

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: 46

Elective courses credits: 134

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: 46

The role of the block: P

Code of the group: BSAIPV1P

Name of the group: BAIPV - povinné p edm ty 1. ro ník

Requirement credits in the group: In this group you have to gain at least 46 credits

Requirement courses in the group: In this group you have to complete at least 13 courses

Credits in the group: 46

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
01MAN	Calculus 1 Miroslav Kolá , Severin Pošta, Edita Pelantová Severin Pošta Severin Pošta (Gar.)	Z	4	4+4		P
01MANZ	Calculus 1, exam Miroslav Kolá , Severin Pošta, Edita Pelantová Severin Pošta Severin Pošta (Gar.)	ZK	4	0P+0C		P
01LAL	Linear Algebra 1 Lubomíra Dvo áková Lubomíra Dvo áková Lubomíra Dvo áková (Gar.)	Z	2	2P+2C		P
01LALZ	Linear Algebra 1, exam Lubomíra Dvo áková, Petr Ambrož Lubomíra Dvo áková Lubomíra Dvo áková (Gar.)	ZK	2	0P+0C		P
18ZPRO	Basics of Programming Maksym Dreval, Vladimír Jarý, Petr Voká , Zden k ulík, Miroslav Virius, Dana Majerová, Nichita Vatamaniuc Dana Majerová	Z	4	2P+2C	Z	P
18MIK	Microeconomics Serzod Tašpulatov	Z,ZK	4	2P+2C	Z	P
01LAL2	Linear Algebra 2 Lubomíra Dvo áková, Petr Ambrož Lubomíra Dvo áková Petr Ambrož (Gar.)	Z,ZK	4	2P+2C		P
18MAK1	Macroeconomics 1 Quang Van Tran, Adam Borovi ka Quang Van Tran	Z,ZK	4	2+2	Z	P
01MAN2	Calculus 2 Miroslav Kolá , Severin Pošta, Edita Pelantová Miroslav Kolá Miroslav Kolá (Gar.)	Z,ZK	8	4P+4C		P
18PPY	Introduction to Python programming Matej Možeš, Pavel Váchal, Josef Nový	Z	2	1P+1C		P
18OS	Operating Systems Administration Vladimír Jarý, Josef Drobny Josef Drobny	KZ	2	0+2	L	P
12UNIXAP	Introduction to UNIX Milan Kucha ík, Richard Liska Milan Kucha ík Milan Kucha ík (Gar.)	Z	2	1P+1C	L	P
18ZALG	Basics of Algorithmization Vladimír Jarý, Zden k ulík, Miroslav Virius, Nichita Vatamaniuc, Aleš Suhomel, František Vold ich, Tomáš Oberhuber Vladimír Jarý Miroslav Virius (Gar.)	Z,ZK	4	2+2	L	P

Characteristics of the courses of this group of Study Plan: Code=BSAIPV1P Name=BAIPV - povinné p edm ty 1. ro ník

01MAN	Calculus 1	Z	4
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Basic calculus (real analysis, functions of one real variable, differential calculus).

01MANZ	Calculus 1, exam	ZK	4
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
18ZPRO	Basics of Programming 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 C++ programming language.	Z	4
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
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
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
18PPY	Introduction to Python programming 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).	Z	2
18OS	Operating Systems Administration Administration of operating systems Windows and Linux. Users, rights, configuration, command line, networks, firewall	KZ	2
12UNIXAP	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. Graphical user interface X-windows. 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

Name of the block: Elective courses

Minimal number of credits of the block: 0

The role of the block: V

Code of the group: BSAIPV1V

Name of the group: BAIPV - volitelné p edm ty 1. ro ník

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
04AKS	English Conversation Jana Ková ová Jana Ková ová (Gar.)	Z	1	0+2	L	v
00MAM1	Essentials of High School Course 1 David B e	Z	1	0+1		v
00MAM2	Essentials of High School Math Course 2 Lukáš Heriban Severín Pošta Lukáš Heriban (Gar.)	Z	1	0+1		v
18PVP	Programming in Pascal Miroslav Vírúš	Z,ZK	4	2+2		v
18UOA	Introduction into Object Oriented Architecture Rudolf Pecinovský Rudolf Pecinovský	Z,ZK	4	2+2	Z	v

Characteristics of the courses of this group of Study Plan: Code=BSAIPV1V Name=BAIPV - volitelné p edm ty 1. ro ník

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.			
00MAM1	Essentials of High School Course 1	Z	1
00MAM2	Essentials of High School Math Course 2 Review of basics of high school mathematics.	Z	1
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.			
18UOA	Introduction into Object Oriented Architecture	Z,ZK	4

List of courses of this pass:

Code	Name of the course	Completion	Credits
00MAM1	Essentials of High School Course 1	Z	1
00MAM2	Essentials of High School Math Course 2 Review of basics of high school mathematics.	Z	1
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
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
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.			
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. Graphical user interface X-windows. 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
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
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
18OS	Operating Systems Administration Administration of operating systems Windows and Linux. Users, rights, configuration, command line, networks, firewall	KZ	2
18PPY	Introduction to Python programming 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).	Z	2
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
18UOA	Introduction into Object Oriented Architecture	Z,ZK	4
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

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 C++ programming language.

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

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