Study plan

Name of study plan: Applications of Informatics in Natural Sciences

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: 168
Elective courses credits: 12
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: 148
The role of the block: P

Code of the group: BSPAIPV_1
Name of the group: BS P_AIPVB 1st year
Requirement credits in the group: In this group you have to gain 50 credits
Requirement courses in the group: In this group you have to complete 15 courses
Credits in the group: 50
Note on the group: rok zahájení 2023/2024

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
802DEF1	**History of Physics 1** *Olga Kouřimská Igor Jex (Gar.)*	Z	2	2P+0C	Z	P
801LI2	**Linear Algebra B 2** *Dana Majerová* ***Dana Majerová*** *Lubomíra Dvořáková (Gar.)*	Z,ZK	4	2P+2C	L	P
801LI1	**Linear Algebra 1** *Dana Majerová* ***Dana Majerová*** *Lubomíra Dvořáková (Gar.)*	Z	2	2P+2C	Z	P
801LIZ	**Linear Algebra 1, Examination** *Dana Majerová* ***Dana Majerová*** *Lubomíra Dvořáková (Gar.)*	ZK	2		Z	P
818MAKR1	**Macroeconomics 1** ***Quang Van Tran*** *Quang Van Tran (Gar.)*	Z,ZK	4	2+2	Z	P
801MAN1	**Calculus 1** *Petr Kubera* ***Petr Kubera*** *Pavel Strachota (Gar.)*	Z	4	4P+4C	Z	P
801MANZ	**Calculus 1, Examination** *Petr Kubera* ***Petr Kubera*** *Pavel Strachota (Gar.)*	ZK	4		Z	P
801MAN2	**Calculus 2** *Petr Kubera, Pavel Eichler* ***Petr Kubera*** *Edita Pelantová (Gar.)*	Z,ZK	8	4P+4C	L	P
818MIK	**Microeconomics** *Alexandra Dvořáčková* ***Quang Van Tran*** *Quang Van Tran (Gar.)*	Z,ZK	4	2P+2C	Z	P
818PPY	**Introduction to Python programming** *Jiří Fišer* ***Jiří Fišer*** *Jakub Klinkovský (Gar.)*	Z	2	1P+1C	L	P
800PT	**Preparatory Week** *Dana Majerová* ***Dana Majerová*** *Dana Majerová (Gar.)*	Z	2	26B	Z	P
818OSY	**Operating Systems Administration** *Josef Nový* ***Josef Nový*** *Vladimír Jarý (Gar.)*	KZ	2	0P+2C	Z	P
812UNX	**Introduction to Unix** *Jiří Fišer* ***Jiří Fišer*** *Pavel Váchal (Gar.)*	Z	2	1P+1C	L	P
818ZALG	**Basics of Algorithmization** *Miroslav Virius* ***Josef Nový*** *Miroslav Virius (Gar.)*	Z,ZK	4	2P+2C	L	P
818ZPRO	**Basics of Programming** *Michal Moc* ***Michal Moc*** *Michal Moc (Gar.)*	Z	4	4C	Z	P

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV_1 Name=BS P_AIPVB 1st year

802DEF1	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 Orient and Greece, Greek natural philosophers, Aristotle. Physics in Helenistic period, Archimed. Arabic science, European science in Middle Ages. Renaissance - da Vinci, Giordano Bruno. Copernicus, Kepler, Galileo, Huygens. The birth of physics as experimental science. Newton and his work.

801LI2	Linear Algebra B 2	Z,ZK	4
Determinant. Regular matrix, regular operator. Inverse matrix and operator. Inner product, orthogonality, Gramm-Schmidt orthogonalization process. Linear geometry. Eigenvalues, eigenvectors, diagonalization of matrices. Special types of matrices.			
801LI1	Linear Algebra 1	Z	2
801LIZ	Linear Algebra 1, Examination	ZK	2
818MAKR1	Macroeconomics 1	Z,ZK	4
The aim of course "Macroeconomics"is to present a clear, accurate and interesting introduction to the principles of modern Macroeconomics and to the institution of the Czech and world economy.			
801MAN1	Calculus 1	Z	4
801MANZ	Calculus 1, Examination	ZK	4
801MAN2	Calculus 2	Z,ZK	8
818MIK	Microeconomics	Z,ZK	4
818PPY	Introduction to Python programming	Z	2
The aim of the course is to introduce students to programming in Python (version 3). First, students are introduced to the basic programming constructs in Python (conditions, cycles, functions). There is space dedicated to both the object and the functional paradigm. In the next part of the course, students are introduced to the use of Python in the field of scientific and technical calculations (NumPy, SciPy, SymPy libraries) and in the field of GUI application development or data processing (database).			
800PT	Preparatory Week	Z	2
818OSY	Operating Systems Administration	KZ	2
Administration of operating systems Windows and Linux. Users, rights, configuration, command line, networks, firewall			
812UNX	Introduction to Unix	Z	2
818ZALG	Basics of Algorithmization	Z,ZK	4
This course is devoted to selected algorithms and methods for algorithm design. This course intruduces selected methods for the determination of the algorithm complexity.			
818ZPRO	Basics of Programming	Z	4
This course is intended mainly for students with little or no experience in programming. It familiarizes the students with the basic concepts in programming and with the Python programming language.			

Code of the group: BSPAIPV_2
Name of the group: BS P_AIPVB 2nd year
Requirement credits in the group: In this group you have to gain 51 credits
Requirement courses in the group: In this group you have to complete 14 courses
Credits in the group: 51
Note on the group: rok zahájení 2023/2024

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
801DIM1	**Discrete Mathematics 1** *Kateřina Horaisová* ***Kateřina Horaisová*** *Zuzana Masáková (Gar.)*	Z	2	2+0	Z	P
801DIM2	**Discrete Mathematics 2** *Kateřina Horaisová* ***Kateřina Horaisová*** *Zuzana Masáková (Gar.)*	Z	2	2+0	L	P
802FY1	**Physics 1** *Goce Chadzitaskos* ***Jaroslav Bielčík*** *Jaroslav Bielčík (Gar.)*	Z,ZK	4	2P+2C	Z	P
802FY2	**Physics 2** *Goce Chadzitaskos, Jaroslav Bielčík* ***Jaroslav Bielčík*** *Jaroslav Bielčík (Gar.)*	Z,ZK	4	2P+2C	L	P
818MAKR2	**Macroeconomics 2** *Jan Řada* ***Jan Řada*** *Quang Van Tran (Gar.)*	Z,ZK	4	2P+2C	L	P
801MAN3	**Mathematical Analysis B 3** *Kateřina Horaisová* ***Kateřina Horaisová*** *Milan Krbálek (Gar.)*	Z,ZK	8	4P+4C	Z	P
801MAN4	**Mathematical Analysis 4** *Kateřina Horaisová* ***Kateřina Horaisová*** *Milan Krbálek (Gar.)*	Z,ZK	6	2P+4C	L	P
812NME1	**Numerical Methods 1** *Petr Kubera* ***Petr Kubera*** *Pavel Váchal (Gar.)*	Z,ZK	4	2P+2C	L	P
818PS	**Probability and Statistics** *Pavel Eichler* ***Pavel Eichler*** *Pavel Eichler (Gar.)*	Z,ZK	4	3P+1C	L	P
818PRC1	**Programming in C++ 1** *Josef Nový* ***Josef Nový*** *Miroslav Virius (Gar.)*	Z	4	2P+2C	Z	P
818PRC2	**Programming in C++ 2** *Josef Nový* ***Josef Nový*** *Miroslav Virius (Gar.)*	KZ	4	2P+2C	L	P
818PMTL	**Programming in MATLAB** *Dana Majerová* ***Dana Majerová*** *Jaromír Kukal (Gar.)*	KZ	4	4C	Z	P
801PSL	**Publishing system LaTex** *Jiří Fišer* ***Jiří Fišer*** *Petr Ambrož (Gar.)*	Z	2	0P+2C	L	P
818GUI	**Graphical User Interface Development** *Michal Moc* ***Michal Moc*** *Vladimír Jarý (Gar.)*	Z	2	2C	L	P
800UPRA	**Introduction to the Law** *Radek Hřebík* ***Radek Hřebík*** *Radek Hřebík (Gar.)*	Z	1	0+2	Z	P

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV_2 Name=BS P_AIPVB 2nd year

801DIM1	Discrete Mathematics 1	Z	2
The seminar is devoted to elementary number theory and applications. It includes individual problem solving.			

801DIM2	Discrete Mathematics 2	Z	2
The seminar is devoted to recurrence relations. It includes individual problem solving.			
802FY1	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.			
802FY2	Physics 2	Z,ZK	4
Thermodynamics, electricity and magnetism, modern physics. The lecture is supplemented with practical investigation and demonstration of selected physical phenomena.			
818MAKR2	Macroeconomics 2	Z,ZK	4
801MAN3	Mathematical Analysis B 3	Z,ZK	8
Differential equations - basic types of differential equations of the first order, differential equations of the second order - particular cases, linear differential equations. Quadratic forms and quadrics. Sequences of functions. Series of functions. Power series, Taylor series.			
801MAN4	Mathematical Analysis 4	Z,ZK	6
Limit and continuity of function of more variables. Direction and partial derivative, first derivative and differential, derivative of composite function, derivative of high-orders, Taylor's theorem. Implicit function, regular mapping, replacement of variables. Local and bound extremes of functions of more variables. Multiple integral, basic properties, Fubini's theorem, substitution theorem. Curves and curve integral of the first and the second order. Surface integral of the first and the second order. Green's theorem, Gauss's theorem, Stokes' theorem.			
812NME1	Numerical Methods 1	Z,ZK	4
818PS	Probability and Statistics	Z,ZK	4
818PRC1	Programming in C++ 1	Z	4
This course covers mainly the C programming language and non-object oriented features of the C++ language.			
818PRC2	Programming in C++ 2	KZ	4
This course covers the object oriented programming and othesr advanced constructs in the C+;+ programming language and the Standard Template Library.			
818PMTL	Programming in MATLAB	KZ	4
801PSL	Publishing system LaTex	Z	2
The typesetting of technical and scientific documents by LaTeX focused to structural description of documents. Students obtain necessary information for the typesetting of BC thesis (including mathematics equations, fragments of source texts), resp. for creation of technical documents based on the existing styles.			
818GUI	Graphical User Interface Development	Z	2
800UPRA	Introduction to the Law	Z	1

Code of the group: BSPAIPV_3
Name of the group: BS P_AIPVB 3rd year
Requirement credits in the group: In this group you have to gain 47 credits
Requirement courses in the group: In this group you have to complete 14 courses
Credits in the group: 47
Note on the group: rok zahájení 2023/2024

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
818AOV	**Applied operational research** *Jan Thiele* ***Jan Thiele*** *Quang Van Tran (Gar.)*	Z,ZK	4	2P+2C	Z	P
818BPSE1	**Bachelor's Thesis 1** *Milan Kuchařík* ***Milan Kuchařík*** *Milan Kuchařík (Gar.)*	Z	5	0+5	Z	P
818BPSE2	**Bachelor's Thesis 2** *Milan Kuchařík* ***Milan Kuchařík*** *Milan Kuchařík (Gar.)*	Z	10	0+10	L	P
818EKN	**Econometrics** *Radek Hřebík* ***Radek Hřebík*** *Quang Van Tran (Gar.)*	Z,ZK	4	2P+2C	L	P
801LIP	**Linear Programming** *Petr Kubera* ***Petr Kubera*** *Čestmír Burdík (Gar.)*	Z,ZK	3	2+1	Z	P
801PGR1	**Computer Graphics 1** *Jan Thiele* ***Jan Thiele*** *Pavel Strachota (Gar.)*	Z,ZK	2	1P+1C		P
801PGR2	**Computer Graphics 2** *Jan Thiele* ***Pavel Strachota*** *Pavel Strachota (Gar.)*	Z,ZK	2	1P+1C		P
818PJ	**Programming in Java** *Michal Moc* ***Miroslav Virius*** *Miroslav Virius (Gar.)*	Z,ZK	5	2P+2C	Z	P
818PW	**Web environment and markup languages** *Pavel Eichler* ***Dana Majerová*** *Pavel Eichler (Gar.)*	KZ	2	2C	Z	P
818SBAK	**Bachelor's Thesis Seminar** *Dana Majerová* ***Dana Majerová*** *Dana Majerová (Gar.)*	Z	2	0+2	L	P
801TKO	**Theory of Codes** *Kateřina Horaisová* ***Kateřina Horaisová*** *Edita Pelantová (Gar.)*	ZK	2	2P+0C	L	P
812UPF1	**Introduction to Computational Physics 1** *Pavel Eichler* ***Milan Kuchařík*** *Milan Kuchařík (Gar.)*	Z,ZK	2	1P+1C	Z	P
812UPF2	**Introduction to Computational Physics 2** *Pavel Eichler* ***Pavel Eichler*** *Milan Kuchařík (Gar.)*	Z,ZK	2	1P+1C	L	P
812ZMDB	**Measurement and Data Processing** *Josef Nový* ***Josef Nový*** *Ivan Procházka (Gar.)*	Z,ZK	2	1P+1C	Z	P

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV_3 Name=BS P_AIPVB 3rd year

818AOV	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.			

818BPSE1	Bachelor's Thesis 1	Z	5
818BPSE2	Bachelor's Thesis 2	Z	10
818EKN	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.			
801LIP	Linear Programming	Z,ZK	3
We study special problems about constrained extremum problems for multivariable functions (the function is linear and the constraint equations are given by linear equations and linear inequalities).			
801PGR1	Computer Graphics 1	Z,ZK	2
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.			
801PGR2	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.			
818PJ	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.			
818PW	Web environment and markup languages	KZ	2
This course introduces students to the basic information and principles for proper design of web pages from a technical and informational perspective, with emphasis on their purpose and user.			
818SBAK	Bachelor's Thesis Seminar	Z	2
Seminar devoted to preparation of the bachelor's thesis and the presentation of the result. Students present their running results.			
801TKO	Theory of Codes	ZK	2
Algebraic methods used in error detecting and error correcting codes.			
812UPF1	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.			
812UPF2	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.			
812ZMDB	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 propeties, data fitting, separation of the signal from the noise.			

Name of the block: Compulsory elective courses
Minimal number of credits of the block: 8
The role of the block: PV

Code of the group: BSPAIPV_JAZYKY_ZK
Name of the group: BS jazyky zkoušky
Requirement credits in the group: In this group you have to gain 8 credits
Requirement courses in the group: In this group you have to complete 2 courses
Credits in the group: 8
Note on the group: rok zahájení 2023/2024

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
804XAMZK	**English for Intermediate Students Examination** *Karolina Beauxisová*	ZK	4		Z	PV
804XAPZK	**English for Advanced Students Examination** *Karolina Beauxisová*	ZK	4		Z	PV
804XNMZK	**German for Intermediate Students Examination** *Světlana Petrová, Světlana Petrová* ***Světlana Petrová***	ZK	4		Z	PV
804XNPZK	**German for Advanced Students Examination** *Světlana Petrová*	ZK	4		Z	PV

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV_JAZYKY_ZK Name=BS jazyky zkoušky

804XAMZK	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.			

804XAPZK	English for Advanced Students Examination	ZK	4
The course content is the examination as given by the study plan. The student is supposed to demonstrate mastering the AP3 syllabus and the ability to apply their knowledge obtained in the three AP courses. The examination consists of 2 parts - written (110 min) and oral (30 min) and includes also oral presentation of a topic from the student´s field of study.			
804XNMZK	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.			
804XNPZK	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.			

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

Code of the group: BSPAIPV_V
Name of the group: BS P_AIPVB volitelné předměty
Requirement credits in the group:
Requirement courses in the group:
Credits in the group: 0
Note on the group: rok zahájení 2023/2024

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
818DTB1	**Database 1** *Josef Nový* ***Josef Nový*** *Josef Nový (Gar.)*	KZ	2	2C	Z	v
818DTB2	**Database 2** *Josef Nový* ***Josef Nový*** *Josef Nový (Gar.)*	KZ	2	2C	L	v
818NES1	**Neural Networks 1** *Kateřina Horaisová* ***Kateřina Horaisová*** *Kateřina Horaisová (Gar.)*	Z	2	1+1	Z	v
818NES2	**Neural Networks 2** *Kateřina Horaisová* ***Kateřina Horaisová*** *Kateřina Horaisová (Gar.)*	Z	2	1+1	L	v
818NES3	**Neural Networks 3** *Josef Nový* ***Josef Nový*** *Josef Nový (Gar.)*	Z	2	0P+2C	Z	v
818PMT	**Programming for mobile phones on the J2ME platform** *Jiří Fišer* ***Jiří Fišer*** *Jiří Fišer (Gar.)*	Z	3	0+3	L	v
818RM1	**Mathematics Repetitorium 1** *Linda Mrázková* ***Linda Mrázková*** *Linda Mrázková (Gar.)*	Z	3	0P+3C	Z	v
818RM2	**Mathematics Repetitorium 2** *Pavel Eichler* ***Pavel Eichler*** *Pavel Eichler (Gar.)*	Z	2	0P+2C	L	v
818SVK	**Student's Scientific Conference** *Kateřina Horaisová* ***Kateřina Horaisová*** *Jiří Mikyška (Gar.)*	Z	1	5 dní	L	v
818TV1	**Physical Education 1** *Dana Majerová* ***Dana Majerová*** *Dana Majerová (Gar.)*	Z	1	0+2	Z	v
818TV2	**Physical Education 2** *Dana Majerová* ***Dana Majerová*** *Dana Majerová (Gar.)*	Z	1	0+2	L	v
818TV3	**Physical Education 3** *Dana Majerová* ***Dana Majerová*** *Dana Majerová (Gar.)*	Z	1	0+2	Z	v
818TV4	**Physical Education 4** *Dana Majerová* ***Dana Majerová*** *Dana Majerová (Gar.)*	Z	1	0+2	L	v
818TVS1	**Team Development of Software 1** *Michal Moc* ***Michal Moc*** *Michal Moc (Gar.)*	KZ	3	0P+3C	Z	v
818TVS2	**Team Development of Software 2** *Michal Moc* ***Michal Moc*** *Michal Moc (Gar.)*	KZ	3	0P+3C	L	v
818TVS3	**Software Team Development 3** *Michal Moc* ***Michal Moc*** *Michal Moc (Gar.)*	KZ	3	0+3	Z	v
818TVS4	**Software Team Development 4** *Michal Moc* ***Michal Moc*** *Michal Moc (Gar.)*	KZ	3	0+3	L	v
818ZDVP	**Data Processing in Pandas** *Jiří Fišer* ***Jiří Fišer*** *Jiří Fišer (Gar.)*	Z	2	2C	Z	v
818ZDTP	**Data Processing using Spreadsheet** *Linda Mrázková* ***Dana Majerová*** *Dana Majerová (Gar.)*	Z	2	0P+2C	Z	v
818TDM	**3D modeling** *Jan Thiele* ***Dana Majerová*** *Dana Majerová (Gar.)*	Z	3	1P+2C	L	v

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV_V Name=BS P_AIPVB volitelné předměty

818DTB1	Database 1	KZ	2
The aim of the course "Database 1" is to introduce students to the principles of normalization of relational databases and their design. The course is implemented only in the city of Děčín.			

818DTB2	Database 2	KZ	2
The course "Database 2" is devoted to the SQL language. Students will learn the basic SQL commands (creating tables, inserting/updating and deleting data), the various options for selecting data (including aggregation) and creating views. Students will also learn about programming on the database system side (triggers, stored procedures).			
818NES1	Neural Networks 1	Z	2
Mathematical analysis, model theory and biological context are used for construction of simple models of neural structures. The models are able to learn from pattern sets and their structures and parameters are subjects of optimization.			
818NES2	Neural Networks 2	Z	2
The second module is oriented first to multi-layer neural networks and next to self-organized artificial neural networks. The biological context, cluster analysis and principal component analysis are used for self-organized artificial neural network realization. Self-organization is discussed in vector spaces.			
818NES3	Neural Networks 3	Z	2
818PMT	Programming for mobile phones on the J2ME platform	Z	3
Practical programming on the Java ME mobile platform (this platform is ported for the majority of normal and smartphones). The practical exercises are aimed to implementation of implementation of interactive network oriented applications.			
818RM1	Mathematics Repetitorium 1	Z	3
818RM2	Mathematics Repetitorium 2	Z	2
818SVK	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.			
818TV1	Physical Education 1	Z	1
Swimming, bodybuilding, skiing course, boating course and tourism.			
818TV2	Physical Education 2	Z	1
Swimming, bodybuilding, skiing course, boating course and tourism.			
818TV3	Physical Education 3	Z	1
Swimming, bodybuilding, skiing course, boating course and tourism.			
818TV4	Physical Education 4	Z	1
Swimming, bodybuilding, skiing course, boating course and tourism.			
818TVS1	Team Development of Software 1	KZ	3
Simulation of software development on the team - communication between team members, allocating tasks and its monitoring. Analysis and design of concrete application.			
818TVS2	Team Development of Software 2	KZ	3
The course builds on 818TVS1. The individual teams will continue development and testing of a concrete application, creating documentation.			
818TVS3	Software Team Development 3	KZ	3
818TVS4	Software Team Development 4	KZ	3
818ZDVP	Data Processing in Pandas	Z	2
818ZDTP	Data Processing using Spreadsheet	Z	2
818TDM	3D modeling	Z	3
Students will learn the basics of 3D modeling software tools and with polygon and parametric modeling principles. This course is available only in Děčín.			

Name of the block: Jazyky
Minimal number of credits of the block: 12
The role of the block: J

Code of the group: BSPAIPV_JAZYKY_ZAP
Name of the group: BS jazyky zápočty
Requirement credits in the group: In this group you have to gain 12 credits
Requirement courses in the group: In this group you have to complete 6 courses
Credits in the group: 12
Note on the group: rok zahájení 2023/2024

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
804XAM1	**English for Intermediate Students M1** *Karolina Beauxisová*	Z	2	0P+2C	Z	J
804XAM2	**English for Intermediate Students M2** *Karolina Beauxisová*	Z	2	0P+2C	L	J
804XAM3	**English for Intermediate Students M3** *Karolina Beauxisová*	Z	2	0P+2C	Z	J
804XAP1	**English for Advanced Students P1** *Karolina Beauxisová*	Z	2	0P+2C	Z	J
804XAP2	**English for Advanced Students P2** *Karolina Beauxisová*	Z	2	0P+2C	L	J
804XAP3	**English for Advanced Students P3** *Karolina Beauxisová*	Z	2	0P+2C	Z	J
804XNM2	**German for Intermediate Students M2** *Světlana Petrová*	Z	2	0P+2C	L	J
804XNM1	**German for Intermediate Students M1** *Světlana Petrová, Světlana Petrová* ***Světlana Petrová***	Z	2	0P+2C	Z	J
804XNM3	**German for Intermediate Students M3** *Světlana Petrová, Světlana Petrová* ***Světlana Petrová***	Z	2	0P+2C	Z	J

804XNP1	**German for Advanced Students P1** *Světlana Petrová*	Z	2	0P+2C	Z	J
804XNP2	**German for Advanced Students P2** *Světlana Petrová*	Z	2	0P+2C	L	J
804XNP3	**German for Advanced Students P3** *Světlana Petrová*	Z	2	0P+2C	Z	J

Characteristics of the courses of this group of Study Plan: Code=BSPAIPV_JAZYKY_ZAP Name=BS jazyky zápočty

804XAM1 | 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.

804XAM2 | 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.

804XAM3 | 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.

804XAP1 | English for Advanced Students P1 | Z | 2

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

804XAP2 | English for Advanced Students P2 | Z | 2

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

804XAP3 | English for Advanced Students P3 | Z | 2

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

804XNM2 | 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).

804XNM1 | 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.

804XNM3 | 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).

804XNP1 | 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.

804XNP2 | 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).

804XNP3 | 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.

List of courses of this pass:

Code	Name of the course	Completion	Credits
800PT	Preparatory Week	Z	2
800UPRA	Introduction to the Law	Z	1
801DIM1	Discrete Mathematics 1	Z	2
	The seminar is devoted to elementary number theory and applications. It includes individual problem solving.		
801DIM2	Discrete Mathematics 2	Z	2
	The seminar is devoted to recurrence relations. It includes individual problem solving.		
801LI1	Linear Algebra 1	Z	2
801LI2	Linear Algebra B 2	Z,ZK	4
	Determinant. Regular matrix, regular operator. Inverse matrix and operator. Inner product, orthogonality, Gramm-Schmidt orthogonalization process. Linear geometry. Eigenvalues, eigenvectors, diagonalization of matrices. Special types of matrices.		
801LIP	Linear Programming	Z,ZK	3
	We study special problems about constrained extremum problems for multivariable functions (the function is linear and the constraint equations are given by linear equations and linear inequalities).		
801LIZ	Linear Algebra 1, Examination	ZK	2
801MAN1	Calculus 1	Z	4
801MAN2	Calculus 2	Z,ZK	8
801MAN3	Mathematical Analysis B 3	Z,ZK	8
	Differential equations - basic types of differential equations of the first order, differential equations of the second order - particular cases, linear differential equations. Quadratic forms and quadrics. Sequences of functions. Series of functions. Power series, Taylor series.		
801MAN4	Mathematical Analysis 4	Z,ZK	6
	Limit and continuity of function of more variables. Direction and partial derivative, first derivative and differential, derivative of composite function, derivative of high-orders, Taylor's theorem. Implicit function, regular mapping, replacement of variables. Local and bound extremes of functions of more variables. Multiple integral, basic properties, Fubini's theorem, substitution theorem. Curves and curve integral of the first and the second order. Surface integral of the first and the second order. Green's theorem, Gauss's theorem, Stokes' theorem.		
801MANZ	Calculus 1, Examination	ZK	4
801PGR1	Computer Graphics 1	Z,ZK	2
	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.		
801PGR2	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.		
801PSL	Publishing system LaTex	Z	2
	The typesetting of technical and scientific documents by LaTeX focused to structural description of documents. Students obtain necessary information for the typesetting of BC thesis (including mathematics equations, fragments of source texts), resp. for creation of technical documents based on the existing styles.		
801TKO	Theory of Codes	ZK	2
	Algebraic methods used in error detecting and error correcting codes.		
802DEF1	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 Orient and Greece, Greek natural philosophers, Aristotle. Physics in Helenistic period, Archimed. Arabic science, European science in Middle Ages. Renaissance - da Vinci, Giordano Bruno. Copernicus, Kepler, Galileo, Huygens. The birth of physics as experimental science. Newton and his work.		
802FY1	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.		
802FY2	Physics 2	Z,ZK	4
	Thermodynamics, electricity and magnetism, modern physics. The lecture is supplemented with practical investigation and demonstration of selected physical phenomena.		
804XAM1	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.		
804XAM2	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.		
804XAM3	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.		

804XAMZK	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.			
804XAP1	English for Advanced Students P1	Z	2
The course is designed for students who have successfully completed the full secondary school English language course (at least the B1 level of the Common European Framework of Reference for Languages - CEFR). It provides an introduction into English for Specific and Academic Purposes (ESP, EAP), i.e., into the fundamentals of vocabulary, functions, grammar, and style typical of professional oral and written communication situations (fundamentals of terms in mathematics and physics, definitions, graph descriptions, etc). It also covers professional oral and written communication on topics related to the undergraduate´s life and needs. It develops skills for free professional writing (writing a CV, letter of application, polite request). If necessary, revision of selected grammar topics is included.			
804XAP2	English for Advanced Students P2	Z	2
The AP2 course is based on AP1, thus extending the student´s skills for working with subtechnical texts, and even with professional texts of chosen branches of science. According to the students´ needs it concentrates on chosen grammar topics, but mainly intends to develop understanding of syntactic structures and typical rhetorical functions (e.g., various types of descriptions, and, if possible, a case study). Increasing emphasis is placed on the undergraduate´s independent work with and reading of linguistically more demanding materials. The course extends the student´s subtechnical vocabulary, and includes fundamental notions of chosen branches of science. It is focused on formal writing including the sentence and paragraph structure, linking, cohesion and coherence in texts.			
804XAP3	English for Advanced Students P3	Z	2
The AP3 course is based on AP2 and expects the student to work without any guidance with authentic professional materials and to interpret the text. It includes training oral and written communication skills and functions (e.g., expressing an opinion, agreement, and objections; taking part in discussion, note-taking; summarizing, writing an abstract) and, if possible, also preparing a project on a given or chosen topic and presenting it. The course places emphasis on distinguishing levels of formal and informal language both in oral and written communication.			
804XAPZK	English for Advanced Students Examination	ZK	4
The course content is the examination as given by the study plan. The student is supposed to demonstrate mastering the AP3 syllabus and the ability to apply their knowledge obtained in the three AP courses. The examination consists of 2 parts - written (110 min) and oral (30 min) and includes also oral presentation of a topic from the student´s field of study.			
804XNM1	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.			
804XNM2	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).			
804XNM3	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).			
804XNMZK	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.			
804XNP1	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.			
804XNP2	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).			
804XNP3	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.			
804XNPZK	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.			
812NME1	Numerical Methods 1	Z,ZK	4
812UNX	Introduction to Unix	Z	2
812UPF1	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.			
812UPF2	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.			

812ZMDB	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 propeties, data fitting, separation of the signal from the noise.			
818AOV	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.			
818BPSE1	Bachelor's Thesis 1	Z	5
818BPSE2	Bachelor's Thesis 2	Z	10
818DTB1	Database 1	KZ	2
The aim of the course "Database 1" is to introduce students to the principles of normalization of relational databases and their design. The course is implemented only in the city of Děčín.			
818DTB2	Database 2	KZ	2
The course "Database 2" is devoted to the SQL language. Students will learn the basic SQL commands (creating tables, inserting/updating and deleting data), the various options for selecting data (including aggregation) and creating views. Students will also learn about programming on the database system side (triggers, stored procedures).			
818EKN	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.			
818GUI	Graphical User Interface Development	Z	2
818MAKR1	Macroeconomics 1	Z,ZK	4
The aim of course "Macroeconomics"is to present a clear, accurate and interesting introduction to the principles of modern Macroeconomics and to the institution of the Czech and world economy.			
818MAKR2	Macroeconomics 2	Z,ZK	4
818MIK	Microeconomics	Z,ZK	4
818NES1	Neural Networks 1	Z	2
Mathematical analysis, model theory and biological context are used for construction of simple models of neural structures. The models are able to learn from pattern sets and their structures and parameters are subjects of optimization.			
818NES2	Neural Networks 2	Z	2
The second module is oriented first to multi-layer neural networks and next to self-organized artificial neural networks. The biological context, cluster analysis and principal component analysis are used for self-organized artificial neural network realization. Self-organization is discussed in vector spaces.			
818NES3	Neural Networks 3	Z	2
818OSY	Operating Systems Administration	KZ	2
Administration of operating systems Windows and Linux. Users, rights, configuration, command line, networks, firewall			
818PJ	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.			
818PMT	Programming for mobile phones on the J2ME platform	Z	3
Practical programming on the Java ME mobile platform (this platform is ported for the majority of normal and smartphones). The practical exercises are aimed to implementation of implementation of interactive network oriented applications.			
818PMTL	Programming in MATLAB	KZ	4
818PPY	Introduction to Python programming	Z	2
The aim of the course is to introduce students to programming in Python (version 3). First, students are introduced to the basic programming constructs in Python (conditions, cycles, functions). There is space dedicated to both the object and the functional paradigm. In the next part of the course, students are introduced to the use of Python in the field of scientific and technical calculations (NumPy, SciPy, SymPy libraries) and in the field of GUI application development or data processing (database).			
818PRC1	Programming in C++ 1	Z	4
This course covers mainly the C programming language and non-object oriented features of the C++ language.			
818PRC2	Programming in C++ 2	KZ	4
This course covers the object oriented programming and othesr advanced constructs in the C+;+ programming language and the Standard Template Library.			
818PS	Probability and Statistics	Z,ZK	4
818PW	Web environment and markup languages	KZ	2
This course introduces students to the basic information and principles for proper design of web pages from a technical and informational perspective, with emphasis on their purpose and user.			
818RM1	Mathematics Repetitorium 1	Z	3
818RM2	Mathematics Repetitorium 2	Z	2
818SBAK	Bachelor's Thesis Seminar	Z	2
Seminar devoted to preparation of the bachelor's thesis and the presentation of the result. Students present their running results.			
818SVK	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.			
818TDM	3D modeling	Z	3
Students will learn the basics of 3D modeling software tools and with polygon and parametric modeling principles. This course is available only in Děčín.			
818TV1	Physical Education 1	Z	1
Swimming, bodybuilding, skiing course, boating course and tourism.			
818TV2	Physical Education 2	Z	1
Swimming, bodybuilding, skiing course, boating course and tourism.			
818TV3	Physical Education 3	Z	1
Swimming, bodybuilding, skiing course, boating course and tourism.			
818TV4	Physical Education 4	Z	1
Swimming, bodybuilding, skiing course, boating course and tourism.			
818TVS1	Team Development of Software 1	KZ	3
Simulation of software development on the team - communication between team members, allocating tasks and its monitoring. Analysis and design of concrete application.			

818TVS2	Team Development of Software 2	KZ	3
The course builds on 818TVS1. The individual teams will continue development and testing of a concrete application, creating documentation.			
818TVS3	Software Team Development 3	KZ	3
818TVS4	Software Team Development 4	KZ	3
818ZALG	Basics of Algorithmization	Z,ZK	4
This course is devoted to selected algorithms and methods for algorithm design. This course intruduces selected methods for the determination of the algorithm complexity.			
818ZDTP	Data Processing using Spreadsheet	Z	2
818ZDVP	Data Processing in Pandas	Z	2
818ZPRO	Basics of Programming	Z	4
This course is intended mainly for students with little or no experience in programming. It familiarizes the students with the basic concepts in programming and with the Python programming language.			

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