examination as given by the study plan. Examination consists of two parts - written and oral. Student can register for oral examination only if he/she has passed the written examination test. | | | |

Name of the block: Elective courses
Minimal number of credits of the block: 0
The role of the block: V

Code of the group: BSPJCFAJV
Name of the group: BS P_JČFBA Optional courses
Requirement credits in the group: In this group you have to gain at least credits (at most 0)
Requirement courses in the group:
Credits in the group: 0
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 |
|---|---|---|---|---|---|---|
| 02YDEF1 | **History of Physics 1** | Z | 2 | 2+0 | Z | v |
| 02YDEF2 | **History of Physics 2** ***Miroslav Myška*** | Z | 2 | 2P+0C | L | v |
| 01YFKO | **Functions of Complex Variable** | Z,ZK | 3 | 2+1 | | v |
| 02YFYS1 | **Physical Seminar 1** | Z | 2 | 0+2 | Z | v |
| 00YMAM1 | **Essentials of High School Course 1** | Z | 1 | 0+1 | Z | v |
| 00MAM2 | **Essentials of High School Math Course 2** *Lukáš Heriban Lukáš Heriban (Gar.)* | Z | 1 | 0+1 | | v |
| 02NSAD1 | **Simulations and Data Analysis Tools 1** *Zdeněk Hubáček* ***Zdeněk Hubáček*** *Zdeněk Hubáček (Gar.)* | Z | 2 | 2P+0C | Z | v |
| 02NSAD2 | **Simulations and Data Analysis Tools 2** *Zdeněk Hubáček* ***Zdeněk Hubáček*** *Zdeněk Hubáček (Gar.)* | Z | 2 | 2+0 | | v |
| 18NES1 | **Neural Networks 1** *Zuzana Petříčková* ***Zuzana Petříčková*** | KZ | 5 | 2P+2C | L | v |
| 01YNME2 | **Numerical Methods 2** | KZ | 2 | 2+0 | L | v |
| 15YCH1 | **General Chemistry 1** ***Ondřej Holas*** *Petr Distler (Gar.)* | Z | 3 | 2+1 | Z | v |
| 15CH2 | **General Chemistry 2** *Petr Distler, Václav Čuba, Ondřej Holas* ***Petr Distler*** *Petr Distler (Gar.)* | Z,ZK | 3 | 2+1 | L | v |
| 01YPRST | **Probability and Statistics** | Z,ZK | 4 | 3+1 | Z | v |
| 18YPRC1 | **Programming in C++ 1** ***Miroslav Virius*** *Miroslav Virius (Gar.)* | Z | 4 | 2+2 | Z | v |
| 18YPRC2 | **Programming in C++ 2** ***Miroslav Virius*** *Miroslav Virius (Gar.)* | KZ | 4 | 2+2 | L | v |
| 02YROZ1 | **Seminar on Quark-Gluon Plasma 1** ***Jaroslav Bielčík*** | Z | 2 | 2P+0C | Z | v |
| 02YROZ2 | **Seminar on Quark-Gluon Plasma 2** ***Jaroslav Bielčík*** | Z | 2 | 2P+0C | | v |
| 02YSTR | **Special Theory of Relativity** | ZK | 2 | 2P+0C | L | v |
| TV-1 | **Physical Education** | Z | 1 | | Z | v |
| TV-2 | **Physical Education** | Z | 1 | | L | v |
| TV-3 | **Physical education** | Z | 1 | 0+2 | Z | v |
| TV-4 | **Physical education** | Z | 1 | 0+2 | L | v |
| 02YUFEC | **Introduction to Elementary Particle Physics** ***Jaroslav Bielčík*** | Z | 2 | 2+0 | Z | v |
| 17YUING | **Introduction to Engineering** *Jan Frýbort, Petr Haušild, Radek Mušálek Jan Frýbort (Gar.)* | KZ | 3 | 2P+1C | Z | v |

| | | | | | | |
|---|---|---|---|---|---|---|
| 02UKP1 | **Introduction to Curves and Surfaces**<br>*Ladislav Hlavatý Ladislav Hlavatý (Gar.)* | Z | 2 | 1P+1C | L | v |
| 02UKP2 | **Introduction to Curves and Surfaces 2**<br>*Ladislav Hlavatý Ladislav Hlavatý (Gar.)* | Z | 2 | 1P+1C | Z | v |
| 02YUKT | **Introduction to Quantum Theory** | Z | 2 | 2+0 | L | v |
| 01UP1 | **Introduction to Probability 1**<br>*Jan Vybíral* ***Jan Vybíral*** *Jan Vybíral (Gar.)* | Z,ZK | 3 | 1P+1C | | v |
| 01UP2 | **Introduction to Probability 2**<br>*Michaela Krbálková, Milan Krbálek* ***Michaela Krbálková*** *Milan Krbálek (Gar.)* | Z,ZK | 3 | 1P+1C | | v |
| 12YUNXAP | **Introduction to UNIX**<br>***Ivan Richter*** *Ivan Richter (Gar.)* | Z | 2 | 1P+1C | L | v |
| 12YVKT | **Vacuum Technology**<br>***Ivan Richter*** *Ivan Richter (Gar.)* | KZ | 4 | 2P+2L | Z | v |
| 12YPYTH | **Scientific Programming in Python**<br>***Ivan Richter*** *Ivan Richter (Gar.)* | Z | 2 | 0+2 | L | v |
| 12VTV | **Scientific and Technical Computing**<br>*Ivan Procházka* ***Ivan Procházka*** *Ivan Procházka (Gar.)* | Z | 2 | 1+1 | L | v |
| 18YZALG | **Basics of Algorithmization**<br>***Miroslav Virius*** *Miroslav Virius (Gar.)* | Z,ZK | 4 | 2+2 | L | v |
| 17YZEL | **Basics of Electronics**<br>*Martin Kropík Martin Kropík (Gar.)* | KZ | 3 | 2+2 | Z | v |
| 02ZSM | **Introduction to the Standard Model**<br>*Zdeněk Hubáček* ***Zdeněk Hubáček*** *Zdeněk Hubáček (Gar.)* | ZK | 2 | 2+0 | | v |

**Characteristics of the courses of this group of Study Plan: Code=BSPJCFAJV Name=BS P_JČFBA Optional courses**

| | | | |
|---|---|---|---|
| 02YDEF1 | History of Physics 1 | Z | 2 |

Physics and its place in the system of sciences. The relationship of man and nature. Natural sciences in ancient Orientand Greece, Greek natural philosophers, Aristotle. Physics in Helenistic period, Archimed. Arabic science, European science in Middle Ages. Renaissance - da Vinci, Giordano Bruno. Copernicus, Kepler, Galileo, Huygens. The birth of physics as experimental science. Newton and his work.

| | | | |
|---|---|---|---|
| 02YDEF2 | History of Physics 2 | Z | 2 |

Development of classical mechanics after Newton, Bernoulli's, Euler, Lagrange. Historical development of optics, corpuscular and wave approach. Electricity and magnetism - electrostatics, galvanism, electrodynamics and electromagnetism, Faraday and Maxwell. Thermodynamics and its laws, statistical physics, Boltzmann. The birth of modern quantum and relativistic physics, Planck and Einstein. Discovery of radioaktivity, structure of atom, atomic nucleus, Rutherford and Bohr. The way to nuclear energy, Elementary particles, standard model. The concept of Nature and Universe of today.

| | | | |
|---|---|---|---|
| 01YFKO | Functions of Complex Variable | Z,ZK | 3 |

The course starts from outlining the Jordan curve theorem and the Riemann-Stieltjes integral. Then basic results of complex analysis in one variable are explained in detail: the derivative of a complex function and the Cauchy-Riemann equations, holomorphic and analytic functions, the index of a point with respect to a closed curve, Cauchy's integral theorem, Morera's theorem, roots of a holomorphic function, analytic continuation, isolated singularities, the maximum modulus principle, Liouville's theorem, the Cauchy estimates, Laurent series, residue theorem.

| | | | |
|---|---|---|---|
| 02YFYS1 | Physical Seminar 1 | Z | 2 |

The seminar is devoted to detailed study of interesting physical problems. It should help students to deeper understanding of fundamentals of physics presented in the course of Mechanics. The problems are chosen, studied and presented by the students themselves, with the possibility to use PC and physical laboratory equipments.

| | | | |
|---|---|---|---|
| 00YMAM1 | Essentials of High School Course 1 | Z | 1 |

Students are introduced to mathematical concepts and methods used in the introductory physics course.

| | | | |
|---|---|---|---|
| 00MAM2 | Essentials of High School Math Course 2 | Z | 1 |

Review of basics of high school mathematics.

| | | | |
|---|---|---|---|
| 02NSAD1 | Simulations and Data Analysis Tools 1 | Z | 2 |

Data analysis and simulations of high energy elementary particle collisions. ROOT and Pythia programs.

| | | | |
|---|---|---|---|
| 02NSAD2 | Simulations and Data Analysis Tools 2 | Z | 2 |

Individual work will include implementation and testing of a program for generating of particle collision. Results are reviewed.

| | | | |
|---|---|---|---|
| 18NES1 | Neural Networks 1 | KZ | 5 |

The aim of the course "Neural Networks 1" is to acquaint students with basic models of artificial neural networks, algorithms for their learning, and other related machine learning techniques. The goal is to teach students how to apply these models and methods to solve practical tasks.

| | | | |
|---|---|---|---|
| 01YNME2 | Numerical Methods 2 | KZ | 2 |

The course is devoted to numerical solution of boundary-value problems and intial-boundary-value problems for ordinary and partial differential equations. It explains methods converting boundary-value problems to initial-value problems and finite-difference methods for elliptic, parabolic and first-order hyperbolic partial differential equations.

| | | | |
|---|---|---|---|
| 15YCH1 | General Chemistry 1 | Z | 3 |

The most important concepts, quantities and units used in chemistry are introduced in the course General Chemistry I. Their significance and practical use are illustrated by examples solved in exercises.

| | | | |
|---|---|---|---|
| 15CH2 | General Chemistry 2 | Z,ZK | 3 |

The subject is the continuation of the course General chemistry I. The main attention is paid to general principles governing chemical processes. Using various examples, the fact that the validity of these principles is not restricted only to chemical processes is documented. The significance and practical use of explained principles are illustrated by examples solved in exercises.

| | | | |
|---|---|---|---|
| 01YPRST | Probability and Statistics | Z,ZK | 4 |

It is a basic course of probability theory and mathematical statistics. The probability theory is build gradually beginning with the classical definition and continuing till the Kolmogorov definition. The notions as random variable, distribution function of random variable and characteristics of random variable are treated and basic limit theorems are stated and proved. On the basis of this theory the basic methods of mathematical statistics such as estimation of distribution parameters and hypothesis testing are explained.

| | | | |
|---|---|---|---|
| 18YPRC1 | Programming in C++ 1 | Z | 4 |

This course covers mainly the C programming language and non-object oriented features of the C++ language.

| | | | |
|---|---|---|---|
| 18YPRC2 | Programming in C++ 2 | KZ | 4 |

This course covers the object oriented programming and othesr advanced constructs in the C+;+ programming language and the Standard Template Library.

| | | | |
|---|---|---|---|
| 02YROZ1 | Seminar on Quark-Gluon Plasma 1 | Z | 2 |
| The aim of the seminar is discuss the selection of the most fundamental articles in heavy ion physics. Students participate on the seminar by preparing the presentation about selected papers. | | | |
| 02YROZ2 | Seminar on Quark-Gluon Plasma 2 | Z | 2 |
| The aim of the seminar is discuss the selection of the most fundamental articles in heavy ion physics. Students participate on the seminar by preparing the presentation about selected papers. | | | |
| 02YSTR | Special Theory of Relativity | ZK | 2 |
| Students extend their knowledge of classical, non-quantum mechanics of the special theory of relativity fundamentals. | | | |
| TV-1 | Physical Education | Z | 1 |
| TV-2 | Physical Education | Z | 1 |
| TV-3 | Physical education | Z | 1 |
| TV-4 | Physical education | Z | 1 |
| 02YUFEC | Introduction to Elementary Particle Physics | Z | 2 |
| The course provides an easily accessible introduction to elementary particle physics. Development, methods, goals and perspectives of the subject are presented. | | | |
| 17YUING | Introduction to Engineering | KZ | 3 |
| This course provides introduction to engineering skills. Students should gain general engineering skills at basic level (e.g. material properties and behavior, basics of manufacturing and production, quality assurance, environmental impacts,). In addition, the introduction to scientific work and technical drawing will be included. | | | |
| 02UKP1 | Introduction to Curves and Surfaces | Z | 2 |
| The goal of the lecture is an introduction to the differential geometry of simple manifolds - curves and two-dimensional surfaces. The basic concepts for the curves are introduced Frenets formulae are explained. In the surface theory we introduce first and second fundamental forms and mean and Gaussian curvature. Essential part of the lecture are the examples calculated by students. | | | |
| 02UKP2 | Introduction to Curves and Surfaces 2 | Z | 2 |
| The lecture extends the course 02UKP1. The properties of the first fundamental form are briefly summarized. The concept of the second fundamental form is introduced, leading to the mean and Gaussian curvature. Finally, the usual concepts of Riemann geometry are introduced. | | | |
| 02YUKT | Introduction to Quantum Theory | Z | 2 |
| The aim of the lecture is to introduce the basic principles of quantum theory and its interpretation on simple examples. | | | |
| 01UP1 | Introduction to Probability 1 | Z,ZK | 3 |
| 1.Random trial with finite set of possible results, classical probability, independent random events 2.Probability and combinatorics 3.Probability and geometry, Bertrands paradox 4.Conditional probability, Bayes theorem, medical diagnosis, Simpsons paradox 5.Random variable with discrete state space, its distribution and mean value 6.Problems involving the calculation of mean value 7.Probabilistic method in graph theory 8.Random algorithms, Morris algorithm and its variants | | | |
| 01UP2 | Introduction to Probability 2 | Z,ZK | 3 |
| 1. One-dimensional continuous random variable and its statistical description. 2. Distribution function and probability density. 3. Axiomatic introduction of probability and connection to measure theory. 4. Numerical characteristics of continuous random variables. 5. Selected variants of continuous distributions and their characteristics. 6. Elementary methods for point estimations. 7. Generating pseudorandom numbers from the selected distribution. | | | |
| 12YUNXAP | Introduction to UNIX | Z | 2 |
| Computer and operating systems. Personal computer, workstation and supercomputers. Processor, memory, bus, devices, hard disk, network interface. Hardware and software. Principles of operating systems. Operating system UNIX. Basic principles, kernel, kernel services. Documentation. File system, file atributes, working with files. Text editors: vi, emacs. Command interpreter (shell) bash and its programming (scripts). Controlling processes, process status, computer load a process priorities. Standard tools. Graphical user interface X-windows. Computer networks. Local computer networks. Global computer networks. Addresses and protocols TCP/IP. Network configutation of a computer. Network services: hardware sharing, mail, scp, etc. Network applications | | | |
| 12YVKT | Vacuum Technology | KZ | 4 |
| Rarefied gasses: basic concepts and relations; diffusion,flow of rarefied gases. Flow and current of gas, conductivity. Interaction of gas with solid surface; sorption, desorption; gas transport through solid matter; evaporation, condensation;Vacuum generation: Pumping proces, Ultimative pressure, Pumping speedPumps and their properties:-Positive displacement pumps: Diaphragm, Sliding vane rotary, Diffusion, Molecular, Roots, Molecular and Turbomolecular pumps. Sorption pumps: Cryopumps, Cryo-Adsorption pumps, Sublimation and NEG pumps, Ion getter pumps..Vacuum measurements: vacuum gauges of total and partial pressure; pumping speed; gas flow, search for leaks. Materials and vacuum components and seals.Practical exercises. | | | |
| 12YPYTH | Scientific Programming in Python | Z | 2 |
| The aim of this course is to learn the fundamentals of the modern Python programming language with a focus on scientific computing. Emphasis is placed on effective solutions to real problems. The course is performed in an interactive form of practical exercises, whose topics can be tailored to the content of other subjects or student theses. Students are also involved in ongoing research. In the introductory part of the course, students learn the basic features of Python?from basic types to object oriented or functional programming. The greater part of the course focuses on specific features of Python for scientific programming. Presented are the main numerical libraries NumPy, SciPy and the Matplotlib graphics library. We show how to generate efficient code, how to combine Python with other languages, what tools are available. | | | |
| 12VTV | Scientific and Technical Computing | Z | 2 |
| The students get familiar with methods of solving of computational problems in the scientific and technical practice, and with methods of their programming. The course is oriented mainly to programming in the Fortran language. | | | |
| 18YZALG | Basics of Algorithmization | Z,ZK | 4 |
| This course is devoted to selected algorithms and methods for algorithm design. This course intruduces selected methods for the determination of the algorithm complexity. | | | |
| 17YZEL | Basics of Electronics | KZ | 3 |
| Lectures provide basic information of electronics. In the beginning, lectures are devoted to passive components - resistors, capacitors, inductors and solution of electrical circuits with them. Next, lectures deal with semiconductor components (standard, Zener, capacitive, LED), bipolar, unipolar transistors and semiconductor components with more layers (thyristors and triacs). Lectures continue with general amplifiers and operational amplifiers. Finally, lectures deal with digital circuits, digital/analog and analog/digital converters. Lectures are completed with electronic laboratory exercises. | | | |
| 02ZSM | Introduction to the Standard Model | ZK | 2 |
| Particles, leptons, hadrons, baryons, mesons, symmetry, symmetry group, quarks, gluons, partons, standard model of electroweak and strong interactions, quantum chromodynamics (QCD), cross section, scattering cross section. | | | |

Code of the group: BSPJAZYKYZAP
Name of the group: BS P jazyky zap
Requirement credits in the group:
Requirement courses in the group:

Credits in the group: 0
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 |
|---|---|---|---|---|---|---|
| 04XAM1 | **English for Intermediate Students M1** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XAM2 | **English for Intermediate Students M2** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XAM3 | **English for Intermediate Students M3** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XAP1 | **English for Advanced Students P1** ***Jana Kovářová*** *Darren Copeland (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XAP2 | **English for Advanced Students P2** ***Jana Kovářová*** *Darren Copeland (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XAP3 | **English for Advanced Students P3** ***Jana Kovářová*** *Darren Copeland (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XCESZ1 | **Czech for Foreigners - Beginners 1** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XCESZ2 | **Czech for Foreigners - Beginners 2** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XCESZ3 | **Czech for Foreigners - Beginners 3** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 2S | Z | v |
| 04XCESM1 | **Czech for Foreigners - Intermediate 1** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XCESM2 | **Czech for Foreigners - Intermediate 2** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XCESM3 | **Czech for Foreigners - Intermediate 3** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XCESP1 | **Czech for Foreign Students - Advanced 1** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XCESP2 | **Czech for Foreigners - Advanced 2** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XCESP3 | **Czech for Foreigners - Advanced 3** ***Jana Kovářová*** *Jana Kovářová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XFM1 | **French for Intermediate Students M1** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XFM2 | **French for Intermediate Students M2** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XFM3 | **French for Intermediate Students M3** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XFP1 | **French for Advanced Students P1** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XFP2 | **French for Advanced Students P2** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XFP3 | **French for Advanded Students P3** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XFZ1 | **French for Beginners Z1** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+4 | L | v |
| 04XFZ2 | **French for Beginners Z2** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+4 | Z | v |
| 04XFZ3 | **French for Beginners Z3** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+4 | L | v |
| 04XFZ4 | **French for Beginners Z4** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+4 | Z | v |
| 04XFZ5 | **French for Beginners Z5** ***Věra Šlechtová*** *Věra Šlechtová (Gar.)* | Z | 2 | 0+4 | L | v |
| 04XNM2 | **German for Intermediate Students M2** ***Miloslava Čechová*** *Miloslava Čechová (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XNM1 | **German for Intermediate Students M1** ***Miloslava Čechová*** *Miloslava Čechová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XNM3 | **German for Intermediate Students M3** ***Miloslava Čechová*** *Miloslava Čechová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XNP1 | **German for Advanced Students P1** ***Miloslava Čechová*** *Miloslava Čechová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XNP2 | **German for Advanced Students P2** ***Miloslava Čechová*** *Miloslava Čechová (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XNP3 | **German for Advanced Students P3** ***Miloslava Čechová*** *Miloslava Čechová (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XRM1 | **Russian for Intermediate Students M1** ***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XRM2 | **Russian for Intermediate Students M2** ***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+2 | L | v |

| | | | | | | |
|---|---|---|---|---|---|---|
| 04XRM3 | **Russian for Intermediate Students M3**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XRP1 | **Russian for Advanced Students P1**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XRP2 | **Russian for Advanced Students P2**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XRP3 | **Russian for Advanced Students P3**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XRZ1 | **Russian for Beginners Z1**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+4 | L | v |
| 04XRZ2 | **Russian for Beginners Z2**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+4 | Z | v |
| 04XRZ3 | **Russian for Beginners Z3**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+4 | L | v |
| 04XRZ4 | **Russian for Beginners Z4**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+4 | Z | v |
| 04XRZ5 | **Russian for Beginners Z5**<br>***Zhanna Isaeva*** *Zhanna Isaeva (Gar.)* | Z | 2 | 0+4 | L | v |
| 04XSM1 | **Spanish for Intermediate Students M1**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XSM2 | **Spanish for Intermediate Students M3**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XSM3 | **Spanish for Intermediate Students M3**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XSP1 | **Spanish for Advanced Students P1**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XSP2 | **Spanish for Advanced Students P2**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+2 | L | v |
| 04XSP3 | **Spanish for Advanced Students P3**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+2 | Z | v |
| 04XSZ1 | **Spanish for Beginners Z1**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+4 | L | v |
| 04XSZ2 | **Spanish for Beginners Students Z2**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+4 | Z | v |
| 04XSZ3 | **Spanish for Beginners Z3**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+4 | L | v |
| 04XSZ4 | **Spanish for Beginners Z4**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+4 | Z | v |
| 04XSZ5 | **Spanish for Beginners Z5**<br>***Beatriz Vadillo Gonzalo*** *Beatriz Vadillo Gonzalo (Gar.)* | Z | 2 | 0+4 | L | v |

**Characteristics of the courses of this group of Study Plan: Code=BSPJAZYKYZAP Name=BS P jazyky zap**

| | | | |
|---|---|---|---|
| 04XAM1 | English for Intermediate Students M1 | Z | 2 |

The course is designed for students who have successfully completed the full secondary school English language course at least at the A2 level of the Common European Framework of Reference for Languages (CEFR). It provides an introduction into English for Specific and Academic Purposes (ESP, EAP), i.e., into fundamentals of vocabulary and style typical of professional oral and written communication situations. Thus it covers topics related to the student´s life and needs as well as topics of subtechnical interest. Attention is also paid to extending the knowledge of grammar issues used in EAP.

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| 04XAM2 | English for Intermediate Students M2 | Z | 2 |

The AM2 course expects the student to have completed the AM1 course. It develops their skills for work with subtechnical texts, focusing also more on specific grammar, functions, and lexical items typical of ESP and EAP (e.g., definition, existence and classification of phenomena, object descriptions). Part of the course is also guided writing. If necessary, grammar revision is included.

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|---|---|---|---|
| 04XAM3 | English for Intermediate Students M3 | Z | 2 |

The course develops the skills that enable students to cope with features typical of professional style. Increasing attention is paid to developing subtechnical vocabulary and independent understanding of professional texts. Great emphasis is placed on distinguishing different levels of formal and informal oral and written communication and their appropriate Czech equivalents. The course also includes studying abstracts and rules for writing them as well as basic rules for preparing and giving a short presentation on a chosen topic related to the student´s field.

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|---|---|---|---|
| 04XAP1 | English for Advanced Students P1 | Z | 2 |

The course is designed for students who have successfully completed the full secondary school English language course (at least the B1 level of the Common European Framework of Reference for Languages - CEFR). It provides an introduction into English for Specific and Academic Purposes (ESP, EAP), i.e., into the fundamentals of vocabulary, functions, grammar, and style typical of professional oral and written communication situations (fundamentals of terms in mathematics and physics, definitions, graph descriptions, etc). It also covers professional oral and written communication on topics related to the undergraduate´s life and needs. It develops skills for free professional writing (writing a CV, letter of application, polite request). If necessary, revision of selected grammar topics is included.

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| 04XAP2 | English for Advanced Students P2 | Z | 2 |

The AP2 course is based on AP1, thus extending the student´s skills for working with subtechnical texts, and even with professional texts of chosen branches of science. According to the students´ needs it concentrates on chosen grammar topics, but mainly intends to develop understanding of syntactic structures and typical rhetorical functions (e.g., various types of descriptions, and, if possible, a case study). Increasing emphasis is placed on the undergraduate´s independent work with and reading of linguistically more demanding materials. The course extends the student´s subtechnical vocabulary, and includes fundamental notions of chosen branches of science. It is focused on formal writing including the sentence and paragraph structure, linking, cohesion and coherence in texts.

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| 04XAP3 | English for Advanced Students P3 | Z | 2 |

The AP3 course is based on AP2 and expects the student to work without any guidance with authentic professional materials and to interpret the text. It includes training oral and written communication skills and functions (e.g., expressing an opinion, agreement, and objections; taking part in discussion, note-taking; summarizing, writing an abstract) and, if possible, also preparing a project on a given or chosen topic and presenting it. The course places emphasis on distinguishing levels of formal and informal language both in oral and written communication.

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|---|---|---|---|
| 04XCESZ1 | Czech for Foreigners - Beginners 1 | Z | 2 |
| The course is designed for students of the English programme. Students will become acquainted with the main characteristics of Czech (phonetic and grammar features) and they will acquire basic language and speaking skills. The course focuses on pronunciation exercises, simple social phrases, and oral and written communication in the most common everyday situations. The course covers roughly lessons 1-3 of Čeština Express (Czech Express) by L. Holá and P. Bořilová. | | | |
| 04XCESZ2 | Czech for Foreigners - Beginners 2 | Z | 2 |
| The language and communication competences acquired in CESZ1 are further developed. Students deepen their knowledge of the declension and conjugation system and practise basic communication topics. The course covers roughly lessons 3-5 in Czech Express by L. Holá and P. Bořilová. | | | |
| 04XCESZ3 | Czech for Foreigners - Beginners 3 | Z | 2 |
| The course further develops the language and communication competences acquired in the XCESZ1 and XCESZ2 courses. The teaching focuses on building up basic vocabulary, fixing correct pronunciation and deepening grammar, features through practice, as well as introducing the Czech culture. Students are asked to produce simple texts and they practise frequent types of dialogue. They also practise understanding texts in terms of main ideas or looking for specific details in texts. The course covers roughly lessons 5-7 in Čeština expres 1. | | | |
| 04XCESM1 | Czech for Foreigners - Intermediate 1 | Z | 2 |
| The course is focused on correct pronunciation, important morphological phenomena, prepositional phrases, and verb forms as well as on extending the student´s vocabulary for various social situations. | | | |
| 04XCESM2 | Czech for Foreigners - Intermediate 2 | Z | 2 |
| The course develops the topics covered in CESM1 and is then focused on more difficult grammar phenomena. It practices writing, speaking, and reading skills and trains the student in understanding common abbreviations, abbreviated words, and mathematical terms and formulas. | | | |
| 04XCESM3 | Czech for Foreigners - Intermediate 3 | Z | 2 |
| The last course revises morphological topics covered earlier and extends the student´s knowledge of more difficult language phenomena. It is especially focused on stylistics and lexicology and on developing the student´s writing skills. | | | |
| 04XCESP1 | Czech for Foreign Students - Advanced 1 | Z | 2 |
| The prerequisite of the course is very good knowledge of the Czech language, i.e., communicative competences at least at level B2 of the Common European Framework of Reference. It is focused partly on revision of standard language structures, but mainly on practising more complex grammatical structures typical of the style of science. Students are taught the basics of functional style of engineering and professional communication, both in spoken and written form. The topics include University Studies and Student Life. Written practice includes communication with teachers and faculty administrators. | | | |
| 04XCESP2 | Czech for Foreigners - Advanced 2 | Z | 2 |
| This course extends the student´s knowledge acquired in CESP1 and focuses on difficult language phenomena. It practises working with technical and specialist texts placing greater emphasis on individual work. | | | |
| 04XCESP3 | Czech for Foreigners - Advanced 3 | Z | 2 |
| The course develops the student´s knowledge from CESP2. It includes working with authentic specialist materials, their interpretation and presentation, and, finally, presentation of the student´s project. Writing skills necessary for professional communication are trained. | | | |
| 04XFM1 | French for Intermediate Students M1 | Z | 2 |
| French - intermediate FM The objective of this three-semester course is to improve and further develop communication in the French language in both written and oral form. Students will be able to communicate in social interaction and in academic, scientific and professional environment. They will be able to use the language to transmit general and technical information and to solve problems. FM1 The course builds on and further develops linguistic competence acquired at secondary school. It revises, systemizes and expands language skills gained in previous study. The following topics are covered: University studies in our country and in France, writing of transactional letters, CV, personal statement, request, answer to an advert, French culture and geography, Paris. Topics of specialization: mathematics, physics. Reading technical and popular science texts, work based on these texts. | | | |
| 04XFM2 | French for Intermediate Students M2 | Z | 2 |
| Course FM2 builds on FM1. Linguistic structures and competence acquired in previous study are systemized and expanded. Reading popular science texts, features typical for technical and scientific language (passives, nominalization, word formation). Topics: physics, power engineering, environment, Internet, success of French science and technology, French scientists, artists and architects. Description of an object, device, shapes, dimensions, material. | | | |
| 04XFM3 | French for Intermediate Students M3 | Z | 2 |
| The course is focused on improvement and further development of linguistic competence acquired during the follow-up courses. Syntactic structures (subordinate and infinitive clauses, participle structures, compound tenses). Text summary. -Students prepare a written paper which will be delivered in form of an oral presentation in-class. The paper is linked to the field of students´ future specialisation or to their interest and generally covers a technical /applied science topic. It is not a translation but a creative work compiled from French articles and one´s own knowledge/experience. -Longer monologues on topics /situations set for the examination are prepared. Text structure, cohesion and coherence. | | | |
| 04XFP1 | French for Advanced Students P1 | Z | 2 |
| FP advanced course The objective of this three-semester course is to improve and further develop communication in the French language in both written and oral form. Students will be able to communicate in social interaction and in academic, scientific and work environment. They will be able to use the language to transmit general and technical information and to solve problems. FP1 The course builds on and further develops linguistic competence acquired at secondary school. Difficult grammar topics are repeated and expanded: subjonctif, passé composé-imparfait, pronouns. The following specific topics are covered: University studies in our country and in France, writing of transactional letters, CV, personal statement, request, answer to an advert, environmental issues, success of French science and technology, chosen topics from French regional culture, Paris. Topics of specialization: mathematics, internet, physics, chemistry. Reading of technical and popular science texts, further work with these texts and interpretation. | | | |
| 04XFP2 | French for Advanced Students P2 | Z | 2 |
| With the link to P1 contents, the course further develops language skills. Focus is put on reading popular science texts and on oral communication on given topics. Features typical of technical and scientific communication are stressed (passive voice, nominalization, word formation). | | | |
| 04XFP3 | French for Advanded Students P3 | Z | 2 |
| The course is focused on systemization and improvement of acquired linguistic competence, skills and knowledge, and their use for communication in engineering environment. Special skill - translation of shorter texts (both from and into the language). Writing of a paper and making oral presentation in-class. The paper generally covers a technical /applied science topic. It is a creative work compiled from 3 French sources. Preparation of several set topics for oral examination. | | | |
| 04XFZ1 | French for Beginners Z1 | Z | 2 |
| French for beginners The objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life , in socializing and in professional life. The course includes French for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able to communicate at elementary level, actively using the knowledge of chosen elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbook Pravda - Pravdová, French for beginners (Francouzština pro začátečky). It is extended with situations of communication and functions from the textbook Espaces I, lessons 1-4 : introductions, personal information, asking and giving the directions, simple instructions and questions. Special attention is paid to pronunciation. Spelling is explained in connection with pronunciation and grammar. | | | |
| 04XFZ2 | French for Beginners Z2 | Z | 2 |
| The course is linking up with FZ1. Elementary linguistic knowledge and communication skills are expanded. The scope is given by lessons 8 - 13 of the textbook: Pravda - Pravdová : French for Beginners . Additional topics and skills are filled in from the textbook Espaces I, lesson 1 - 5 (introductions, invitation, welcoming, agreement - disagreement, apology, thanking, travelling, map of France, food, expression of will, wish, order, prohibition, pleasure). Correct pronunciation is practiced. Stress on oral communication. Specific topics covered: How does the machine work? A few expressions concerning the study. Name of University and Faculty. | | | |

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| 04XFZ3 | French for Beginners Z3 | Z | 2 |
| The course builts upon FZ2. Basic linguistic knowledge and skills are developed. The contents is given by lessons 14 - 18 of the textbook: Pravda - Pravdová: French for Beginners. Topics, functions and situations are complemented from other materials. Stress is put on oral communication in dialogues and on reading, both for information and loud as part of pronunciation practice. Reading covers short adapted texts of general interest first, and later popular science texts. | | | |
| 04XFZ4 | French for Beginners Z4 | Z | 2 |
| The course builds up on FZ3. Basic linguistic knowledge and skills are further developed. Oral communication and reading skills are practiced. The contents is roughly covered with lessons 19 - 23 of the textbook French for Beginners, and is expanded with topics and functions from other materials. Reading is developed from the lecture notes French for Engineering Students of FJFI. The course covers generals and specific topics: health- illness, sport, free time, environment, study, travelling in France, Paris, shopping, weather, university in our country and in France, how to write CV, application, topics in mathematics, reading physics - mechanics, informatics, internet. | | | |
| 04XFZ5 | French for Beginners Z5 | Z | 2 |
| All four skills acquired in FZ4 are further developed, as well as technical language. Students prepare a paper on a chosen popular science topic. They present it orally in the class. The general contents is covered by lessons 24 - 26 of the textbook: Pravda-Pravdova, French for Beginners, and is complemented from other materials. Topics: on physics from lecture notes, success of French science and technology, information about France. Grammar is systemized and complemented with syntax (subordinate clauses, typical conjunctions, subjunctive clauses, gerund, passive. | | | |
| 04XNM2 | German for Intermediate Students M2 | Z | 2 |
| The course introduces other more complex grammatical structures and their application in communication based on technical texts, such as the relation between technology and society, the world at the beginning of the 21st century, linguistically more demanding texts on the environment, the language of mathematics, computers and car technology etc. Students practise reading for information and reading aloud, and appropriate language for various purposes in oral and written communication. The course systematically revises other grammatical phenomena important for professional discourse (participles, relative clauses). | | | |
| 04XNM1 | German for Intermediate Students M1 | Z | 2 |
| The objective of the course is to level off the students´ skills in the German language. The course focuses on revision of more difficult phenomena and structures (e.g. the passive) and word formation processes (e.g. importance of verb prefixes). In the lexical part, it covers topics referring to higher education in both the Czech Republic and Germany, current environmental issues together with all necessary expressions and phrases, expressions and phrases needed to chemists, mathematicians, physicists, and the fundamentals of IT terminology. It develops communication on related topics and is aimed at correct pronunciation, grammatical correctness and understandability. | | | |
| 04XNM3 | German for Intermediate Students M3 | Z | 2 |
| The course introduces other more complex grammatical structures and their application in communication based on technical texts, such as the relation between technology and society, the world at the beginning of the 21st century, linguistically more demanding texts on the environment, the language of mathematics, computers and car technology etc. Students practise reading for information and reading aloud, and appropriate language for various purposes in oral and written communication. The course systematically revises other grammatical phenomena important for professional discourse (participles, relative clauses). | | | |
| 04XNP1 | German for Advanced Students P1 | Z | 2 |
| This course requires good grammar knowledge, extended general vocabulary, and good communication skills acquired at secondary school to be levelled off at the beginning of the course. The course is then focused on working with technical and scientific texts and practising reading techniques (skimming, scanning, reading for detail). It revises and develops more difficult grammar structures necessary for understanding a subtechnical text (passive voice, participles, participle structures) and it also focuses on practical everyday communication, i.e., telephoning. | | | |
| 04XNP2 | German for Advanced Students P2 | Z | 2 |
| The course develops the students' skills in working with professional scientific texts (understanding, summarising, note-taking, interpreting) while extending their general and subtechnical vocabulary range. It introduces mathematical expressions and texts of nuclear power engineering. Increasing emphasis is placed on understanding and practising formal communication, both written and oral (CV, letter of application, interview, scholarship), and more complex grammatical structures (i.e., subjunctive, indirect speech). | | | |
| 04XNP3 | German for Advanced Students P3 | Z | 2 |
| The course consists of 3 main parts (general communicative situations, grammar and technical topics). Students will develop their vocabulary in a variety of less common situations (traffic problems and car accidents, accident report, filling in a form, complaints). Based on presentations and technical and subtechnical texts, the vocabulary range in fields such as nuclear power engineering, the environment, computer science, and car technology, will also be extended. Only authentic professional texts are used. By means of a presentation, students are trained to process information gained from their reading of complex and difficult texts and present it to the class in a simplified oral form. The course also includes translation practice to and from German. | | | |
| 04XRM1 | Russian for Intermediate Students M1 | Z | 2 |
| The course is designed for students with previous knowledge of Russian from secondary schools. Students are supposed to know the Russian alphabet (both printed and handwritten), basic vocabulary for communication in everyday situations (introductions, socializing, greetings, shopping for food and objects of everyday need, asking the way and giving directions), they can use basic grammar structures (verbal and nominal forms, irregular verbs, pronouns). The initial knowledge corresponds to the achievement level of the RZ2 course. The contents and scope of the course correspond approximately to the RZ3 course, but for half of the time allotted in the timetable. | | | |
| 04XRM2 | Russian for Intermediate Students M2 | Z | 2 |
| The course is based on the RM1 course, its contents and scope correspond roughly to RZ4, however, for half of the time allotted in the timetable. | | | |
| 04XRM3 | Russian for Intermediate Students M3 | Z | 2 |
| The course develops the knowledge and skills acquired in RM1 and RM2 and its contents and scope are roughly at the same level as those of RZ5, however, for half of the time allotted in the timetable. | | | |
| 04XRP1 | Russian for Advanced Students P1 | Z | 2 |
| The entrance requirement for the course is to achieve the B1 CEFR level. The objective of the course is revision of standard language structures, practicing more difficult grammar structures, understanding the fundamentals of technical language and training writing skills. | | | |
| 04XRP2 | Russian for Advanced Students P2 | Z | 2 |
| The course is based on RP1. It expands grammatical structures important for understanding technical texts (verbal adjectives, participles, passives, verb aspects, specific syntactic structures). Stress is put on independent oral and written communication. | | | |
| 04XRP3 | Russian for Advanced Students P3 | Z | 2 |
| The course is based on RP2 and is mainly focused on working with technical and scientific texts (reading comprehension, oral and written paraphrasing, translation). The RP1 - RP3 courses require good previous knowledge of general language at secondary level (listening, reading, correct communication in everyday situations). The courses develop and expand these skills. Further study is aimed at professional and technical skills (reading technical literature according to the students´ specialization, oral and written interpretation). Students develop their subtechnical vocabulary and practice quick and correct communication in professional situations. They will be able to both speak write accurately and with confidence on technical topics. | | | |
| 04XRZ1 | Russian for Beginners Z1 | Z | 2 |
| The course represents the first stage of the five-semester programme, its final aim being reading and understanding professional texts written in Russian. Thus it begins with mastering the Russian alphabet (for both reading and writing skills) and fundamentals of grammar necessary for everyday communication (listening and speaking). Students will be able to read a short text with marked stress, understand its contents and summarize it. | | | |

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| 04XRZ2 | Russian for Beginners Z2 | Z | 2 |
| The second semester of the programme is designed to teach skills for basic communication in everyday situations and for reading easy and short subtechnical texts. Students will be able to communicate using short sentences and appropriate structures, and read aloud with confidence a short text without marked stress. They will also develop their vocabulary and master further grammatical structures. They will have mastered with confidence the Russian alphabet and will be able to use it in writing. | | | |
| 04XRZ3 | Russian for Beginners Z3 | Z | 2 |
| The course is based on RZ2 and includes further everyday topics, develops understanding of short compact texts on new subtechnical topics (for training various forms of reading skills and listening) and introduces new grammar. Students will be trained to distinguish intonation patterns while listening to spoken language. They will be able to respond so as to be understood, and to express their opinion. Writing skills will be trained on guided writing tasks and note-taking. | | | |
| 04XRZ4 | Russian for Beginners Z4 | Z | 2 |
| The course is based on RZ3. It improves and expands the knowledge of general language in all four skills (reading and understanding longer texts with a certain percentage of unfamiliar words, oral communication in everyday situations, writing longer texts). Students are trained to use grammar structures effectively (e.g., irregular verbs, differences in verb patterns from Czech, modality, imperatives, conditionals). They practice and develop communication skills for everyday situations (food, travelling, free time), and practice oral and written communication on more specific topics (environment, addictions, the green movement). They become acquainted with various geographical data (e.g., Siberia), learn how to fill in forms, look up the information from the timetable, learn about Russian holidays and typical meals. | | | |
| 04XRZ5 | Russian for Beginners Z5 | Z | 2 |
| The course expects the student to have completed RZ4. It concentrates predominantly on reading skills (working with professional texts, i.e. understanding, extracting and summarizing information from a specialized text) and speaking, and to a certain extent, writing about the professional information obtained by reading the texts. Communication skills are trained on everyday topics. Studying grammar is based on professional and technical texts and only includes items typically used in professional communication (verbal adjectives, participles, passive voice). Students develop their technical and economic vocabulary, and are also trained in some professional skills (writing a CV, polite request, etc.) | | | |
| 04XSM1 | Spanish for Intermediate Students M1 | Z | 2 |
| The course is designed for students whose competence is at level B1 of CEFR, i.e. those who studied Spanish in the secondary school. The 3-semester course develops standard vocabulary and pays attention to further grammar topics (e.g., perífrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the imperative, and subjunctive), to written and oral communication on a given everyday or easy subtechnical topic, for which the students are trained by reading texts or listening to them. | | | |
| 04XSM2 | Spanish for Intermediate Students M3 | Z | 2 |
| The course develops the students´ knowledge from the previous course (SM1). Students are gradually acquainted with fundamentals of Spanish for specific purposes in order to be able to work with specialized texts on the Internet. | | | |
| 04XSM3 | Spanish for Intermediate Students M3 | Z | 2 |
| The course books are supplemented with additional subtechnical materials, so the students will be gradually acquainted with the peculiarities of academic style. They will be competent enough to use the Internet in Spanish and search for information of their specialization or field of interest. Students will use the information to write short articles and summaries. The final part of the programme, general Spanish course based on course books, covers presentations and, finally, a written and oral examination. | | | |
| 04XSP1 | Spanish for Advanced Students P1 | Z | 2 |
| Course concentrates on more difficult grammar topics, revision of vocabulary, basics of Spanish for specific purposes as well as written communication. Course prerequisites: level B2 of CEFR. | | | |
| 04XSP2 | Spanish for Advanced Students P2 | Z | 2 |
| Course XSP2 is the second part of the advanced Spanish course, extending Spanish for specific purposes topics. It comprises more grammar and syntax and focuses on independent written communication. | | | |
| 04XSP3 | Spanish for Advanced Students P3 | Z | 2 |
| Course XSP3 is the final part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is focused on written communication based on what students will need in their career. | | | |
| 04XSZ1 | Spanish for Beginners Z1 | Z | 2 |
| Course XSZ1 is the first stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and fundamental grammar structures and will be able to communicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spanish and will develop it. | | | |
| 04XSZ2 | Spanish for Beginners Students Z2 | Z | 2 |
| Course XSZ2 is based on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures and lexis will be chosen so as to enable them to understand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries and others such as the Czech Republic. Realia of Spanish-speaking countries are also included. | | | |
| 04XSZ3 | Spanish for Beginners Z3 | Z | 2 |
| This course builds upon the foundations established in course XSZ2 and further develops students vocabulary and grammatical competence. It includes an introduction to the realia and cultural context of Spanish-speaking countries, with a primary focus on Spain. Particular attention is given to key grammatical structures, including the pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund, and the imperative. The course also focuses on both written and spoken communication on general topics. Students are prepared for this through targeted reading and listening activities. | | | |
| 04XSZ4 | Spanish for Beginners Z4 | Z | 2 |
| The course is based on course XSZ3. It develops the student´s vocabulary and extends the knowledge of the culture and social customs of the Spanish speaking countries, mainly of Spain. It pays attention to further grammar topics (perífrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the imperative, and subjunctive), to written and oral communication on a given general or subtechnical topic, for which the student is trained by reading texts or listening to them. | | | |
| 04XSZ5 | Spanish for Beginners Z5 | Z | 2 |
| The course books are supplemented with additional subtechnical materials, so the students will be gradually acquainted with peculiarities of Spanish for specific purposes. In its final part, the general Spanish course based on the course book will end with a written and oral examination. | | | |

## List of courses of this pass:

| Code | Name of the course | Completion | Credits |
|---|---|---|---|
| 00MAM2 | Essentials of High School Math Course 2 | Z | 1 |
| Review of basics of high school mathematics. | | | |
| 00YMAM1 | Essentials of High School Course 1 | Z | 1 |
| Students are introduced to mathematical concepts and methods used in the introductory physics course. | | | |

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|---|---|---|---|
| 00YPT | Orientation Week | Z | 2 |
| The preparatory week is intended for incoming bachelor's students. It includes an introduction to the organizational requirements of university studies and introductory lectures for the first semester. | | | |
| 01RMFB | Equations of Mathematical Physics B | Z,ZK | 5 |
| The subject of this course is solving integral equations, theory of generalized functions, classification of partial differential equations, theory of integral transformations, and solution of partial differential equations. | | | |
| 01UP1 | Introduction to Probability 1 | Z,ZK | 3 |
| 1.Random trial with finite set of possible results, classical probability, independent random events 2.Probability and combinatorics 3.Probability and geometry, Bertrands paradox 4.Conditional probability, Bayes theorem, medical diagnosis, Simpsons paradox 5.Random variable with discrete state space, its distribution and mean value 6.Problems involving the calculation of mean value 7.Probabilistic method in graph theory 8.Random algorithms, Morris algorithm and its variants | | | |
| 01UP2 | Introduction to Probability 2 | Z,ZK | 3 |
| 1. One-dimensional continuous random variable and its statistical description. 2. Distribution function and probability density. 3. Axiomatic introduction of probability and connection to measure theory. 4. Numerical characteristics of continuous random variables. 5. Selected variants of continuous distributions and their characteristics. 6. Elementary methods for point estimations. 7. Generating pseudorandom numbers from the selected distribution. | | | |
| 01YANB3 | Calculus B 3 | Z,ZK | 8 |
| 1. Functional sequences and series - convergence range, criteria of uniform convergence, continuity, limit, differentiation and integration of functional series, power series, Series Expansion, Taylor´s theorem. 2. Ordinary differential equations - equations of first order (method of integration factor, equation of Bernoulli, separation of variables, homogeneous equation and exact equation) and equations of higher order (fundamental system, reduction of order, variation of parameters, equations with constant coefficients and special right-hand side, Euler differential equation). 3. Metric spaces - metric, norm, scalar product, neighborhood, interior and exterior points, boundary point, isolated and non-isolated point, boundary of set, completeness of space, Hilbert spaces. Orthogonal polynomials. Complete orthogonal systems. 4. Fourier series - expansion of functions into Fourier series, trigonometric Fourier series and their convergence. 5. Differential calculus of functions of several variables - limit, continuity, partial and directional derivative, gradient, total derivatives and tangent plane, Taylor series, elementary terms of vector analysis, Jacobi matrix. 6. Functions defined implicitly by one or several equations. | | | |
| 01YANB4 | Calculus B 4 | Z,ZK | 6 |
| [1] Diferenciální počet funkcí více proměnných a funkcionálních vektorů. [2] Funkce zadané implicitně. [3] Taylorovy řady funkce více proměnných. [4] Regulární zobrazení, záměna proměnných, nekartézské soustavy souřadnic. [5] Lokální, vázané a globální extrémy funkce více proměnných. [6] Základy teorie míry a obrys konstrukce Lebesgueovy míry. [7] Integrální počet funkce více proměnných - Riemannův a Lebesgueův integrál, základní vlastnosti, Fubiniova věta, věta o substituci. Leviho a Lebesgueova věta. Limita, spojitost a derivace integrálu podle parametru. [8] Integrály po křivkách a plochách. Integrální věty. | | | |
| 01YFKO | Functions of Complex Variable | Z,ZK | 3 |
| The course starts from outlining the Jordan curve theorem and the Riemann-Stieltjes integral. Then basic results of complex analysis in one variable are explained in detail: the derivative of a complex function and the Cauchy-Riemann equations, holomorphic and analytic functions, the index of a point with respect to a closed curve, Cauchy's integral theorem, Morera's theorem, roots of a holomorphic function, analytic continuation, isolated singularities, the maximum modulus principle, Liouville's theorem, the Cauchy estimates, Laurent series, residue theorem. | | | |
| 01YLAL | Linear Algebra 1 | Z | 2 |
| 1. Vector space. 2. Linear dependence and independence. 3. Basis and dimension. 4. Subspaces of vector spaces. 5. Linear mappings. 6. Matrices of linear mappings. 7. Frobenius theorem. | | | |
| 01YLAL2 | Linear Algebra 2 | Z,ZK | 4 |
| Outline: 1. Inverse matrix and operator. 2. Permutation and determinant. 3. Spectral theory (eigenvalue, eigenvector, diagonalization). 4. Hermitian and quadratic forms. 5. Scalar product and orthogonality. 6. Metric geometry. 7. Riesz theorem and adjoint operator. Outline of the exercises: 1. Methods for calculation of inverse matrices. 2. Methods of calculation of determinants. 3. Calculation of eigenvalues and eigenvectors. 4. Hermitian and quadratic forms. Canonical form. 5. Scalar product and orthogonality. Calculation of orthogonal complements. 6. Geometry exercises and examples. 7. Adjoint operators. | | | |
| 01YLALZ | Linear Algebra 1, exam | ZK | 2 |
| 01YMAN | Calculus 1 | Z | 4 |
| Basic calculus (real analysis, functions of one real variable, differential calculus). | | | |
| 01YMAN2 | Calculus 2 | Z,ZK | 8 |
| 1. Continuation of differential calculus: Taylor´s Polynomials, Taylor´s formula 2. Infinite series: criteria of convergence, operations on series, absolute and conditional convergence 3. Real and complex power series, the Cauchy-Hadamard theorem, expansion of function into power series, summation of infinite series. 4. Theory of integrals: primitives, definite integral (Riemann definition), techniques of integration and application of integrals, Generalized Riemann integral | | | |
| 01YMANZ | Calculus 1, exam | ZK | 4 |
| 01YNME2 | Numerical Methods 2 | KZ | 2 |
| The course is devoted to numerical solution of boundary-value problems and intial-boundary-value problems for ordinary and partial differential equations. It explains methods converting boundary-value problems to initial-value problems and finite-difference methods for elliptic, parabolic and first-order hyperbolic partial differential equations. | | | |
| 01YPRST | Probability and Statistics | Z,ZK | 4 |
| It is a basic course of probability theory and mathematical statistics. The probability theory is build gradually beginning with the classical definition and continuing till the Kolmogorov definition. The notions as random variable, distribution function of random variable and characteristics of random variable are treated and basic limit theorems are stated and proved. On the basis of this theory the basic methods of mathematical statistics such as estimation of distribution parameters and hypothesis testing are explained. | | | |
| 02BPJC1 | Bachelor Project 1 | Z | 5 |
| Abstract: The bachelor project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor during common regular meetings and discussions. | | | |
| 02BPJC2 | Bachelor Project 2 | Z | 10 |
| Abstract: The bachelor project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor during common regular meetings and discussions. | | | |
| 02NSAD1 | Simulations and Data Analysis Tools 1 | Z | 2 |
| Data analysis and simulations of high energy elementary particle collisions. ROOT and Pythia programs. | | | |
| 02NSAD2 | Simulations and Data Analysis Tools 2 | Z | 2 |
| Individual work will include implementation and testing of a program for generating of particle collision. Results are reviewed. | | | |
| 02UKP1 | Introduction to Curves and Surfaces | Z | 2 |
| The goal of the lecture is an introduction to the differential geometry of simple manifolds - curves and two-dimensional surfaces. The basic concepts for the curves are introduced Frenets formulae are explained. In the surface theory we introduce first and second fundamental forms and mean and Gaussian curvature. Essential part of the lecture are the examples calculated by students. | | | |

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| 02UKP2 | Introduction to Curves and Surfaces 2 | Z | 2 |
| The lecture extends the course 02UKP1. The properties of the first fundamental form are briefly summarized. The concept of the second fundamental form is introduced, leading to the mean and Gaussian curvature. Finally, the usual concepts of Riemann geometry are introduced. | | | |
| 02YDEF1 | History of Physics 1 | Z | 2 |
| Physics and its place in the system of sciences. The relationship of man and nature. Natural sciences in ancient Orientand Greece, Greek natural philosophers, Aristotle. Physics in Helenistic period, Archimed. Arabic science, European science in Middle Ages. Renaissance - da Vinci, Giordano Bruno. Copernicus, Kepler, Galileo, Huygens. The birth of physics as experimental science. Newton and his work. | | | |
| 02YDEF2 | History of Physics 2 | Z | 2 |
| Development of classical mechanics after Newton, Bernoulli's, Euler, Lagrange. Historical development of optics, corpuscular and wave approach. Electricity and magnetism - electrostatics, galvanism, electrodynamics and electromagnetism, Faraday and Maxwell. Thermodynamics and its laws, statistical physics, Boltzmann. The birth of modern quantum and relativistic physics, Planck and Einstein. Discovery of radioaktivity, structure of atom, atomic nucleus, Rutherford and Bohr. The way to nuclear energy, Elementary particles, standard model. The concept of Nature and Universe of today. | | | |
| 02YDPD1 | Detectors and Principles of Detection 1 | ZK | 2 |
| Abstract: The lectures introduce the main forms of interaction of some particles with matter. The goal is that the student gets an overview of what type of processes are possible and in which situations they may be dominant. Some applications to Medicine and to study the fundamental structure of matter are presented. | | | |
| 02YDPD2 | Detectors and Principles of Detection 2 | ZK | 4 |
| Abstract: The lectures introduce the main ideas needed to understand how detector systems work. It will be focused on gaseous detecting principles, scintilating principles and semiconductor detecting principles. Basic information about various detector constructions is provided. | | | |
| 02YELMA | Electricity and Magnetism | Z,ZK | 6 |
| Electric charge, Coulomb's law, electrostatic field, Gauss' law. Electric dipole, polarization. Conductors anddielectrics. Electric current and circuits, conductivity. Basics of the relativity theory. Electrodynamic forces,magnetic field. Magnetic dipole, magnetics. Electromagnetic induction, ac currents. Electromagnetic waves,Maxwell equations | | | |
| 02YEXF | Experimental Physics | ZK | 2 |
| The goal of this subject is to introduce the students the principles of physics measurements, their techniques, methods and instruments that are used for such measurements, and the analysis of measured data. | | | |
| 02YFYS1 | Physical Seminar 1 | Z | 2 |
| The seminar is devoted to detailed study of interesting physical problems. It should help students to deeper understanding of fundamentals of physics presented in the course of Mechanics. The problems are chosen, studied and presented by the students themselves, with the possibility to use PC and physical laboratory equipments. | | | |
| 02YKM1 | Quantum Mechanics 1 | Z,ZK | 6 |
| Abstract: The lecture describes the birth of quantum mechanics and description of one particle and more particles by elements of the Hilbert space as well as its time evolution. Besides that it includes description of observable quantities by operators in the Hilbert space and calculation of their spectra. | | | |
| 02YKM2 | Quantum Mechanics 2 | Z,ZK | 6 |
| Abstract: The lecture expands the introduction to quantum mechanics with more general formalism of quantum theory, approximate methods and path integral. It summarizes the terminology and methods used in various applications of quantum mechanics and prepares the students for an effective scientific research and further study, in particular, of the modern formulations of quantum field theory. | | | |
| 02YMECH | Mechanics | Z | 4 |
| ntroduction to physics, physical quantities and units. Particle kinematics, basic types of motion and theirsuperposition. Particle dynamics, one-dimensional equations of motion, motion in central force field, forces innoninertial reference frames. Mechanics of system of free particles, two-body problem, collisions. Mechanics ofrigid body, rotation. Fundamentals of continuum mechanics, elasticity, hydrodynamics. Sound. | | | |
| 02YMECHZ | Mechanics - Examination | ZK | 2 |
| The content of the subject is the examination according to the plan of studies. | | | |
| 02YPRA1 | Experimental Laboratory 1 | KZ | 6 |
| Lecture is intended especially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nuclear Engineering). But it can be also attended by students interested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work with theliterature), the implementation of the measurement (acquire of different experimental procedures and routines), willteach writing the records of measurement, processing and evaluation of results. At the same time practically extendthe knowledge gained in lectures on physics. | | | |
| 02YPRA2 | Experimental Laboratory 2 | KZ | 6 |
| Lecture is intended especially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nuclear Engineering). But it can be also attended by students interested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work with theliterature), the implementation of the measurement (acquire of different experimental procedures and routines), willteach writing the records of measurement, processing and evaluation of results. At the same time practically extendthe knowledge gained in lectures on physics. | | | |
| 02YROZ1 | Seminar on Quark-Gluon Plasma 1 | Z | 2 |
| The aim of the seminar is discuss the selection of the most fundamental articles in heavy ion physics. Students participate on the seminar by preparing the presentation about selected papers. | | | |
| 02YROZ2 | Seminar on Quark-Gluon Plasma 2 | Z | 2 |
| The aim of the seminar is discuss the selection of the most fundamental articles in heavy ion physics. Students participate on the seminar by preparing the presentation about selected papers. | | | |
| 02YSF | Subatomic Physics | Z,ZK | 6 |
| The goal of these lectures is to present basic knowledge of particle physics. Students will become familiar with the structure of the matter, with elementary interactions and with basic laws of microcosmos. Lectures will include basics of quantum mechanics and the theory of relativity needed for the description of elementary particles behavior. Students will also become familiar with basic accelerating principles and with current particle physics experimental centers. | | | |
| 02YSF2 | Subatomic Physics 2 | Z,ZK | 6 |
| The aim of the course is to teach students the basics of physics of atomic nucleus. Students will acquire knowledgeabout the basic properties of atomic nuclei and the way they can be measured. They will learn basic models, whichdescribe the structure of the atomic nucleus and nuclear reactions. Part of the lectures is also getting familiar with thephysics of the cosmic radiation and applications of nuclear physics. | | | |
| 02YSTR | Special Theory of Relativity | ZK | 2 |
| Students extend their knowledge of classical, non-quantum mechanics of the special theory of relativity fundamentals. | | | |
| 02YTEF1 | Theoretical Physics 1 | Z,ZK | 4 |
| The course is an introduction to analytical mechanics. The students acquire knowledge of the basic concepts of the Lagrange and Hamiltonian formalism as well as diferent approaches to description of dynamics (Newtons, Lagrange, Hamilton and Hamilton-Jacobi equations). The efficiency of these methods is illustrated on elementary examples like the two-body problem, the motion of a system of constrained mass points, and of a rigid body. Advanced parts of the course cover differential and integral principles of mechanics. The subject is the first part of the course of classical theoretical physics (02TEF1, 02TEF2). | | | |

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| 02YTEF2 | Theoretical Physics 2 | Z,ZK | 4 |
| Tensors and transformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and classical field theory in the Minkowski space-time. Classical electrodynamics: Maxwell's equations in the Minkowski space-time, electromagnetic waves in dielectric media, electromagnetic radiation in the dipole approximation. | | | |
| 02YTER | Heat and Molecular Physics | Z,ZK | 4 |
| Thermal expansion of materials, heat transfer; stationary and non-stationary heat conduction, heat transfer and penetration; 1st and 2nd thermodynamic principle, ideal and real gas, entropy; non-chemical systems: dielectric and magnetic materials; Maxwell relations and thermodynamic potentials; kinetic theory: Maxwell's velocity distribution,equipartition theorem. | | | |
| 02YTSFA | Thermodynamics and Statistical Physics | Z,ZK | 4 |
| Foundation of thermodynamics and statistical physics. Thermodynamic potential, the Joule Thomson effect,conditions of equilibrium, the Braun-Le Chatelier principle. Statistical entropy. Basics of many body descriptionfrom a statistical point of view (classical and quasiclassical regime within the frame of a canonical and grand-canonical ensemble, Fermi gas, models of crystals and the black body radiation). The Boltzmann equation is usedto discusses simple transport phenomena. | | | |
| 02YUFEC | Introduction to Elementary Particle Physics | Z | 2 |
| The course provides an easily accessible introduction to elementary particle physics. Development, methods, goals and perspectives of the subject are presented. | | | |
| 02YUKT | Introduction to Quantum Theory | Z | 2 |
| The aim of the lecture is to introduce the basic principles of quantum theory and its interpretation on simple examples. | | | |
| 02YVOAF | Waves, Optics and Atomic Physics | Z,ZK | 6 |
| Wave phenomena in mechanics and electromagnetism: modes, standing and travelling waves, wave packets indispersive media. Wave optics: polarization, interference, diffraction, coherence. Geometrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglie waves,the Schrodinger equation, stationary states and spectra of finite systems. | | | |
| 02YVS1 | Workshop 1 | Z | 1 |
| Abstract: Students will participate on annual Workshop JČF, where they will present results obtained during the work on their bachelor thesis. During other presentations from students and staff, they will also get familiar with scientific topics developed at the department and with methods other colleagues use for their scientific work. | | | |
| 02YZM1 | Foundations of Physical Measurements 1 | ZK | 2 |
| The lecture is designed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however, it can be attended by students of other branches. The goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired data on a PC. Students learn the basic habits of work in a physics lab. | | | |
| 02YZM2 | Foundations of Physical Measurements 2 | KZ | 4 |
| The lecture is designed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however, it can be attended by students of other branches. The goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired data on a PC. Students learn the basic habits of work in a physics lab. | | | |
| 02ZSM | Introduction to the Standard Model | ZK | 2 |
| Particles, leptons, hadrons, baryons, mesons, symmetry, symmetry group, quarks, gluons, partons, standard model of electroweak and strong interactions, quantum chromodynamics (QCD), cross section, scattering cross section. | | | |
| 04XAM1 | English for Intermediate Students M1 | Z | 2 |
| The course is designed for students who have successfully completed the full secondary school English language course at least at the A2 level of the Common European Framework of Reference for Languages (CEFR). It provides an introduction into English for Specific and Academic Purposes (ESP, EAP), i.e., into fundamentals of vocabulary and style typical of professional oral and written communication situations. Thus it covers topics related to the student´s life and needs as well as topics of subtechnical interest. Attention is also paid to extending the knowledge of grammar issues used in EAP. | | | |
| 04XAM2 | English for Intermediate Students M2 | Z | 2 |
| The AM2 course expects the student to have completed the AM1 course. It develops their skills for work with subtechnical texts, focusing also more on specific grammar, functions, and lexical items typical of ESP and EAP (e.g., definition, existence and classification of phenomena, object descriptions). Part of the course is also guided writing. If necessary, grammar revision is included. | | | |
| 04XAM3 | English for Intermediate Students M3 | Z | 2 |
| The course develops the skills that enable students to cope with features typical of professional style. Increasing attention is paid to developing subtechnical vocabulary and independent understanding of professional texts. Great emphasis is placed on distinguishing different levels of formal and informal oral and written communication and their appropriate Czech equivalents. The course also includes studying abstracts and rules for writing them as well as basic rules for preparing and giving a short presentation on a chosen topic related to the student´s field. | | | |
| 04XAMZK | English for Intermediate Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The examination covers the AM1, AM2, and AM3 courses and consists of two parts - written (100 min) and oral (20-30 min). The student is expected to master the AM syllabus and demonstrate the ability to apply their knowledge gained in the three English courses. | | | |
| 04XAP1 | English for Advanced Students P1 | Z | 2 |
| The course is designed for students who have successfully completed the full secondary school English language course (at least the B1 level of the Common European Framework of Reference for Languages - CEFR). It provides an introduction into English for Specific and Academic Purposes (ESP, EAP), i.e., into the fundamentals of vocabulary, functions, grammar, and style typical of professional oral and written communication situations (fundamentals of terms in mathematics and physics, definitions, graph descriptions, etc). It also covers professional oral and written communication on topics related to the undergraduate´s life and needs. It develops skills for free professional writing (writing a CV, letter of application, polite request). If necessary, revision of selected grammar topics is included. | | | |
| 04XAP2 | English for Advanced Students P2 | Z | 2 |
| The AP2 course is based on AP1, thus extending the student´s skills for working with subtechnical texts, and even with professional texts of chosen branches of science. According to the students´ needs it concentrates on chosen grammar topics, but mainly intends to develop understanding of syntactic structures and typical rhetorical functions (e.g., various types of descriptions, and, if possible, a case study). Increasing emphasis is placed on the undergraduate´s independent work with and reading of linguistically more demanding materials. The course extends the student´s subtechnical vocabulary, and includes fundamental notions of chosen branches of science. It is focused on formal writing including the sentence and paragraph structure, linking, cohesion and coherence in texts. | | | |
| 04XAP3 | English for Advanced Students P3 | Z | 2 |
| The AP3 course is based on AP2 and expects the student to work without any guidance with authentic professional materials and to interpret the text. It includes training oral and written communication skills and functions (e.g., expressing an opinion, agreement, and objections; taking part in discussion, note-taking; summarizing, writing an abstract) and, if possible, also preparing a project on a given or chosen topic and presenting it. The course places emphasis on distinguishing levels of formal and informal language both in oral and written communication. | | | |
| 04XAPZK | English for Advanced Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The student is supposed to demonstrate mastering the AP3 syllabus and the ability to apply their knowledge obtained in the three AP courses. The examination consists of 2 parts - written (100 min) and oral (30 min) and includes also oral presentation of a topic from the student´s field of study. | | | |

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| 04XCESM1 | Czech for Foreigners - Intermediate 1 | Z | 2 |
| The course is focused on correct pronunciation, important morphological phenomena, prepositional phrases, and verb forms as well as on extending the student´s vocabulary for various social situations. | | | |
| 04XCESM2 | Czech for Foreigners - Intermediate 2 | Z | 2 |
| The course develops the topics covered in CESM1 and is then focused on more difficult grammar phenomena. It practices writing, speaking, and reading skills and trains the student in understanding common abbreviations, abbreviated words, and mathematical terms and formulas. | | | |
| 04XCESM3 | Czech for Foreigners - Intermediate 3 | Z | 2 |
| The last course revises morphological topics covered earlier and extends the student´s knowledge of more difficult language phenomena. It is especially focused on stylistics and lexicology and on developing the student´s writing skills. | | | |
| 04XCESMZK | Czech for Intermediate Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the CESM1,2,3 courses and can only be taken after successful completion of the 3 courses. Detailed information is to be obtained from the teacher. | | | |
| 04XCESP1 | Czech for Foreign Students - Advanced 1 | Z | 2 |
| The prerequisite of the course is very good knowledge of the Czech language, i.e., communicative competences at least at level B2 of the Common European Framework of Reference. It is focused partly on revision of standard language structures, but mainly on practising more complex grammatical structures typical of the style of science. Students are taught the basics of functional style of engineering and professional communication, both in spoken and written form. The topics include University Studies and Student Life. Written practice includes communication with teachers and faculty administrators. | | | |
| 04XCESP2 | Czech for Foreigners - Advanced 2 | Z | 2 |
| This course extends the student´s knowledge acquired in CESP1 and focuses on difficult language phenomena. It practises working with technical and specialist texts placing greater emphasis on individual work. | | | |
| 04XCESP3 | Czech for Foreigners - Advanced 3 | Z | 2 |
| The course develops the student´s knowledge from CESP2. It includes working with authentic specialist materials, their interpretation and presentation, and, finally, presentation of the student´s project. Writing skills necessary for professional communication are trained. | | | |
| 04XCESPZK | Czech for Foreign Students - Advanced Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the CESP1,2,3 courses and can only be taken after successful completion of the 3 courses. Detailed information is to be obtained from the teacher. | | | |
| 04XCESZ1 | Czech for Foreigners - Beginners 1 | Z | 2 |
| The course is designed for students of the English programme. Students will become acquainted with the main characteristics of Czech (phonetic and grammar features) and they will acquire basic language and speaking skills. The course focuses on pronunciation exercises, simple social phrases, and oral and written communication in the most common everyday situations. The course covers roughly lessons 1-3 of Čeština Express (Czech Express) by L. Holá and P. Bořilová. | | | |
| 04XCESZ2 | Czech for Foreigners - Beginners 2 | Z | 2 |
| The language and communication competences acquired in CESZ1 are further developed. Students deepen their knowledge of the declension and conjugation system and practise basic communication topics. The course covers roughly lessons 3-5 in Czech Express by L. Holá and P. Bořilová. | | | |
| 04XCESZ3 | Czech for Foreigners - Beginners 3 | Z | 2 |
| The course further develops the language and communication competences acquired in the XCESZ1 and XCESZ2 courses. The teaching focuses on building up basic vocabulary, fixing correct pronunciation and deepening grammar, features through practice, as well as introducing the Czech culture. Students are asked to produce simple texts and they practise frequent types of dialogue. They also practise understanding texts in terms of main ideas or looking for specific details in texts. The course covers roughly lessons 5-7 in Čeština expres 1. | | | |
| 04XCESZZK | Czech for Foreigners Beginners - Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the 04XCESZ1,2,3 courses and can only be taken after successful completion of all three courses. Detailed information is to be obtained from the teacher. | | | |
| 04XFM1 | French for Intermediate Students M1 | Z | 2 |
| French - intermediate FM The objective of this three-semester course is to improve and further develop communication in the French language in both written and oral form. Students will be able to communicate in social interaction and in academic, scientific and professional environment. They will be able to use the language to transmit general and technical information and to solve problems. FM1 The course builds on and further develops linguistic competence acquired at secondary school. It revises, systemizes and expands language skills gained in previous study. The following topics are covered: University studies in our country and in France, writing of transactional letters, CV, personal statement, request, answer to an advert, French culture and geography, Paris. Topics of specialization: mathematics, physics. Reading technical and popular science texts, work based on these texts. | | | |
| 04XFM2 | French for Intermediate Students M2 | Z | 2 |
| Course FM2 builds on FM1. Linguistic structures and competence acquired in previous study are systemized and expanded. Reading popular science texts, features typical for technical and scientific language (passives, nominalization, word formation). Topics: physics, power engineering, environment, Internet, success of French science and technology, French scientists, artists and architects. Description of an object, device, shapes, dimensions, material. | | | |
| 04XFM3 | French for Intermediate Students M3 | Z | 2 |
| The course is focused on improvement and further development of linguistic competence acquired during the follow-up courses. Syntactic structures (subordinate and infinitive clauses, participle structures, compound tenses). Text summary. -Students prepare a written paper which will be delivered in form of an oral presentation in-class. The paper is linked to the field of students´ future specialisation or to their interest and generally covers a technical /applied science topic. It is not a translation but a creative work compiled from French articles and one´s own knowledge/experience. -Longer monologues on topics /situations set for the examination are prepared. Text structure, cohesion and coherence. | | | |
| 04XFMZK | French for Intermediate Students Examination | ZK | 4 |
| The content is the examination as given by the study programme. The whole French programme is ended with an examination covering the contents of FM1-FM3. The examination consists of a written and oral part and is organized according to Examination Instructions, a document available on the web. | | | |
| 04XFP1 | French for Advanced Students P1 | Z | 2 |
| FP advanced course The objective of this three-semester course is to improve and further develop communication in the French language in both written and oral form. Students will be able to communicate in social interaction and in academic, scientific and work environment. They will be able to use the language to transmit general and technical information and to solve problems. FP1 The course builds on and further develops linguistic competence acquired at secondary school. Difficult grammar topics are repeated and expanded: subjonctif, passé composé-imparfait, pronouns. The following specific topics are covered: University studies in our country and in France, writing of transactional letters, CV, personal statement, request, answer to an advert, environmental issues, success of French science and technology, chosen topics from French regional culture, Paris. Topics of specialization: mathematics, internet, physics, chemistry. Reading of technical and popular science texts, further work with these texts and interpretation. | | | |
| 04XFP2 | French for Advanced Students P2 | Z | 2 |
| With the link to P1 contents, the course further develops language skills. Focus is put on reading popular science texts and on oral communication on given topics. Features typical of technical and scientific communication are stressed (passive voice, nominalization, word formation). | | | |

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| 04XFP3 | French for Advanded Students P3 | Z | 2 |
| The course is focused on systemization and improvement of acquired linguistic competence, skills and knowledge, and their use for communication in engineering environment. Special skill - translation of shorter texts (both from and into the language). Writing of a paper and making oral presentation in-class. The paper generally covers a technical /applied science topic. It is a creative work compiled from 3 French sources. Preparation of several set topics for oral examination. | | | |
| 04XFPZK | French for Advanced Students Examination | ZK | 4 |
| The whole French program is ended with an examination covering the contents of FP1-FP3. The examination consists of a written and/or an oral part and is organized according to Examination Instructions, a document available on the web. Assessment of the presentation is included into the examination grading. | | | |
| 04XFZ1 | French for Beginners Z1 | Z | 2 |
| French for beginners The objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life , in socializing and in professional life. The course includes French for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able to communicate at elementary level, actively using the knowledge of chosen elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbook Pravda - Pravdová, French for beginners (Francouzština pro začátečky). It is extended with situations of communication and functions from the textbook Espaces I, lessons 1-4 : introductions, personal information, asking and giving the directions, simple instructions and questions. Special attention is paid to pronunciation. Spelling is explained in connection with pronunciation and grammar. | | | |
| 04XFZ2 | French for Beginners Z2 | Z | 2 |
| The course is linking up with FZ1. Elementary linguistic knowledge and communication skills are expanded. The scope is given by lessons 8 - 13 of the textbook: Pravda - Pravdová : French for Beginners . Additional topics and skills are filled in from the textbook Espaces I, lesson 1 - 5 (introductions, invitation, welcoming, agreement - disagreement, apology, thanking, travelling, map of France, food, expression of will, wish, order, prohibition, pleasure). Correct pronunciation is practiced. Stress on oral communication. Specific topics covered: How does the machine work? A few expressions concerning the study. Name of University and Faculty. | | | |
| 04XFZ3 | French for Beginners Z3 | Z | 2 |
| The course builts upon FZ2. Basic linguistic knowledge and skills are developed. The contents is given by lessons 14 - 18 of the textbook: Pravda - Pravdová: French for Beginners. Topics, functions and situations are complemented from other materials. Stress is put on oral communication in dialogues and on reading, both for information and loud as part of pronunciation practice. Reading covers short adapted texts of general interest first, and later popular science texts. | | | |
| 04XFZ4 | French for Beginners Z4 | Z | 2 |
| The course builds up on FZ3. Basic linguistic knowledge and skills are further developed. Oral communication and reading skills are practiced. The contents is roughly covered with lessons 19 - 23 of the textbook French for Beginners, and is expanded with topics and functions from other materials. Reading is developed from the lecture notes French for Engineering Students of FJFI. The course covers generals and specific topics: health- illness, sport, free time, environment, study, travelling in France, Paris, shopping, weather, university in our country and in France, how to write CV, application, topics in mathematics, reading physics - mechanics, informatics, internet. | | | |
| 04XFZ5 | French for Beginners Z5 | Z | 2 |
| All four skills acquired in FZ4 are further developed, as well as technical language. Students prepare a paper on a chosen popular science topic. They present it orally in the class. The general contents is covered by lessons 24 - 26 of the textbook: Pravda-Pravdova, French for Beginners, and is complemented from other materials. Topics: on physics from lecture notes, success of French science and technology, information about France. Grammar is systemized and complemented with syntax (subordinate clauses, typical conjunctions, subjunctive clauses, gerund, passive. | | | |
| 04XFZZK | French for Beginners Examination | ZK | 3 |
| The content is the examination as given by the study plan. The course is terminated with an examination consisting of oral and written part. The examination is ruled by the document Instruction for examination. Its content covers the levels FZ1 - FZ5. | | | |
| 04XNM1 | German for Intermediate Students M1 | Z | 2 |
| The objective of the course is to level off the students´ skills in the German language. The course focuses on revision of more difficult phenomena and structures (e.g. the passive) and word formation processes (e.g. importance of verb prefixes). In the lexical part, it covers topics referring to higher education in both the Czech Republic and Germany, current environmental issues together with all necessary expressions and phrases, expressions and phrases needed to chemists, mathematicians, physicists, and the fundamentals of IT terminology. It develops communication on related topics and is aimed at correct pronunciation, grammatical correctness and understandability. | | | |
| 04XNM2 | German for Intermediate Students M2 | Z | 2 |
| The course introduces other more complex grammatical structures and their application in communication based on technical texts, such as the relation between technology and society, the world at the beginning of the 21st century, linguistically more demanding texts on the environment, the language of mathematics, computers and car technology etc. Students practise reading for information and reading aloud, and appropriate language for various purposes in oral and written communication. The course systematically revises other grammatical phenomena important for professional discourse (participles, relative clauses). | | | |
| 04XNM3 | German for Intermediate Students M3 | Z | 2 |
| The course introduces other more complex grammatical structures and their application in communication based on technical texts, such as the relation between technology and society, the world at the beginning of the 21st century, linguistically more demanding texts on the environment, the language of mathematics, computers and car technology etc. Students practise reading for information and reading aloud, and appropriate language for various purposes in oral and written communication. The course systematically revises other grammatical phenomena important for professional discourse (participles, relative clauses). | | | |
| 04XNMZK | German for Intermediate Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The whole German for Intermediate Students Course is completed by an examination consisting of two parts - written and oral, which cover the courses NM1 - NM3. The oral part follows after passing the written part successfully and after obtaining the 04NM3 assessment. More detailed information is to be obtained from the teacher. | | | |
| 04XNP1 | German for Advanced Students P1 | Z | 2 |
| This course requires good grammar knowledge, extended general vocabulary, and good communication skills acquired at secondary school to be levelled off at the beginning of the course. The course is then focused on working with technical and scientific texts and practising reading techniques (skimming, scanning, reading for detail). It revises and develops more difficult grammar structures necessary for understanding a subtechnical text (passive voice, participles, participle structures) and it also focuses on practical everyday communication, i.e., telephoning. | | | |
| 04XNP2 | German for Advanced Students P2 | Z | 2 |
| The course develops the students' skills in working with professional scientific texts (understanding, summarising, note-taking, interpreting) while extending their general and subtechnical vocabulary range. It introduces mathematical expressions and texts of nuclear power engineering. Increasing emphasis is placed on understanding and practising formal communication, both written and oral (CV, letter of application, interview, scholarship), and more complex grammatical structures (i.e., subjunctive, indirect speech). | | | |
| 04XNP3 | German for Advanced Students P3 | Z | 2 |
| The course consists of 3 main parts (general communicative situations, grammar and technical topics). Students will develop their vocabulary in a variety of less common situations (traffic problems and car accidents, accident report, filling in a form, complaints). Based on presentations and technical and subtechnical texts, the vocabulary range in fields such as nuclear power engineering, the environment, computer science, and car technology, will also be extended. Only authentic professional texts are used. By means of a presentation, students are trained to process information gained from their reading of complex and difficult texts and present it to the class in a simplified oral form. The course also includes translation practice to and from German. | | | |

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| 04XNPZK | German for Advanced Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The whole German for Advanced Students Course is completed by an examination consisting of two parts - written and oral, which cover the courses NP1 - NP3. The oral part follows after passing the written part successfully and after obtaining the 04NP3 ungraded assessment. More detailed information is to be obtained from the teacher. | | | |
| 04XRM1 | Russian for Intermediate Students M1 | Z | 2 |
| The course is designed for students with previous knowledge of Russian from secondary schools. Students are supposed to know the Russian alphabet (both printed and handwritten), basic vocabulary for communication in everyday situations (introductions, socializing, greetings, shopping for food and objects of everyday need, asking the way and giving directions), they can use basic grammar structures (verbal and nominal forms, irregular verbs, pronouns). The initial knowledge corresponds to the achievement level of the RZ2 course. The contents and scope of the course correspond approximately to the RZ3 course, but for half of the time allotted in the timetable. | | | |
| 04XRM2 | Russian for Intermediate Students M2 | Z | 2 |
| The course is based on the RM1 course, its contents and scope correspond roughly to RZ4, however, for half of the time allotted in the timetable. | | | |
| 04XRM3 | Russian for Intermediate Students M3 | Z | 2 |
| The course develops the knowledge and skills acquired in RM1 and RM2 and its contents and scope are roughly at the same level as those of RZ5, however, for half of the time allotted in the timetable. | | | |
| 04XRMZK | Russian for Intermediate Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowledge and skills acquired in RM1 - RM3. Students are eligible for the oral examination only after a prior pass in RM3 and a successful written examination. Students are given instructions by the teacher. | | | |
| 04XRP1 | Russian for Advanced Students P1 | Z | 2 |
| The entrance requirement for the course is to achieve the B1 CEFR level. The objective of the course is revision of standard language structures, practicing more difficult grammar structures, understanding the fundamentals of technical language and training writing skills. | | | |
| 04XRP2 | Russian for Advanced Students P2 | Z | 2 |
| The course is based on RP1. It expands grammatical structures important for understanding technical texts (verbal adjectives, participles, passives, verb aspects, specific syntactic structures). Stress is put on independent oral and written communication. | | | |
| 04XRP3 | Russian for Advanced Students P3 | Z | 2 |
| The course is based on RP2 and is mainly focused on working with technical and scientific texts (reading comprehension, oral and written paraphrasing, translation). The RP1 - RP3 courses require good previous knowledge of general language at secondary level (listening, reading, correct communication in everyday situations). The courses develop and expand these skills. Further study is aimed at professional and technical skills (reading technical literature according to the students´ specialization, oral and written interpretation). Students develop their subtechnical vocabulary and practice quick and correct communication in professional situations. They will be able to both speak write accurately and with confidence on technical topics. | | | |
| 04XRPZK | Russian for Advanced Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowledge and skills acquired in RP1 - RP3. Students are eligible for the oral examination only after a prior pass in RP3 and a successful written examination. Students are given instructions by the teacher. | | | |
| 04XRZ1 | Russian for Beginners Z1 | Z | 2 |
| The course represents the first stage of the five-semester programme, its final aim being reading and understanding professional texts written in Russian. Thus it begins with mastering the Russian alphabet (for both reading and writing skills) and fundamentals of grammar necessary for everyday communication (listening and speaking). Students will be able to read a short text with marked stress, understand its contents and summarize it. | | | |
| 04XRZ2 | Russian for Beginners Z2 | Z | 2 |
| The second semester of the programme is designed to teach skills for basic communication in everyday situations and for reading easy and short subtechnical texts. Students will be able to communicate using short sentences and appropriate structures, and read aloud with confidence a short text without marked stress. They will also develop their vocabulary and master further grammatical structures. They will have mastered with confidence the Russian alphabet and will be able to use it in writing. | | | |
| 04XRZ3 | Russian for Beginners Z3 | Z | 2 |
| The course is based on RZ2 and includes further everyday topics, develops understanding of short compact texts on new subtechnical topics (for training various forms of reading skills and listening) and introduces new grammar. Students will be trained to distinguish intonation patterns while listening to spoken language. They will be able to respond so as to be understood, and to express their opinion. Writing skills will be trained on guided writing tasks and note-taking. | | | |
| 04XRZ4 | Russian for Beginners Z4 | Z | 2 |
| The course is based on RZ3. It improves and expands the knowledge of general language in all four skills (reading and understanding longer texts with a certain percentage of unfamiliar words, oral communication in everyday situations, writing longer texts). Students are trained to use grammar structures effectively (e.g., irregular verbs, differences in verb patterns from Czech, modality, imperatives, conditionals). They practice and develop communication skills for everyday situations (food, travelling, free time), and practice oral and written communication on more specific topics (environment, addictions, the green movement). They become acquainted with various geographical data (e.g., Siberia), learn how to fill in forms, look up the information from the timetable, learn about Russian holidays and typical meals. | | | |
| 04XRZ5 | Russian for Beginners Z5 | Z | 2 |
| The course expects the student to have completed RZ4. It concentrates predominantly on reading skills (working with professional texts, i.e. understanding, extracting and summarizing information from a specialized text) and speaking, and to a certain extent, writing about the professional information obtained by reading the texts. Communication skills are trained on everyday topics. Studying grammar is based on professional and technical texts and only includes items typically used in professional communication (verbal adjectives, participles, passive voice). Students develop their technical and economic vocabulary, and are also trained in some professional skills (writing a CV, polite request, etc.) | | | |
| 04XRZZK | Russian for Beginners Examination | ZK | 3 |
| The course content is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowledge and skills acquired in RZ1 - RZ5. Students are eligible for the oral examination only after a prior pass in RZ5 and a successful written examination. Students are given instructions by the teacher. | | | |
| 04XSM1 | Spanish for Intermediate Students M1 | Z | 2 |
| The course is designed for students whose competence is at level B1 of CEFR, i.e. those who studied Spanish in the secondary school. The 3-semester course develops standard vocabulary and pays attention to further grammar topics (e.g., perífrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the imperative, and subjunctive), to written and oral communication on a given everyday or easy subtechnical topic, for which the students are trained by reading texts or listening to them. | | | |
| 04XSM2 | Spanish for Intermediate Students M3 | Z | 2 |
| The course develops the students´ knowledge from the previous course (SM1). Students are gradually acquainted with fundamentals of Spanish for specific purposes in order to be able to work with specialized texts on the Internet. | | | |
| 04XSM3 | Spanish for Intermediate Students M3 | Z | 2 |
| The course books are supplemented with additional subtechnical materials, so the students will be gradually acquainted with the peculiarities of academic style. They will be competent enough to use the Internet in Spanish and search for information of their specialization or field of interest. Students will use the information to write short articles and summaries. The final part of the programme, general Spanish course based on course books, covers presentations and, finally, a written and oral examination. | | | |
| 04XSMZK | Spanish for Intermediate Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. XSMZK examination consists of two parts: written and oral; to be eligible for the written part, students will have obtained non-graded assessment for course XSM3. Oral examination follows the written part. | | | |

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| 04XSP1 | Spanish for Advanced Students P1 | Z | 2 |
| Course concentrates on more difficult grammar topics, revision of vocabulary, basics of Spanish for specific purposes as well as written communication. Course prerequisites: level B2 of CEFR. | | | |
| 04XSP2 | Spanish for Advanced Students P2 | Z | 2 |
| Course XSP2 is the second part of the advanced Spanish course, extending Spanish for specific purposes topics. It comprises more grammar and syntax and focuses on independent written communication. | | | |
| 04XSP3 | Spanish for Advanced Students P3 | Z | 2 |
| Course XSP3 is the final part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is focused on written communication based on what students will need in their career. | | | |
| 04XSPZK | Spanish for Advanced Students Examination | ZK | 4 |
| The course content is the examination as given by the study plan. Examination XSPZK consists of two parts, namely oral and written. The prerequisite for admission to oral part is having passed the written test. Examination content is based on syllabi of courses XSP1, XSP2, and XSP3 or on an individual study plan of the student. | | | |
| 04XSZ1 | Spanish for Beginners Z1 | Z | 2 |
| Course XSZ1 is the first stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and fundamental grammar structures and will be able to communicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spanish and will develop it. | | | |
| 04XSZ2 | Spanish for Beginners Students Z2 | Z | 2 |
| Course XSZ2 is based on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures and lexis will be chosen so as to enable them to understand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries and others such as the Czech Republic. Realia of Spanish-speaking countries are also included. | | | |
| 04XSZ3 | Spanish for Beginners Z3 | Z | 2 |
| This course builds upon the foundations established in course XSZ2 and further develops students vocabulary and grammatical competence. It includes an introduction to the realia and cultural context of Spanish-speaking countries, with a primary focus on Spain. Particular attention is given to key grammatical structures, including the pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund, and the imperative. The course also focuses on both written and spoken communication on general topics. Students are prepared for this through targeted reading and listening activities. | | | |
| 04XSZ4 | Spanish for Beginners Z4 | Z | 2 |
| The course is based on course XSZ3. It develops the student´s vocabulary and extends the knowledge of the culture and social customs of the Spanish speaking countries, mainly of Spain. It pays attention to further grammar topics (perífrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the imperative, and subjunctive), to written and oral communication on a given general or subtechnical topic, for which the student is trained by reading texts or listening to them. | | | |
| 04XSZ5 | Spanish for Beginners Z5 | Z | 2 |
| The course books are supplemented with additional subtechnical materials, so the students will be gradually acquainted with peculiarities of Spanish for specific purposes. In its final part, the general Spanish course based on the course book will end with a written and oral examination. | | | |
| 04XSZZK | Spanish for Beginners Examination | ZK | 3 |
| The course content is the examination as given by the study plan. Examination consists of two parts - written and oral. Student can register for oral examination only if he/she has passed the written examination test. | | | |
| 04YAPI | Presentation Course | Z | 2 |
| The course will prepare students for presenting issues in their field by mastering the strategies and techniques of oral presentation. The course includes discussions (expressing views, comments, agreement, disagreement). Students will be able to respond to comments on their presentation and answer questions addressed to them after the presentation, which is a skill required for the defence of the Bachelor Project. Students will learn the basic structure of a Bachelor Project and rules for writing a paper. | | | |
| 12VTV | Scientific and Technical Computing | Z | 2 |
| The students get familiar with methods of solving of computational problems in the scientific and technical practice, and with methods of their programming. The course is oriented mainly to programming in the Fortran language. | | | |
| 12YNME1 | Numerical Methods 1 | Z,ZK | 4 |
| There are explained the basic principles of numerical mathematics important for numerical solving of problems important for physics and technology. Methods for solution of tasks very important for physicists (ordinary differential equations, random numbers) are included in addition to the basic numerical methods. Integrated computational environment MATLAB is used as a principle programming language as a demonstration tool. The seminars are held in computer laboratory. | | | |
| 12YPYTH | Scientific Programming in Python | Z | 2 |
| The aim of this course is to learn the fundamentals of the modern Python programming language with a focus on scientific computing. Emphasis is placed on effective solutions to real problems. The course is performed in an interactive form of practical exercises, whose topics can be tailored to the content of other subjects or student theses. Students are also involved in ongoing research. In the introductory part of the course, students learn the basic features of Python?from basic types to object oriented or functional programming. The greater part of the course focuses on specific features of Python for scientific programming. Presented are the main numerical libraries NumPy, SciPy and the Matplotlib graphics library. We show how to generate efficient code, how to combine Python with other languages, what tools are available. | | | |
| 12YUNXAP | Introduction to UNIX | Z | 2 |
| Computer and operating systems. Personal computer, workstation and supercomputers. Processor, memory, bus, devices, hard disk, network interface. Hardware and software. Principles of operating systems. Operating system UNIX. Basic principles, kernel, kernel services. Documentation. File system, file atributes, working with files. Text editors: vi, emacs. Command interpreter (shell) bash and its programming (scripts). Controlling processes, process status, computer load a process priorities. Standard tools. Graphical user interface X-windows. Computer networks. Local computer networks. Global computer networks. Addresses and protocols TCP/IP. Network configutation of a computer. Network services: hardware sharing, mail, scp, etc. Network applications | | | |
| 12YVKT | Vacuum Technology | KZ | 4 |
| Rarefied gasses: basic concepts and relations; diffusion,flow of rarefied gases. Flow and current of gas, conductivity. Interaction of gas with solid surface; sorption, desorption; gas transport through solid matter; evaporation, condensation;Vacuum generation: Pumping proces, Ultimative pressure, Pumping speedPumps and their properties:-Positive displacement pumps: Diaphragm, Sliding vane rotary, Diffusion, Molecular, Roots, Molecular and Turbomolecular pumps. Sorption pumps: Cryopumps, Cryo-Adsorption pumps, Sublimation and NEG pumps, Ion getter pumps..Vacuum measurements: vacuum gauges of total and partial pressure; pumping speed; gas flow, search for leaks. Materials and vacuum components and seals.Practical exercises. | | | |
| 15CH2 | General Chemistry 2 | Z,ZK | 3 |
| The subject is the continuation of the course General chemistry I. The main attention is paid to general principles governing chemical processes. Using various examples, the fact that the validity of these principles is not restricted only to chemical processes is documented. The significance and practical use of explained principles are illustrated by examples solved in exercises. | | | |
| 15YCH1 | General Chemistry 1 | Z | 3 |
| The most important concepts, quantities and units used in chemistry are introduced in the course General Chemistry I. Their significance and practical use are illustrated by examples solved in exercises. | | | |

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| 17YUING | Introduction to Engineering | KZ | 3 |
| This course provides introduction to engineering skills. Students should gain general engineering skills at basic level (e.g. material properties and behavior, basics of manufacturing and production, quality assurance, environmental impacts,). In addition, the introduction to scientific work and technical drawing will be included. | | | |
| 17YZEL | Basics of Electronics | KZ | 3 |
| Lectures provide basic information of electronics. In the beginning, lectures are devoted to passive components - resistors, capacitors, inductors and solution of electrical circuits with them. Next, lectures deal with semiconductor components (standard, Zener, capacitive, LED), bipolar, unipolar transistors and semiconductor components with more layers (thyristors and triacs). Lectures continue with general amplifiers and operational amplifiers. Finally, lectures deal with digital circuits, digital/analog and analog/digital converters. Lectures are completed with electronic laboratory exercises. | | | |
| 18NES1 | Neural Networks 1 | KZ | 5 |
| The aim of the course "Neural Networks 1" is to acquaint students with basic models of artificial neural networks, algorithms for their learning, and other related machine learning techniques. The goal is to teach students how to apply these models and methods to solve practical tasks. | | | |
| 18YPRC1 | Programming in C++ 1 | Z | 4 |
| This course covers mainly the C programming language and non-object oriented features of the C++ language. | | | |
| 18YPRC2 | Programming in C++ 2 | KZ | 4 |
| This course covers the object oriented programming and othesr advanced constructs in the C+;+ programming language and the Standard Template Library. | | | |
| 18YZALG | Basics of Algorithmization | Z,ZK | 4 |
| This course is devoted to selected algorithms and methods for algorithm design. This course intruduces selected methods for the determination of the algorithm complexity. | | | |
| 18YZPRO | Basics of Programming | Z | 4 |
| This course is intended mainly for students with little or no experience in programming. It familiarizes the students with the basic concepts in programming and with the Python programming language. | | | |
| TV-1 | Physical Education | Z | 1 |
| TV-2 | Physical Education | Z | 1 |
| TV-3 | Physical education | Z | 1 |
| TV-4 | Physical education | Z | 1 |

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