

Study plan

Name of study plan: Aplikace informatiky v přírodních vědách

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Applications of Informatics in Natural Sciences

Type of study: Bachelor full-time

Required credits: 0

Elective courses credits: 180

Sum of credits in the plan: 180

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 0

The role of the block: P

Code of the group: BSPAIPV1

Name of the group: BS P_AIPVB 1st year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 17 courses

Credits in the group: 0

Note on the group:

Podmínkou skládání zkoušky 01MANZ je získání zápočtu z 01MAN.Podmínkou skládání zkoušky 01LALZ je získání zápočtu z 01LAL.

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
02DEF1	History of Physics 1 Igor Jex Igor Jex (Gar.)	Z	2	2+0	Z	P
01DIM1	Discrete Mathematics 1 Edita Pelantová, Zuzana Masáková, Lubomíra Dvořáková Lubomíra Dvořáková Zuzana Masáková (Gar.)	Z	2	2P+0C	Z	P
01DIM2	Discrete Mathematics 2 Edita Pelantová, Zuzana Masáková Zuzana Masáková Zuzana Masáková (Gar.)	Z	2	2P+0C	L	P
01LAL	Linear Algebra 1 Lubomíra Dvořáková, Petr Ambrož Lubomíra Dvořáková Lubomíra Dvořáková (Gar.)	Z	2	2P+2C		P
01LALZ	Linear Algebra 1, exam Lubomíra Dvořáková, Petr Ambrož Lubomíra Dvořáková Lubomíra Dvořáková (Gar.)	ZK	2	0P+0C		P
01LAL2	Linear Algebra 2 Lubomíra Dvořáková, Petr Ambrož Lubomíra Dvořáková Lubomíra Dvořáková (Gar.)	Z,ZK	4	2P+2C		P
18MAK1	Macroeconomics 1 Quang Van Tran Quang Van Tran Quang Van Tran (Gar.)	Z,ZK	4	2+2	L	P
01MAN	Calculus 1 Pavel Strachota Pavel Strachota Pavel Strachota (Gar.)	Z	4	4+4		P
01MANZ	Calculus 1, exam Edita Pelantová, Pavel Strachota, Miroslav Kolář Pavel Strachota Pavel Strachota (Gar.)	ZK	4	0P+0C		P
01MAN2	Calculus 2 Maksym Dreval Maksym Dreval Maksym Dreval (Gar.)	Z,ZK	8	4P+4C		P
18MIK	Microeconomics Quang Van Tran Quang Van Tran Quang Van Tran (Gar.)	Z,ZK	4	2P+2C	Z	P
18PPY1	Programming in Python 1 Matej Moješ, Jakub Klínek Jakub Klínek Jakub Klínek (Gar.)	Z	2	2C	L	P
00PT	Preparatory Week Petr Ambrož, Milan Krbálek Petr Ambrož Petr Ambrož (Gar.)	Z	2	týden	Z	P
18OS	Operating Systems Administration Vladimír Jarý Vladimír Jarý Vladimír Jarý (Gar.)	KZ	2	0+2	L	P
12UNIXAP	Introduction to UNIX Milan Kuchařík Milan Kuchařík Milan Kuchařík (Gar.)	Z	2	1P+1C	L	P

18ZALG	Basics of Algorithmization Vladimír Jarý, Jan Tomsa, Petr Pauš, Miroslav Virius, Zuzana Petříčková, Alexandr Žák, Matěj Michálek Vladimír Jarý Miroslav Virius (Gar.)	Z,ZK	4	2+2	L	P
18ZPRO	Basics of Programming Jakub Klinkovský, Vladimír Jarý, Jan Tomsa, Petr Pauš, Miroslav Virius, Zuzana Petříčková, Jan Vondruška Miroslav Virius Miroslav Virius (Gar.)	Z	4	4C	Z	P

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV1 Name=BS P_AIPVB 1st year

02DEF1	History of Physics 1 Physics and its place in the system of sciences. The relationship of man and nature. Natural sciences in ancient Orient and Greece, Greek natural philosophers, Aristotle. Physics in Hellenistic period, Archimedes. 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.				Z	2
01DIM1	Discrete Mathematics 1 The seminar is devoted to elementary number theory and applications. In addition to the material discussed, it includes individual problem solving.				Z	2
01DIM2	Discrete Mathematics 2 The seminar is devoted to recurrence relations. It includes individual problem solving.				Z	2
01LAL	Linear Algebra 1 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.				Z	2
01LALZ	Linear Algebra 1, exam				ZK	2
01LAL2	Linear Algebra 2 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.				Z,ZK	4
18MAK1	Macroeconomics 1 Macroeconomics I provides students with a fundamental theoretical basis for understanding how an economy works. It introduces main macroeconomic indicators, money market, macroeconomic equilibrium theory, fundamentals of open economy theory, inflation, unemployment, economic growth, economic fluctuations, basic macroeconomic models of IS-LM, AS-AD and their implications for economic policies. The learning outcomes of the course is to equip students with ability to analyze macroeconomic phenomena and their interconnections and subsequently to use them under the conditions of modern economic life.				Z,ZK	4
01MAN	Calculus 1 Basic calculus (real analysis, functions of one real variable, differential calculus).				Z	4
01MANZ	Calculus 1, exam				ZK	4
01MAN2	Calculus 2 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				Z,ZK	8
18MIK	Microeconomics Microeconomics is a set of theories, which help us to understand processes by which the scarce resources are allocated among alternative uses. Microeconomics explains the role of prices and markets in these processes and makes more clear behaviour of the economic agents. Lectures and seminars are designed so that the explanation of microeconomic concepts does not require knowledge of calculus.				Z,ZK	4
18PPY1	Programming in Python 1 This course introduces students to advanced features of the Python language and common scientific packages. The course covers both object-oriented as well as functional programming paradigms. The following part of the course describes the use of Python in the fields of scientific and technical computing (NumPy and SciPy packages), data processing and visualization.				Z	2
00PT	Preparatory Week				Z	2
18OS	Operating Systems Administration Administration of operating systems Windows and Linux. Users, rights, configuration, command line, networks, firewall				KZ	2
12UNXAP	Introduction to UNIX 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 attributes, 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. Computer networks. Local computer networks. Global computer networks. Addresses and protocols TCP/IP. Network configuration of a computer. Network services: hardware sharing, mail, scp, etc. Network applications				Z	2
18ZALG	Basics of Algorithmization This course is devoted to selected algorithms and methods for algorithm design. This course introduces selected methods for the determination of the algorithm complexity.				Z,ZK	4
18ZPRO	Basics of Programming 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.				Z	4

Code of the group: BSPAIPV2

Name of the group: BS P_AIPVB 2nd year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 11 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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
12ANM	Applied Numerical Methods <i>Pavel Váchal, Jan Pšikal, Alena Zavadilová Alena Zavadilová Jan Pšikal (Gar.)</i>	KZ	4	2+2	L	P
02FY1	Physics 1 <i>Jaroslav Bielčík Jaroslav Bielčík Jaroslav Bielčík (Gar.)</i>	Z,ZK	4	2P+2C	Z	P
02FY2	Physics 2 <i>Jaroslav Bielčík Jaroslav Bielčík Jaroslav Bielčík (Gar.)</i>	Z,ZK	4	2P+2C	L	P
18MAK2	Macroeconomics 2 <i>Quang Van Tran Quang Van Tran Quang Van Tran (Gar.)</i>	Z,ZK	4	2+2	Z	P
01ANB3	Calculus B 3 <i>Milan Krbálek Milan Krbálek Milan Krbálek (Gar.)</i>	Z,ZK	8	4P+4C		P
01ANB4	Calculus B 4 <i>Jiří Mikyška Jiří Mikyška</i>	Z,ZK	6	2P+4C		P
18PRC1	Programming in C++ 1 <i>Vladimír Jarý, Miroslav Virius Miroslav Virius Miroslav Virius (Gar.)</i>	Z	4	2+2	Z	P
18PRC2	Programming in C++ 2 <i>Jakub Klinkovský, Vladimír Jarý, Miroslav Virius Miroslav Virius Miroslav Virius (Gar.)</i>	KZ	4	2+2	L	P
18PMTL	Programming in MATLAB <i>Quang Van Tran, Matěj Pokorný, Jaromír Kukul Quang Van Tran Jaromír Kukul (Gar.)</i>	KZ	4	4C	Z	P
01PSL	LaTeX - Publication Instrument <i>Petr Ambrož Petr Ambrož Petr Ambrož (Gar.)</i>	Z	2	0+2	L	P
18GUI	Construction og Grafical user nterface <i>Vladimír Jarý Vladimír Jarý Vladimír Jarý (Gar.)</i>	Z	2	0P + 2C	L	P

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV2 Name=BS P_AIPVB 2nd year

12ANM	Applied Numerical Methods For English version use code 12YNME1. The basic principles of numerical mathematics important for the numerical solution of physical and technical problems are explained. In addition to fundamental numerical tasks, problems relevant to physicists are also included (e.g. solving ordinary differential equations). The exercises take place in a computer lab, featuring demonstrations of various numerical methods, their properties, and applications.	KZ	4
02FY1	Physics 1 History, principles and applications of mechanics, waves and thermodynamics ? basic level. The lecture is supplemented with practical investigation and demonstration of selected physical phenomena.	Z,ZK	4
02FY2	Physics 2 Thermodynamics, electricity and magnetism, modern physics. The lecture is supplemented with practical investigation and demonstration of selected physical phenomena.	Z,ZK	4
18MAK2	Macroeconomics 2 Macroeconomics II extends theoretical knowledge acquired from Macroeconomics I of its students with the latest knowledge of contemporary macroeconomics. They are models of economic growth, especially those with an emphasis on the role of human capital and technological progress. Furthermore, it introduces students to modern principles of economic modeling, i.e., macroeconomic models derived from microeconomic behavior of subjects and economics and their rational expectations. It also provides students with modern knowledge of labor market modeling.	Z,ZK	4
01ANB3	Calculus B 3 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. Quadratic functions and quadrics. 4. 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. 5. Differential calculus for functions of several variables - limit, continuity, partial and directional derivative, gradient, total derivatives and tangent plane. 6. Taylor series for functions of several variables. 7. Fundamentals in vector analysis, Jacobi matrix.	Z,ZK	8
01ANB4	Calculus B 4 [1] Implicitly defined functions. [2] Regular mapping, transformation of coordinates, non-cartesian coordinate systems. [3] Local, constrained, and global extrema of functions of several independent variables. [4] Basics of the measure theory, and construction of the Lebesgue measure. [5] Integral calculus of construction of several independent variables - Riemann and Lebesgue integrals, basic properties, theorem of Fubini, substitution theorem, theorems of Levi and Lebesgue. Limit, continuity and differentiability of parametric integrals. [6] Line and surface integrals. Integral theorems.	Z,ZK	6
18PRC1	Programming in C++ 1 This course covers mainly the C programming language and non-object oriented features of the C++ language.	Z	4
18PRC2	Programming in C++ 2 This course covers the object oriented programming and other advanced constructs in the C++; programming language and the Standard Template Library.	KZ	4
18PMTL	Programming in MATLAB Introducing Matlab environment as efficient tool for computation in complex arrays and symbolic variables, namely for linear algebra, mathematic analysis, statistics, algorithmization and geometric representation of results.	KZ	4
01PSL	LaTeX - Publication Instrument The course is devoted to the basics and facilities of computer typography, particularly to the system LaTeX	Z	2
18GUI	Construction og Grafical user nterface The course introduces to the graphical user interface, its design and creation. Practical problems and their solutions will be demonstrated in the exercises. Students will learn to create simple RAD applications	Z	2

Code of the group: BSPAIPV3

Name of the group: BS P_AIPVB 3rd year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 16 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
18AOV	Applied operational research Quang Van Tran, Adam Borovička Quang Van Tran Quang Van Tran (Gar.)	Z,ZK	4	2P+2C	L	P
18BPSE1	Bachelor Thesis 1 Milan Kuchařík, Radek Fučík, Dana Majerová Milan Kuchařík Milan Kuchařík (Gar.)	Z	5	0+5	Z	P
18BPSE2	Bachelor Thesis 2 Milan Kuchařík, Jaromír Kukal, Radek Fučík, Dana Majerová Milan Kuchařík Milan Kuchařík (Gar.)	Z	10	0+10	L	P
18EKN	Econometrics Quang Van Tran, Radek Hřebík Quang Van Tran Quang Van Tran (Gar.)	Z,ZK	4	2P+2C	L	P
01LIP	Linear Programming Radek Fučík, Jan Bureš, Jan Volec Jan Volec Radek Fučík (Gar.)	Z,ZK	3	2+1	Z	P
01PGR1	Computer Graphics 1 Pavel Strachota Pavel Strachota Pavel Strachota (Gar.)	Z,ZK	2	1P+1C		P
01PGR2	Computer Graphics 2 Pavel Strachota Pavel Strachota Pavel Strachota (Gar.)	Z,ZK	2	1P+1C		P
01PRST	Probability and Statistics Tomáš Hobza Tomáš Hobza Tomáš Hobza (Gar.)	Z,ZK	4	3+1	Z	P
18PJ	Programming in Java Miroslav Virius Miroslav Virius Miroslav Virius (Gar.)	Z,ZK	5	2P+2C	Z	P
18PW	Web environment and markup languages Pavel Eichler Dana Majerová Dana Majerová (Gar.)	KZ	2	2C	Z	P
18SBAK	Bachelor Seminar Quang Van Tran, Milan Kuchařík, Jaromír Kukal, Dana Majerová Milan Kuchařík Milan Kuchařík (Gar.)	Z	2	0+2	L	P
01TKO	Theory of Codes Edita Pelantová, Jan Volec Edita Pelantová Jan Volec (Gar.)	ZK	2	2P+0C	L	P
18INTA	Development of internet applications Jakub Klínek, Dana Majerová Dana Majerová Dana Majerová (Gar.)	KZ	4	2P+2C	L	P
12UPF1	Introduction to Computational Physics 1 Milan Kuchařík, Richard Liska Milan Kuchařík Milan Kuchařík (Gar.)	Z,ZK	2	1P+1C	Z	P
12UPF2	Introduction to Computational Physics 2 Milan Kuchařík, Richard Liska Milan Kuchařík Milan Kuchařík (Gar.)	Z,ZK	2	1P+1C	L	P
12ZMDT	Measurement and Data Processing Ivan Procházka, Josef Blažej Josef Blažej Ivan Procházka (Gar.)	Z,ZK	2	1P+1C	Z	P

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV3 Name=BS P_AIPVB 3rd year

18AOV	Applied operational research The course is an introduction course to selected models and methods for economic decision making. The main attention is given to the introduction to the methods and possibilities of their real applications and problem solving by means of the current software products.	Z,ZK	4
18BPSE1	Bachelor Thesis 1 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.	Z	5
18BPSE2	Bachelor Thesis 2 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.	Z	10
18EKN	Econometrics Econometrics is based on economic theory and the relations between economic quantities are expressed by mathematical tools and observed data from economic reality. The course covers basic instruments of econometric analysis as the basic econometric model, the generalized model, the system of simultaneous equations and instruments for econometric model verification.	Z,ZK	4
01LIP	Linear Programming The course deals with special problems concerning bound extremes of functions of several variables (the function is linear and the constraints are in the form of linear equations and inequalities).	Z,ZK	3
01PGR1	Computer Graphics 1 The first part of the two-semester "Computer Graphics" course is devoted to the specifics of digital display devices spanning from history up to the state of the art technologies. Further, a survey of fundamental problems in 2D computer graphics is given together with their solutions. Focus is put on mathematical description of problems and explanation of the corresponding algorithms using knowledge previously obtained in a variety of subjects available at FNSPE. The final part of the course covers the applications of computer graphics approaches in the process of authoring scientific documents and presentations.	Z,ZK	2
01PGR2	Computer Graphics 2 The second part of the two-semester "Computer Graphics" course begins with a brief introduction to signal theory in the context of aliasing - a phenomenon ubiquitous in computer graphics. Further, a well structured survey of fundamental problems in 3D computer graphics is given together with their solutions, from the description of a 3D scene to its realistic rendering. Focus is put on mathematical description of problems and explanation of the corresponding algorithms using knowledge previously obtained in a variety of subjects available at FNSPE. The algorithm implementation aspect such as data structures design etc. is also a matter of concern. In the last lecture, a number of theoretical concepts are demonstrated using Blender, an open-source 3D modeling and rendering software instrument.	Z,ZK	2

01PRST	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.			
18PJ	Programming in Java	Z,ZK	5
This course is devoted to the Java platform and to the development of the basic types of applications for this platform.			
18PW	Web environment and markup languages	KZ	2
The course introduces students to fundamental principles and best practices for web design with respect to technical functionality, informational value, readability and usability.			
18SBAK	Bachelor Seminar	Z	2
Seminar devoted to preparation of the bachelor's thesis and the presentation of the result. Students present their running results.			
01TKO	Theory of Codes	ZK	2
Algebraic methods used in error detecting and error correcting codes.			
18INTA	Development of internet applications	KZ	4
The lectures provide an overview of modern technologies for the development of web applications. Students will learn basic web languages and concepts (HTML, URL, etc.) and they will also be introduced to relational database systems. The tutorials are dedicated to practical examples of building web applications, from the simplest to more advanced. The course is oriented primarily towards backend technologies and using the Python languages, but covers also frontend frameworks and JavaScript.			
12UPF1	Introduction to Computational Physics 1	Z,ZK	2
Numerical simulation and its role in physics, methodology of writing computer codes. Computer languages for physics. Numerical libraries and program libraries for physics. Computer tools for scientific visualization. Computational fluid dynamics, hydrodynamic simulations, methods for discretization of Euler equations. High-performance computing, parallel computing, software for parallel simulations. Databases of scientific information, scientist evaluation, citation analysis.			
12UPF2	Introduction to Computational Physics 2	Z,ZK	2
Nonlinear models, complex systems, chaotic systems, fractals and their applications in physics. Artificial intelligence methods: neural networks, machine learning, genetic algorithms, expert systems and their applications in physics. Quantum computing. Virtual reality.			
12ZMDT	Measurement and Data Processing	Z,ZK	2
Basic knowledge for the measurements and data processing and result interpretation: errors, precision, accuracy, normal distribution and its properties, data fitting, separation of the signal from the noise.			

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: BSSPOLVEDY

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: Only one of these courses is obligatory.

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
00EKOT	Economy in Technology <i>Jana Kovářová</i>	Z	1	2+0		PV
00ETV	Ethics of Science and Technology <i>Jakub Hajiček Jana Kovářová Jakub Hajiček (Gar.)</i>	Z	1	0+2	L	PV
00RET	Rhetoric <i>Jana Kovářová Jana Kovářová Jana Kovářová (Gar.)</i>	Z	1	0+2		PV
00UPRA	Introduction to Law <i>Martin Čech Jana Kovářová Martin Čech (Gar.)</i>	Z	1	0+2		PV
00UPSY	Introduction to Psychology <i>Jakub Hajiček Jana Kovářová Jakub Hajiček (Gar.)</i>	Z	1	0+2		PV

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

00EKOT	Economy in Technology	Z	1
The course introduces the basics of micro- and macroeconomics.			
00ETV	Ethics of Science and Technology	Z	1
00RET	Rhetoric	Z	1
The course is focused on the acquisition of speech and voice techniques and on the rules of correct pronunciation. The course is also devoted to the composition of public speech as well as to its nonverbal aspects. Stylistics exercises, strategies for coping with stage-fright and a short excursion into the history of rhetoric are an integral part of the course.			
00UPRA	Introduction to Law	Z	1
00UPSY	Introduction to Psychology	Z	1

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 (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
04XAMZK	English for Intermediate Students Examination <i>Jana Kovářová, Slavěna Brownová Jana Kovářová Jana Kovářová (Gar.)</i>	ZK	4		Z	PV
04XAPZK	English for Advanced Students Examination <i>Slavěna Brownová, Darren Copeland Jana Kovářová Darren Copeland (Gar.)</i>	ZK	4		Z	PV
04XCESZZK	Czech for Foreigners Beginners - Examination <i>Slavěna Brownová Jana Kovářová Jana Kovářová (Gar.)</i>	ZK	4		Z	PV
04XCESMZK	Czech for Intermediate Students Examination <i>Jana Kovářová Jana Kovářová Jana Kovářová (Gar.)</i>	ZK	4		Z	PV
04XCESPZK	Czech for Foreign Students - Advanced Examination <i>Jana Kovářová Jana Kovářová Jana Kovářová (Gar.)</i>	ZK	4		Z	PV
04XFMZK	French for Intermediate Students Examination <i>Věra Šlechtová Věra Šlechtová Věra Šlechtová (Gar.)</i>	ZK	4		Z	PV
04XFPZK	French for Advanced Students Examination <i>Věra Šlechtová Věra Šlechtová Věra Šlechtová (Gar.)</i>	ZK	4		Z	PV
04XFZZK	French for Beginners Examination <i>Věra Šlechtová Věra Šlechtová Věra Šlechtová (Gar.)</i>	ZK	3		L	PV
04XNMZK	German for Intermediate Students Examination <i>Miloslava Čechová Miloslava Čechová Miloslava Čechová (Gar.)</i>	ZK	4		Z	PV
04XNPZK	German for Advanced Students Examination <i>Miloslava Čechová Miloslava Čechová Miloslava Čechová (Gar.)</i>	ZK	4		Z	PV
04XRMZK	Russian for Intermediate Students Examination <i>Zhanna Isaeva Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	ZK	4		Z	PV
04XRPZK	Russian for Advanced Students Examination <i>Zhanna Isaeva Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	ZK	4		Z	PV
04XRZZK	Russian for Beginners Examination <i>Zhanna Isaeva Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	ZK	3		L	PV
04XSMZK	Spanish for Intermediate Students Examination <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	ZK	4		Z	PV
04XSPZK	Spanish for Advanced Students Examination <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	ZK	4		Z	PV
04XSZZK	Spanish for Beginners Examination <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	ZK	3		L	PV

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

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.			
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 04XAP3 syllabus and the ability to apply their knowledge obtained in the three 04XAP courses. In addition to passing courses 04XAP1, 04XAP2, and 04XAP3, a prerequisite for taking the exam is a presentation on a specialized topic in the student's field. The examination consists of 2 parts - written and oral.			
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.			
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.			
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.			
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.			
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.			
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.			
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.			
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.			

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.			
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. Students can register for oral examination only if they have 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: BSPAIPVV

Name of the group: BS P_AIPVB Optional courses

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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
12AUX	Administration of UNIX System <i>Milan Šiňor Milan Šiňor Milan Šiňor (Gar.)</i>	KZ	2	2+0	L	v
18AAIO	Applications of AI for image processing <i>Petr Kubera Petr Kubera Petr Kubera (Gar.)</i>	KZ	3	5XD		v
02DEF2	History of Physics 2 <i>Igor Jex Miroslav Myška Igor Jex (Gar.)</i>	Z	2	2+0	L	v
01DIMA3	Discrete Mathematics 3 <i>Lubomíra Dvořáková Lubomíra Dvořáková Lubomíra Dvořáková (Gar.)</i>	ZK	2	2P+0C		v
11GNU	GNU Programming <i>Martin Dráb Martin Dráb Martin Dráb (Gar.)</i>	KZ	4	2P+2C	L	v
01JEPR	Simple Compilers <i>Zdeněk Čulík Zdeněk Čulík Zdeněk Čulík (Gar.)</i>	Z	2	2	L	v
04AKS	English Conversation <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	1	0+2	L	v
00MAM1	Essentials of High School Course 1 <i>David Břeň</i>	Z	1	0+1		v
00MAM2	Essentials of High School Math Course 2 <i>Lukáš Heriban Lukáš Heriban Lukáš Heriban (Gar.)</i>	Z	1	0+1		v
18NES1	Neural Networks 1 <i>Zuzana Petříčková Zuzana Petříčková</i>	KZ	5	2P+2C	L	v
18NES2	Neural Networks 2 <i>Zuzana Petříčková Zuzana Petříčková</i>	KZ	3	0P+2C	L	v
01SITE1	Computer Networks 1 <i>Miroslav Minárik Miroslav Minárik Miroslav Minárik (Gar.)</i>	Z	2	1+1	Z	v
01SITE2	Computer Networks 2 <i>Miroslav Minárik Miroslav Minárik Miroslav Minárik (Gar.)</i>	Z	2	1+1	L	v
18PROP	Practical training in programming <i>Jakub Klínek Jakub Klínek Jakub Klínek (Gar.)</i>	KZ	3	2C	Z	v
01PERI	Programming of Peripherals Devices <i>Zdeněk Čulík Zdeněk Čulík (Gar.)</i>	Z	2	2+0	Z	v
18PVP	Programming in Pascal <i>Miroslav Vírúš Miroslav Vírúš Miroslav Vírúš (Gar.)</i>	Z,ZK	4	2+2	L	v
18PPY2	Programming in Python 2 <i>Jakub Klínek Jakub Klínek Jakub Klínek (Gar.)</i>	Z	2	2S	Z	v
18PPY3	Programming in Python 3 <i>Jakub Klínek, Rudolf Pecinovský Jakub Klínek Jakub Klínek (Gar.)</i>	Z	2	2C	L	v

18SVK	Student's Scientific Conference <i>Kateřina Horaisov Kateřina Horaisov Kateřina Horaisov (Gar.)</i>	Z	1	5 dn		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
14TED	Creating Electronic Documents <i>Aleř Materna, Jiř Martinek Aleř Materna Aleř Materna (Gar.)</i>	Z	2	26C		v
18UDB	Introduction to Databases <i>Dana Majerov Dana Majerov Dana Majerov (Gar.)</i>	Z	2	1P+1C	Z	v
17UING	Introduction to Engineering <i>Jan Frybor, Petr Hausld, Radek Muřlek Jan Frybor Jan Frybor (Gar.)</i>	KZ	3	2P+1C	Z	v
18UQI	Introduction to quantum informatics <i>Aleř Wodeck Aleř Wodeck (Gar.)</i>	Z	3	2P	L	v
18UOA	Introduction into Object Oriented Architecture <i>Rudolf Pecinovsk Rudolf Pecinovsk</i>	Z,ZK	4	2P+2C	Z	v
01UOP	Introduction to Object Programming <i>Zdenekulk Zdenekulk Zdenekulk (Gar.)</i>	ZK	2	0+2		v
01UP1	Introduction to Probability 1 <i>Jan Vybral Jan Vybral Jan Vybral (Gar.)</i>	Z,ZK	3	1P+1C		v
01UP2	Introduction to Probability 2 <i>Milan Krblek, Michaela Krblkov Michaela Krblkov Milan Krblek (Gar.)</i>	Z,ZK	3	1P+1C		v
01USU	Introduction to Machine Learning <i>Jan Flusser Jan Flusser Jan Flusser (Gar.)</i>	Z,ZK	4	2P+2C		v
12PYTH	Scientific Programming in Python <i>Pavel Vchal, Jakub Urban Pavel Vchal Pavel Vchal (Gar.)</i>	Z	2	0+2	L	v
18CLOUD	Virtualization and cloud technologies <i>Jakub Klinkovsk Jakub Klinkovsk Jakub Klinkovsk (Gar.)</i>	KZ	3	1P+1C	L	v

Characteristics of the courses of this group of Study Plan: Code=BSPAIPVV Name=BS P_AIPVB Optional courses

12AUX	Administration of UNIX System Basic and more advanced administration of Unix operating system	KZ	2
18AAIO	Applications of AI for image processing The aim of the course is to provide students with hands-on experience with existing state-of-the-art tools based on neural networks (NN), with a primary focus on image processing. An example of such tools in the NVIDIA ecosystem is the Jetson device. Students will learn how to set up this device, install the required software, and develop programs that use existing pre-trained models.	KZ	3
02DEF2	History of Physics 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 radioactivity, 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.	Z	2
01DIMA3	Discrete Mathematics 3 Students get to know problems and methods of their solving from various parts of discrete mathematics. The seminar includes individual problem solving of ones own choice from the given literature.	ZK	2
11GNU	GNU Programming The aim of the course is to introduce students into the Linux system environment and therein used GNU utilities and programming tools to such a level, that they would be able to use these tools for creating scripts and programs for processing acquired or simulated data for their experiments in physics with the use of the faculty's Hyperion cluster (however the learned skills could of course be applied to any Linux system). For students to be able to write an effective code, it is necessary to know how today's computers function internally, so the first half of the course is dedicated to an overview of principles of internal functionality of a computer (from hardware, through the operating system, up to the applications).	KZ	4
01JEPR	Simple Compilers Lexical and syntax analysis, code generation, simple optimizations, development environments, reflection.	Z	2
04AKS	English Conversation The course will develop the student's communication skills acquired throughout their previous studies. It aims to improve all aspects of oral communication. The student will develop their vocabulary for various communication situations and will master their communication strategy. They will also practise their listening skills in order to better follow and participate in discussions. The student will be trained to express their ideas clearly and according to current English usage, and become a more confident speaker.	Z	1
00MAM1	Essentials of High School Course 1 Students are introduced to mathematical concepts and methods used in the introductory physics course.	Z	1
00MAM2	Essentials of High School Math Course 2 The course introduces the fundamental areas of mathematics essential for university studies and practical applications. It covers sets, logic, proofs, functions, derivatives, integrals, analytic geometry, combinatorics, and probability, with emphasis on understanding principles, rigor, and problem solving.	Z	1
18NES1	Neural Networks 1 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.	KZ	5
18NES2	Neural Networks 2 The aim of the course "Neural Networks 2" is to acquaint students with basic models of deep neural networks and teach them how to apply these models and methods to solve practical tasks.	KZ	3
01SITE1	Computer Networks 1 Understanding the history and present network (LAN, WAN, use the principles and technologies). Architecture of reference model ISO/OSI. Network protocols, practical exercises with TCP/IP communications. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification authorities, public key infrastructure (PKI). Use in practice. Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the serial control lines, modems)	Z	2

01SITE2	Computer Networks 2	Z	2
Understanding the history and present network (LAN, WAN, use the principles and technologies). Architecture of reference model ISO/OSI. Network protocols, practical exercises with TCP/IP communications. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification authorities, public key infrastructure (PKI). Use in practice. Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the serial control lines, modems)			
18PROP	Practical training in programming	KZ	3
The goal of this course is to understand advanced topics related to programming, code design and software project development. Students will practice pragmatic techniques and principles on concrete real-world examples. Emphasis is put on the review of freely available software tools that can improve the programmers work efficiency and ensure high quality of the final source code.			
01PERI	Programming of Peripherals Devices	Z	2
Memory organization, input and output ports, computer bus. Software libraries for computer peripherals, 3D graphic libraries. Principles of peripherals device drivers.			
18PVP	Programming in Pascal	Z,ZK	4
This lecture 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 Pascal programming language.			
18PPY2	Programming in Python 2	Z	2
This course introduces students to practical applications of the Python language in scientific as well as commercial fields. The course is a seminar where each presented topic is accompanied by a short demo of a real-world application in the specific field.			
18PPY3	Programming in Python 3	Z	2
This advanced course is intended for students who have basic experience with programming in Python and using its libraries. It introduces students to advanced concepts of the Python language and modules they are based on.			
18SVK	Student's Scientific Conference	Z	1
This is the active participation of the student in one of the approved student conferences. The list of such conferences is defined by the course guarantor.			
TV-1	Physical Education	Z	1
TV-2	Physical Education	Z	1
TV-3	Physical education	Z	1
TV-4	Physical education	Z	1
14TED	Creating Electronic Documents	Z	2
Basic skills for creating and presenting student theses. Individual exercises focus on creating and formatting texts, equations, charts, tables, presentations and entire documents in an office suite.			
18UDB	Introduction to Databases	Z	2
This course is an introduction to relational database systems. Students will learn basic concepts and how to design a relational database. Students will be able to work with data using SQL. Credit is awarded for the seminar work (ERA model of relational database and its implementation in SQL).			
17UING	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.			
18UQI	Introduction to quantum informatics	Z	3
Quantum information has been on the rise for years. In this course, we explore the basics of quantum information theory with a strong emphasis on quantum computing. We discuss some of the most important quantum principles that lead to the so called quantum advantage and discuss many important quantum algorithms with the requisite amount of theoretical underpinning.			
18UOA	Introduction into Object Oriented Architecture	Z,ZK	4
The course is intended for students who are familiar with the basics of object-oriented programming in Python. A basic knowledge of object-oriented features in Java and C++ is also beneficial. It will familiarize students with the general object-oriented paradigm and, above all, with the principles that should be followed when building larger applications. Using several gradually built and improved applications, it demonstrates how adherence to these principles can be applied in the gradual improvement and refinement of applications according to growing customer requirements.			
01UOP	Introduction to Object Programming	ZK	2
Object oriented programming languages. Object oriented programming libraries for graphics, databases and distributed systems.			
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.			
01USU	Introduction to Machine Learning	Z,ZK	4
The aim of this course is to provide a broad introduction to machine learning, data mining and statistical image recognition. Main attention is paid to the basic methods of learning with the teacher, cluster analysis and dimensionality reduction. The lectures and theory explanation is accompanied by examples of experiments and practical applications. Exercises use Python and run in computer labs with emphasis on the implementation and use of machine learning algorithms applied to real data from practical problems.			
12PYTH	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.			
18CLOUD	Virtualization and cloud technologies	KZ	3
The goal of this course is to introduce the principles and technological foundations of cloud systems. Students will be introduced to the architectures of distributed systems, principles of application virtualization and they will learn how to use these technologies in practice. A fundamental part of the course is using containers, which is currently the most efficient technology for managing complex software systems. The practical part of the course covers tools for automatic configuration, testing, monitoring and deployment of virtualized applications.			

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) <i>Tutors, authors and guarantors (Gar.)</i>	Completion	Credits	Scope	Semester	Role
04XAM1	English for Intermediate Students M1 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	Z	v
04XAM2	English for Intermediate Students M2 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	L	v
04XAM3	English for Intermediate Students M3 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	Z	v
04XAP1	English for Advanced Students P1 <i>Jana Kovářová Darren Copeland (Gar.)</i>	Z	2	0+2	Z	v
04XAP2	English for Advanced Students P2 <i>Jana Kovářová Darren Copeland (Gar.)</i>	Z	2	0+2	L	v
04XAP3	English for Advanced Students P3 <i>Jana Kovářová Darren Copeland (Gar.)</i>	Z	2	0+2	Z	v
04XCESZ1	Czech for Foreigners - Beginners 1 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	Z	v
04XCESZ2	Czech for Foreigners - Beginners 2 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	L	v
04XCESZ3	Czech for Foreigners - Beginners 3 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	2S	Z	v
04XCESM1	Czech for Foreigners - Intermediate 1 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	Z	v
04XCESM2	Czech for Foreigners - Intermediate 2 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	L	v
04XCESM3	Czech for Foreigners - Intermediate 3 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	Z	v
04XCESP1	Czech for Foreign Students - Advanced 1 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	Z	v
04XCESP2	Czech for Foreigners - Advanced 2 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	L	v
04XCESP3	Czech for Foreigners - Advanced 3 <i>Jana Kovářová Jana Kovářová (Gar.)</i>	Z	2	0+2	Z	v
04XFM1	French for Intermediate Students M1 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+2	Z	v
04XFM2	French for Intermediate Students M2 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+2	L	v
04XFM3	French for Intermediate Students M3 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+2	Z	v
04XFP1	French for Advanced Students P1 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+2	Z	v
04XFP2	French for Advanced Students P2 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+2	L	v
04XFP3	French for Advanced Students P3 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+2	Z	v
04XFZ1	French for Beginners Z1 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+4	L	v
04XFZ2	French for Beginners Z2 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+4	Z	v
04XFZ3	French for Beginners Z3 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+4	L	v
04XFZ4	French for Beginners Z4 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+4	Z	v
04XFZ5	French for Beginners Z5 <i>Věra Šlechtová Věra Šlechtová (Gar.)</i>	Z	2	0+4	L	v
04XNM2	German for Intermediate Students M2 <i>Miloslava Čechová Miloslava Čechová (Gar.)</i>	Z	2	0+2	L	v
04XNM1	German for Intermediate Students M1 <i>Miloslava Čechová Miloslava Čechová (Gar.)</i>	Z	2	0+2	Z	v
04XNM3	German for Intermediate Students M3 <i>Miloslava Čechová Miloslava Čechová (Gar.)</i>	Z	2	0+2	Z	v
04XNP1	German for Advanced Students P1 <i>Miloslava Čechová Miloslava Čechová (Gar.)</i>	Z	2	0+2	Z	v
04XNP2	German for Advanced Students P2 <i>Miloslava Čechová Miloslava Čechová (Gar.)</i>	Z	2	0+2	L	v
04XNP3	German for Advanced Students P3 <i>Miloslava Čechová Miloslava Čechová (Gar.)</i>	Z	2	0+2	Z	v
04XRM1	Russian for Intermediate Students M1 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+2	Z	v

04XRM2	Russian for Intermediate Students M2 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+2	L	v
04XRM3	Russian for Intermediate Students M3 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+2	Z	v
04XRP1	Russian for Advanced Students P1 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+2	Z	v
04XRP2	Russian for Advanced Students P2 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+2	L	v
04XRP3	Russian for Advanced Students P3 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+2	Z	v
04XRZ1	Russian for Beginners Z1 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+4	L	v
04XRZ2	Russian for Beginners Z2 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+4	Z	v
04XRZ3	Russian for Beginners Z3 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+4	L	v
04XRZ4	Russian for Beginners Z4 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+4	Z	v
04XRZ5	Russian for Beginners Z5 <i>Zhanna Isaeva Zhanna Isaeva (Gar.)</i>	Z	2	0+4	L	v
04XSM1	Spanish for Intermediate Students M1 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+2	Z	v
04XSM2	Spanish for Intermediate Students M3 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+2	L	v
04XSM3	Spanish for Intermediate Students M3 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+2	Z	v
04XSP1	Spanish for Advanced Students P1 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+2	Z	v
04XSP2	Spanish for Advanced Students P2 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+2	L	v
04XSP3	Spanish for Advanced Students P3 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+2	Z	v
04XSZ1	Spanish for Beginners Z1 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+4	L	v
04XSZ2	Spanish for Beginners Students Z2 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+4	Z	v
04XSZ3	Spanish for Beginners Z3 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+4	L	v
04XSZ4	Spanish for Beginners Z4 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	Z	2	0+4	Z	v
04XSZ5	Spanish for Beginners Z5 <i>Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)</i>	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.			
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.			
04XAP1	English for Advanced Students P1	Z	2
The course is at the level of advanced English, designed for students who have successfully completed the full secondary school English language course (at least to 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), providing insights into the fundamentals of vocabulary, grammar, and the purpose and style which is typical of academic and professional oral and written communication situations concerning science, technology, engineering and mathematics (STEM) contexts. There is an emphasis on reading material and discussing ideas with colleagues prior to participating in plenary sessions. Full and active participation is a basic expectation.			
04XAP2	English for Advanced Students P2	Z	2
The course is designed for students who have successfully completed AP1 and is a continuation of the Advanced English course. The AP2 course builds on content covered in AP1, thus extending the students skills for working with texts relating to science, technology, engineering and mathematics (STEM), and honing spoken and written communication in STEM contexts. The course extends the students academic vocabulary, through exposure to a wide variety of diverse texts and broadens knowledge of key aspects of grammar (referred to as Language Topics), pertinent to effective academic discourse and communication. There is a specific emphasis on responding to graphic data and the synthesizing of comprehensive and nuanced interpretations of such data. There is a focus on formal conventions in written communication including sentence and paragraph structure, discourse marking and cohesion. As in AP1, considerations of the purpose and concomitant style which is typical of academic and professional oral and written communication is explored through sample materials. And once again, students are expected to discuss ideas with colleagues prior to participating in plenary sessions. Full and active participation is a basic expectation.			

04XAP3	English for Advanced Students P3	Z	2
<p>The AP3 course is designed for students who have successfully completed AP2 and is a continuation of the Advanced English course leading to a zápočet and a final graded examination. The AP3 course builds on content covered in both AP1 and AP2, and in terms of the final examinations, provides a summative assessment of the knowledge and skills acquired over the course of the three semesters. The AP3 course places greater emphasis on student participation, training oral communication skills, particularly when expressing an opinion, agreement, and objections in formal discussions. There is also focus on professional written communication in the context of applying for work placements and opportunities for further study. For most students this is their third year of studying for their bachelors degree and so there is a commitment to honing efficient and effective language skills with a view to enabling successful communication in English both in the academic context and in the wider world. Collaborating with colleagues to enable deeper understanding of complex ideas is a key goal.</p>			
04XCESZ1	Czech for Foreigners - Beginners 1	Z	2
<p>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.</p>			
04XCESZ2	Czech for Foreigners - Beginners 2	Z	2
<p>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.</p>			
04XCESZ3	Czech for Foreigners - Beginners 3	Z	2
<p>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.</p>			
04XCESM1	Czech for Foreigners - Intermediate 1	Z	2
<p>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.</p>			
04XCESM2	Czech for Foreigners - Intermediate 2	Z	2
<p>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.</p>			
04XCESM3	Czech for Foreigners - Intermediate 3	Z	2
<p>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.</p>			
04XCESP1	Czech for Foreign Students - Advanced 1	Z	2
<p>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.</p>			
04XCESP2	Czech for Foreigners - Advanced 2	Z	2
<p>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.</p>			
04XCESP3	Czech for Foreigners - Advanced 3	Z	2
<p>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.</p>			
04XFM1	French for Intermediate Students M1	Z	2
<p>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.</p>			
04XFM2	French for Intermediate Students M2	Z	2
<p>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.</p>			
04XFM3	French for Intermediate Students M3	Z	2
<p>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.</p>			
04XFP1	French for Advanced Students P1	Z	2
<p>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: subjontif, passé composé-impairfait, 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.</p>			
04XFP2	French for Advanced Students P2	Z	2
<p>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).</p>			
04XFP3	French for Advanced Students P3	Z	2
<p>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.</p>			

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 builds 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.			
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, 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 (XSM1). 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
00EKOT	Economy in Technology The course introduces the basics of micro- and macroeconomics.	Z	1
00ETV	Ethics of Science and Technology	Z	1
00MAM1	Essentials of High School Course 1 Students are introduced to mathematical concepts and methods used in the introductory physics course.	Z	1
00MAM2	Essentials of High School Math Course 2 The course introduces the fundamental areas of mathematics essential for university studies and practical applications. It covers sets, logic, proofs, functions, derivatives, integrals, analytic geometry, combinatorics, and probability, with emphasis on understanding principles, rigor, and problem solving.	Z	1
00PT	Preparatory Week	Z	2
00RET	Rhetoric The course is focused on the acquisition of speech and voice techniques and on the rules of correct pronunciation. The course is also devoted to the composition of public speech as well as to its nonverbal aspects. Stylistics exercises, strategies for coping with stage-fright and a short excursion into the history of rhetoric are an integral part of the course.	Z	1
00UPRA	Introduction to Law	Z	1
00UPSY	Introduction to Psychology	Z	1
01ANB3	Calculus B 3 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. Quadratic functions and quadrics. 4. 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. 5. Differential calculus for functions of several variables - limit, continuity, partial and directional derivative, gradient, total derivatives and tangent plane. 6. Taylor series for functions of several variables. 7. Fundamentals in vector analysis, Jacobi matrix.	Z,ZK	8
01ANB4	Calculus B 4 [1] Implicitly defined functions. [2] Regular mapping, transformation of coordinates, non-cartesian coordinate systems. [3] Local, constrained, and global extrema of functions of several independent variables. [4] Basics of the measure theory, and construction of the Lebesgue measure. [5] Integral calculus of functions of several independent variables - Riemann and Lebesgue integrals, basic properties, theorem of Fubini, substitution theorem, theorems of Levi and Lebesgue. Limit, continuity and differentiability of parametric integrals. [6] Line and surface integrals. Integral theorems.	Z,ZK	6
01DIM1	Discrete Mathematics 1 The seminar is devoted to elementary number theory and applications. In addition to the material discussed, it includes individual problem solving.	Z	2
01DIM2	Discrete Mathematics 2 The seminar is devoted to recurrence relations. It includes individual problem solving.	Z	2
01DIMA3	Discrete Mathematics 3 Students get to know problems and methods of their solving from various parts of discrete mathematics. The seminar includes individual problem solving of ones own choice from the given literature.	ZK	2
01JEPR	Simple Compilers Lexical and syntax analysis, code generation, simple optimizations, development environments, reflection.	Z	2
01LAL	Linear Algebra 1 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.	Z	2
01LAL2	Linear Algebra 2 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.	Z,ZK	4
01LALZ	Linear Algebra 1, exam	ZK	2
01LIP	Linear Programming The course deals with special problems concerning bound extremes of functions of several variables (the function is linear and the constraints are in the form of linear equations and inequalities).	Z,ZK	3
01MAN	Calculus 1 Basic calculus (real analysis, functions of one real variable, differential calculus).	Z	4
01MAN2	Calculus 2 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	Z,ZK	8
01MANZ	Calculus 1, exam	ZK	4
01PERI	Programming of Peripherals Devices Memory organization, input and output ports, computer bus. Software libraries for computer peripherals, 3D graphic libraries. Principles of peripherals device drivers.	Z	2
01PGR1	Computer Graphics 1 The first part of the two-semester "Computer Graphics" course is devoted to the specifics of digital display devices spanning from history up to the state of the art technologies. Further, a survey of fundamental problems in 2D computer graphics is given together with their solutions. Focus is put on mathematical description of problems and explanation of the corresponding algorithms using knowledge previously obtained in a variety of subjects available at FNSPE. The final part of the course covers the applications of computer graphics approaches in the process of authoring scientific documents and presentations.	Z,ZK	2

01PGR2	Computer Graphics 2	Z,ZK	2
The second part of the two-semester "Computer Graphics" course begins with a brief introduction to signal theory in the context of aliasing - a phenomenon ubiquitous in computer graphics. Further, a well structured survey of fundamental problems in 3D computer graphics is given together with their solutions, from the description of a 3D scene to its realistic rendering. Focus is put on mathematical description of problems and explanation of the corresponding algorithms using knowledge previously obtained in a variety of subjects available at FNSPE. The algorithm implementation aspect such as data structures design etc. is also a matter of concern. In the last lecture, a number of theoretical concepts are demonstrated using Blender, an open-source 3D modeling and rendering software instrument.			
01PRST	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.			
01PSL	LaTeX - Publication Instrument	Z	2
The course is devoted to the basics and facilities of computer typography, particularly to the system LaTeX			
01SITE1	Computer Networks 1	Z	2
Understanding the history and present network (LAN, WAN, use the principles and technologies). Architecture of reference model ISO/OSI. Network protocols, practical exercises with TCP/IP communications. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification authorities, public key infrastructure (PKI). Use in practice. Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the serial control lines, modems)			
01SITE2	Computer Networks 2	Z	2
Understanding the history and present network (LAN, WAN, use the principles and technologies). Architecture of reference model ISO/OSI. Network protocols, practical exercises with TCP/IP communications. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification authorities, public key infrastructure (PKI). Use in practice. Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the serial control lines, modems)			
01TKO	Theory of Codes	ZK	2
Algebraic methods used in error detecting and error correcting codes.			
01UOP	Introduction to Object Programming	ZK	2
Object oriented programming languages. Object oriented programming libraries for graphics, databases and distributed systems.			
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.			
01USU	Introduction to Machine Learning	Z,ZK	4
The aim of this course is to provide a broad introduction to machine learning, data mining and statistical image recognition. Main attention is paid to the basic methods of learning with the teacher, cluster analysis and dimensionality reduction. The lectures and theory explanation is accompanied by examples of experiments and practical applications. Exercises use Python and run in computer labs with emphasis on the implementation and use of machine learning algorithms applied to real data from practical problems.			
02DEF1	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 Hellenistic 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.			
02DEF2	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 radioactivity, 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.			
02FY1	Physics 1	Z,ZK	4
History, principles and applications of mechanics, waves and thermodynamics ? basic level. The lecture is supplemented with practical investigation and demonstration of selected physical phenomena.			
02FY2	Physics 2	Z,ZK	4
Thermodynamics, electricity and magnetism, modern physics. The lecture is supplemented with practical investigation and demonstration of selected physical phenomena.			
04AKS	English Conversation	Z	1
The course will develop the student's communication skills acquired throughout their previous studies. It aims to improve all aspects of oral communication. The student will develop their vocabulary for various communication situations and will master their communication strategy. They will also practise their listening skills in order to better follow and participate in discussions. The student will be trained to express their ideas clearly and according to current English usage, and become a more confident speaker.			
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 at the level of advanced English, designed for students who have successfully completed the full secondary school English language course (at least to 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), providing insights into the fundamentals of vocabulary, grammar, and the purpose and style which is typical of academic and professional oral and written communication situations concerning science, technology, engineering and mathematics (STEM) contexts. There is an emphasis on reading material and discussing ideas with colleagues prior to participating in plenary sessions. Full and active participation is a basic expectation.			
04XAP2	English for Advanced Students P2	Z	2
The course is designed for students who have successfully completed AP1 and is a continuation of the Advanced English course. The AP2 course builds on content covered in AP1, thus extending the students skills for working with texts relating to science, technology, engineering and mathematics (STEM), and honing spoken and written communication in STEM contexts. The course extends the students academic vocabulary, through exposure to a wide variety of diverse texts and broadens knowledge of key aspects of grammar (referred to as Language Topics), pertinent to effective academic discourse and communication. There is a specific emphasis on responding to graphic data and the synthesizing of comprehensive and nuanced interpretations of such data. There is a focus on formal conventions in written communication including sentence and paragraph structure, discourse marking and cohesion. As in AP1, considerations of the purpose and concomitant style which is typical of academic and professional oral and written communication is explored through sample materials. And once again, students are expected to discuss ideas with colleagues prior to participating in plenary sessions. Full and active participation is a basic expectation.			
04XAP3	English for Advanced Students P3	Z	2
The AP3 course is designed for students who have successfully completed AP2 and is a continuation of the Advanced English course leading to a zápočet and a final graded examination. The AP3 course builds on content covered in both AP1 and AP2, and in terms of the final examinations, provides a summative assessment of the knowledge and skills acquired over the course of the three semesters. The AP3 course places greater emphasis on student participation, training oral communication skills, particularly when expressing an opinion, agreement, and objections in formal discussions. There is also focus on professional written communication in the context of applying for work placements and opportunities for further study. For most students this is their third year of studying for their bachelors degree and so there is a commitment to honing efficient and effective language skills with a view to enabling successful communication in English both in the academic context and in the wider world. Collaborating with colleagues to enable deeper understanding of complex ideas is a key goal.			
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 04XAP3 syllabus and the ability to apply their knowledge obtained in the three 04XAP courses. In addition to passing courses 04XAP1, 04XAP2, and 04XAP3, a prerequisite for taking the exam is a presentation on a specialized topic in the student's field. The examination consists of 2 parts - written and oral.			
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: subjunctif, passé composé-impairfait, 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 Advanced 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 builds 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.			
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, 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 (XSM1). 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.			
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. Students can register for oral examination only if they have passed the written examination test.			
11GNU	GNU Programming	KZ	4
The aim of the course is to introduce students into the Linux system environment and therein used GNU utilities and programming tools to such a level, that they would be able to use these tools for creating scripts and programs for processing acquired or simulated data for their experiments in physics with the use of the faculty's Hyperion cluster (however the learned skills could of course be applied to any Linux system). For students to be able to write an effective code, it is necessary to know how today's computers function internally, so the first half of the course is dedicated to an overview of principles of internal functionality of a computer (from hardware, through the operating system, up to the applications).			
12ANM	Applied Numerical Methods	KZ	4
For English version use code 12YNME1. The basic principles of numerical mathematics important for the numerical solution of physical and technical problems are explained. In addition to fundamental numerical tasks, problems relevant to physicists are also included (e.g. solving ordinary differential equations). The exercises take place in a computer lab, featuring demonstrations of various numerical methods, their properties, and applications.			
12AUX	Administration of UNIX System Basic and more advanced administration of Unix operating system	KZ	2
12PYTH	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.			
12UNXAP	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 attributes, 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. Computer networks. Local computer networks. Global computer networks. Addresses and protocols TCP/IP. Network configuration of a computer. Network services: hardware sharing, mail, scp, etc. Network applications			
12UPF1	Introduction to Computational Physics 1	Z,ZK	2
Numerical simulation and its role in physics, methodology of writing computer codes. Computer languages for physics. Numerical libraries and program libraries for physics. Computer tools for scientific visualization. Computational fluid dynamics, hydrodynamic simulations, methods for discretization of Euler equations. High-performance computing, parallel computing, software for parallel simulations. Databases of scientific information, scientist evaluation, citation analysis.			
12UPF2	Introduction to Computational Physics 2	Z,ZK	2
Nonlinear models, complex systems, chaotic systems, fractals and their applications in physics. Artificial intelligence methods: neural networks, machine learning, genetic algorithms, expert systems and their applications in physics. Quantum computing. Virtual reality.			
12ZMDT	Measurement and Data Processing	Z,ZK	2
Basic knowledge for the measurements and data processing and result interpretation: errors, precision, accuracy, normal distribution and its properties, data fitting, separation of the signal from the noise.			
14TED	Creating Electronic Documents	Z	2
Basic skills for creating and presenting student theses. Individual exercises focus on creating and formatting texts, equations, charts, tables, presentations and entire documents in an office suite.			
17UING	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.			
18AAIO	Applications of AI for image processing	KZ	3
The aim of the course is to provide students with hands-on experience with existing state-of-the-art tools based on neural networks (NN), with a primary focus on image processing. An example of such tools in the NVIDIA ecosystem is the Jetson device. Students will learn how to set up this device, install the required software, and develop programs that use existing pre-trained models.			
18AOV	Applied operational research	Z,ZK	4
The course is an introduction course to selected models and methods for economic decision making. The main attention is given to the introduction to the methods and possibilities of their real applications and problem solving by means of the current software products.			
18BPSE1	Bachelor Thesis 1	Z	5
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.			
18BPSE2	Bachelor Thesis 2	Z	10
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.			
18CLOUD	Virtualization and cloud technologies	KZ	3
The goal of this course is to introduce the principles and technological foundations of cloud systems. Students will be introduced to the architectures of distributed systems, principles of application virtualization and they will learn how to use these technologies in practice. A fundamental part of the course is using containers, which is currently the most efficient technology for managing complex software systems. The practical part of the course covers tools for automatic configuration, testing, monitoring and deployment of virtualized applications.			
18EKN	Econometrics	Z,ZK	4
Econometrics is based on economic theory and the relations between economic quantities are expressed by mathematical tools and observed data from economic reality. The course covers basic instruments of econometric analysis as the basic econometric model, the generalized model, the system of simultaneous equations and instruments for econometric model verification.			
18GUI	Construction of Graphical user interface	Z	2
The course introduces to the graphical user interface, its design and creation. Practical problems and their solutions will be demonstrated in the exercises. Students will learn to create simple RAD applications			
18INTA	Development of internet applications	KZ	4
The lectures provide an overview of modern technologies for the development of web applications. Students will learn basic web languages and concepts (HTML, URL, etc.) and they will also be introduced to relational database systems. The tutorials are dedicated to practical examples of building web applications, from the simplest to more advanced. The course is oriented primarily towards backend technologies and using the Python languages, but covers also frontend frameworks and JavaScript.			
18MAK1	Macroeconomics 1	Z,ZK	4
Macroeconomics I provides students with a fundamental theoretical basis for understanding how an economy works. It introduces main macroeconomic indicators, money market, macroeconomic equilibrium theory, fundamentals of open economy theory, inflation, unemployment, economic growth, economic fluctuations, basic macroeconomic models of IS-LM, AS-AD and their implications for economic policies. The learning outcomes of the course is to equip students with ability to analyze macroeconomic phenomena and their interconnections and subsequently to use them under the conditions of modern economic life.			
18MAK2	Macroeconomics 2	Z,ZK	4
Macroeconomics II extends theoretical knowledge acquired from Macroeconomics I of its students with the latest knowledge of contemporary macroeconomics. They are models of economic growth, especially those with an emphasis on the role of human capital and technological progress. Furthermore, it introduces students to modern principles of economic modeling, i.e., macroeconomic models derived from microeconomic behavior of subjects and economics and their rational expectations. It also provides students with modern knowledge of labor market modeling.			
18MIK	Microeconomics	Z,ZK	4
Microeconomics is a set of theories, which help us to understand processes by which the scarce resources are allocated among alternative uses. Microeconomics explains the role of prices and markets in these processes and makes more clear behaviour of the economic agents. Lectures and seminars are designed so that the explanation of microeconomic concepts does not require knowledge of calculus.			
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.			
18NES2	Neural Networks 2	KZ	3
The aim of the course "Neural Networks 2" is to acquaint students with basic models of deep neural networks and teach them how to apply these models and methods to solve practical tasks.			

18OS	Operating Systems Administration Administration of operating systems Windows and Linux. Users, rights, configuration, command line, networks, firewall	KZ	2
18PJ	Programming in Java This course is devoted to the Java platform and to the development of the basic types of applications for this platform.	Z,ZK	5
18PMTL	Programming in MATLAB Introducing Matlab environment as efficient tool for computation in complex arrays and symbolic variables, namely for linear algebra, mathematic analysis, statistics, algorithmization and geometric representation of results.	KZ	4
18PPY1	Programming in Python 1 This course introduces students to advanced features of the Python language and common scientific packages. The course covers both object-oriented as well as functional programming paradigms. The following part of the course describes the use of Python in the fields of scientific and technical computing (NumPy and SciPy packages), data processing and visualization.	Z	2
18PPY2	Programming in Python 2 This course introduces students to practical applications of the Python language in scientific as well as commercial fields. The course is a seminar where each presented topic is accompanied by a short demo of a real-world application in the specific field.	Z	2
18PPY3	Programming in Python 3 This advanced course is intended for students who have basic experience with programming in Python and using its libraries. It introduces students to advanced concepts of the Python language and modules they are based on.	Z	2
18PRC1	Programming in C++ 1 This course covers mainly the C programming language and non-object oriented features of the C++ language.	Z	4
18PRC2	Programming in C++ 2 This course covers the object oriented programming and other advanced constructs in the C++; programming language and the Standard Template Library.	KZ	4
18PROP	Practical training in programming The goal of this course is to understand advanced topics related to programming, code design and software project development. Students will practice pragmatic techniques and principles on concrete real-world examples. Emphasis is put on the review of freely available software tools that can improve the programmers work efficiency and ensure high quality of the final source code.	KZ	3
18PVP	Programming in Pascal This lecture 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 Pascal programming language.	Z,ZK	4
18PW	Web environment and markup languages The course introduces students to fundamental principles and best practices for web design with respect to technical functionality, informational value, readability and usability.	KZ	2
18SBAK	Bachelor Seminar Seminar devoted to preparation of the bachelor's thesis and the presentation of the result. Students present their running results.	Z	2
18SVK	Student's Scientific Conference This is the active participation of the student in one of the approved student conferences. The list of such conferences is defined by the course guarantor.	Z	1
18UDB	Introduction to Databases This course is an introduction to relational database systems. Students will learn basic concepts and how to design a relational database. Students will be able to work with data using SQL. Credit is awarded for the seminar work (ERA model of relational database and its implementation in SQL).	Z	2
18UOA	Introduction into Object Oriented Architecture The course is intended for students who are familiar with the basics of object-oriented programming in Python. A basic knowledge of object-oriented features in Java and C++ is also beneficial. It will familiarize students with the general object-oriented paradigm and, above all, with the principles that should be followed when building larger applications. Using several gradually built and improved applications, it demonstrates how adherence to these principles can be applied in the gradual improvement and refinement of applications according to growing customer requirements.	Z,ZK	4
18UQI	Introduction to quantum informatics Quantum information has been on the rise for years. In this course, we explore the basics of quantum information theory with a strong emphasis on quantum computing. We discuss some of the most important quantum principles that lead to the so called quantum advantage and discuss many important quantum algorithms with the requisite amount of theoretical underpinning.	Z	3
18ZALG	Basics of Algorithmization This course is devoted to selected algorithms and methods for algorithm design. This course introduces selected methods for the determination of the algorithm complexity.	Z,ZK	4
18ZPRO	Basics of Programming 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.	Z	4
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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