## Study plan

# Name of study plan: Physical Engineering - Computational physics

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Physical Engineering

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: Povinné p edm ty specializace

Minimal number of credits of the block: 0

The role of the block: PS

Code of the group: BSPFIPF1

Name of the group: BS P\_FIB PF 1st year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 14 courses

Credits in the group: 0

Note on the group: Podmínkou skládání zkoušky 01MANZ je získání zápočtu z 01MAN. Podmínkou skládání

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, Miroslav Myška Miroslav Myška Igor Jex (Gar.)	Z	2	2+0	Z	PS
02ELMA	Electricity and Magnetism Iskender Yalcinkaya, Goce Chadzitaskos, Josef Schmidt, Jan Vysoký Jan Vysoký Goce Chadzitaskos (Gar.)	Z,ZK	6	4+2	L	PS
01LAL	Linear Algebra 1 Petr Ambrož, Lubomíra Dvo áková Lubomíra Dvo áková (Gar.)	Z	2	2P+2C		PS
01LALZ	Linear Algebra 1, exam Petr Ambrož, Lubomíra Dvo áková Lubomíra Dvo áková (Gar.)	ZK	2	0P+0C		PS
01LAL2	Linear Algebra 2 Petr Ambrož, Lubomíra Dvo áková Lubomíra Dvo áková (Gar.)	Z,ZK	4	2P+2C		PS
01MAN	Calculus 1  Miroslav Kolá, Pavel Strachota, Edita Pelantová Pavel Strachota Edita  Pelantová (Gar.)	Z	4	4+4		PS
01MANZ	Calculus 1, exam  Miroslav Kolá, Pavel Strachota, Edita Pelantová Pavel Strachota Pavel  Strachota (Gar.)	ZK	4	0P+0C		PS
01MAN2	Calculus 2 Severin Pošta, Miroslav Kolá, Edita Pelantová Miroslav Kolá Severin Pošta (Gar.)	Z,ZK	8	4P+4C		PS
02MECH	Mechanics Iskender Yalcinkaya, David Be Michal Jex David Be (Gar.)	Z	4	4+2	Z	PS
02MECHZ	Mechanics - Examination Iskender Yalcinkaya, Goce Chadzitaskos, David Be, Filip Petrásek, Stanislav Skoupý, Antonín Hoskovec, Petr Novotný Antonín Hoskovec David Be (Gar.)	ZK	2	-	Z	PS
00PT	Preparatory Week Petr Ambrož, Milan Krbálek Petr Ambrož Petr Ambrož (Gar.)	Z	2	týden	Z	PS
02TER	Heat and Molecular Physics Filip Petrásek Petr Novotný Petr Jizba (Gar.)	Z,ZK	4	2+2	L	PS
12UNXAP	Introduction to UNIX Milan Kucha ik Milan Kucha ik Milan Kucha ik Gar.)	Z	2	1P+1C	L	PS

	Basics of Programming Maksym Dreval, Vladimír Jarý, Miroslav Virius, Jakub Klinkovský, Petr Pauš, František Vold ich, Jan Tomsa, Zuzana Pet í ková Miroslav Virius Miroslav Virius (Gar.)	Z	4	4C	Z	PS
haracteristics (	of the courses of this group of Study Plan: Code=BSPFIPF1 Name=BS	P_FIB PF	1st year			
2DEF1	History of Physics 1				Z	2
hysics and its place	in the system of sciences. The relationship of man and nature. Natural sciences in ancient Orienta	and Greece,	Greek natu	al philosoph	ers, Aristotl	e. Physics in
elenistic period, Arc	nimed. Arabic science, European science in Middle Ages. Renaissance - da Vinci, Giordano Brun	o. Copernicu	s, Kepler, G	alileo, Huyge	ens. The bir	th of physics
s experimental scien	ce. Newton and his work.					
2ELMA	Electricity and Magnetism			Z	',ZK	6
ectric charge, Could	mb's law, electrostatic field, Gauss' law. Electric dipole, polarization. Conductors anddielectrics. E	lectric currer	nt and circui	ts, conductiv	ity. Basics o	of the relativity
eory. Electrodynami	c forces, magnetic field. Magnetic dipole, magnetics. Electromagnetic induction, ac currents. Elect	romagnetic w	aves,Maxw	ell equations	3	
1LAL	Linear Algebra 1				Z	2
	ear dependence and independence. 3. Basis and dimension. 4. Subspaces of vector spaces. 5. L	inear mappin	as. 6. Matri	ces of linear	mappings.	7. Frobenius
eorem.			<b>J</b>		-11 3-	
1LALZ	Linear Algebra 1, exam				ZK	2
1LAL2						4
	Linear Algebra 2	!!4!	\ 4      !4!		.,ZK	•
	trix and operator. 2. Permutation and determinant. 3. Spectral theory (eigenvalue, eigenvector, dia	0	,			
	ality. 6. Metric geometry. 7. Riesz theorem and adjoint operator. Outline of the exercises: 1. Metho					
	Iculation of eigenvalues and eigenvectors. 4. Hermitian and quadratic forms. Canonical form. 5. S	calar produc	t and ortnog	onality. Calc	ulation of oi	tnogonai
•	netry – exercises and examples. 7. Adjoint operators.				_	
IMAN	Calculus 1				Z	4
asic calculus (real a	nalysis, functions of one real variable, differential calculus).					
1MANZ	Calculus 1, exam				ZK	4
					`	
1MAN2	Calculus 2			Z	Z,ZK	8
	Calculus 2 erential calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence, o	operations or	series, abs		Z,ZK	8
Continuation of diffe		•		olute and co	Z,ZK enditional co	8 Invergence 3.
eal and complex pov	erential calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence, or	•		olute and co	Z,ZK enditional co	8 Invergence 3.
Continuation of diffeeal and complex pour tiemann definition),	rential calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence, over series, the Cauchy-Hadamard theorem, expansion of function into power series, summation of techniques of integration and application of integrals, Generalized Riemann integral	•		olute and co	Z,ZK onditional co primitives, o	8 Invergence 3.
Continuation of different and complex powiemann definition), 2MECH	rerential calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence, of ever series, the Cauchy-Hadamard theorem, expansion of function into power series, summation of echniques of integration and application of integrals, Generalized Riemann integral  Mechanics	f infinite serie	s. 4. Theory	olute and co	Z,ZK onditional coprimitives, of	8 envergence 3. definite integr
Continuation of differed and complex powiemann definition), 2MECH roduction to physics	prential calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence, of ver series, the Cauchy-Hadamard theorem, expansion of function into power series, summation of the changes of integration and application of integrals, Generalized Riemann integral  Mechanics  Output  Description: Particle kinematics, basic types of motion and their superposition. First provided the content of the cont	f infinite serie	s. 4. Theory	olute and co of integrals:	Z,ZK onditional coprimitives, of	8 Invergence 3. Idefinite integral  4 Inverse 4 Inverse 4
Continuation of different and complex power temann definition), 2MECH roduction to physics central force field, force fiel	prential calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence, of the Cauchy-Hadamard theorem, expansion of function into power series, summation of the changes of integration and application of integrals, Generalized Riemann integral    Mechanics	f infinite serie	s. 4. Theory	olute and co of integrals:	Z,ZK onditional coprimitives, of	8 Invergence 3. Idefinite integral  4 Inverse 4 Inverse 4
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Continuation of different and complex povilemann definition), 2MECH roduction to physics central force field, for intinuum mechanics 2MECHZ recontent of the sulper content	prential calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence, over series, the Cauchy-Hadamard theorem, expansion of function into power series, summation of techniques of integration and application of integrals, Generalized Riemann integral    Mechanics	Particle dynar old on the control of	mics, one-di hanics ofrig	mensional ed body, rotation distribution of integrals:	z,ZK  noditional coprimitives, of the primitives, o	8 Invergence 3. Idefinite integrate 4 Invergence 3. Idefinite integrate 4 Inverse 4 Inverse 5 Inverse 6 Inverse 7 In
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Code of the group: BSPFIPF2

Name of the group: BS P\_FIB PF 2nd year

Requirement credits in the group:

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

Note on the group:

Credits in the group: 0

Předmět 02TEF1 lze absolvovat až po absolvování předmětu 02MECHZ. Předmět 02TEF2 lze absolvovat až po absolvování předmětů 02ELMA a 02TEF1.

Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their Completion Credits | Scope | Semester Code Role members) Tutors, authors and guarantors (gar.) Calculus B 3 01ANB3 Z,ZK 4P+4C PS Miroslav Kolá, Milan Krbálek Miroslav Kolá Milan Krbálek (Gar.) Calculus B 4 Z,ZK 2P+4C 01ANB4 6 PS Ji í Mikyška, Miroslav Kolá, Milan Krbálek Milan Krbálek Milan Krbálek **Numerical Methods 1** Z,ZK L 12NME1 4 2+2 PS Pavel Váchal Pavel Váchal (Gar.) Computer Algebra Systems Ζ 2 Ζ 12PAS 1P+1C PS Milan Ši or Milan Ši or Milan Ši or (Gar.)

18PRC1	Programming in C++ 1 Vladimír Jarý, Miroslav Virius Miroslav Virius Miroslav Virius (Gar.)	Z	4	2+2	Z	PS
18PRC2	Programming in C++ 2 Vladimír Jarý, Miroslav Virius, Jakub Klinkovský <b>Miroslav Virius</b> Miroslav Virius (Gar.)	KZ	4	2+2	L	PS
02TEF1	Theoretical Physics 1 Petr Novotný Petr Novotný Igor Jex (Gar.)	Z,ZK	4	2+2	Z	PS
02TEF2	Theoretical Physics 2 Filip Petrásek, Petr Novotný Josef Schmidt Petr Novotný (Gar.)	Z,ZK	4	2+2	L	PS
02TSFA	Thermodynamics and Statistical Physics Igor Jex, Jaroslav Novotný Antonín Hoskovec Igor Jex (Gar.)	Z,ZK	4	2+2	L	PS
12UVP	Introduction to Scientific Computing Milan Ši or Milan Ši or (Gar.)	Z	2	1P+1C	L	PS
02VOAF	Waves, Optics and Atomic Physics Josef Schmidt, Petr Novotný Jan Vysoký Ji í Tolar (Gar.)	Z,ZK	6	4+2	Z	PS
12VPMF	Selected Topics in Modern Physics Jan Pšikal Jan Pšikal (Gar.)	Z	3	2P+1C	L	PS
12ZMDT	Measurement and Data Processing Ivan Procházka, Josef Blažej Josef Blažej Ivan Procházka (Gar.)	Z,ZK	2	1P+1C	Z	PS

	Jan Pšikal <b>Jan Pšikal</b> Jan Pšikal (Gar.)					
12ZMDT	Measurement and Data Processing Ivan Procházka, Josef Blažej Josef Blažej Ivan Procházka (Gar.)	Z,ZK	2	1P+1C	Z	PS
Characteristics of the	courses of this group of Study Plan: Code=BSPFIPF2 Na	me=BS P_FIB PF	2nd year	ar		
	Iculus B 3				Z,ZK	8
l l	d series - convergence range, criteria of uniform convergence, continuity, limit, di	ferentiation and integra	ation of fund	1		_
Expansion, Taylor's theorem	2. Ordinary differential equations - equations of first order (method of integration	n factor, equation of Be	ernoulli, sep	aration of va	riables, homo	geneous
equation and exact equation)	and equations of higher order (fundamental system, reduction of order, variation	of parameters, equatio	ns with con	stant coeffici	ents and spec	ial right-hand
side, Euler differential equati	ion). 3. Metric spaces - metric, norm, scalar product, neighborhood, interior and	exterior points, bounda	ry point, iso	lated and no	n-isolated poi	nt, boundary
of set, completeness of space	e, Hilbert spaces. Orthogonal polynomials. Complete orthogonal systems. 4. Four	ier series - expansion o	f functions i	nto Fourier s	eries, trigonor	netric Fourier
series and their convergence	e. 5. Differential calculus of functions of several variables - limit, continuity, partial	and directional derivat	ive, gradier	nt, total deriva	atives and tan	gent plane,
Taylor series, elementary ter	ms of vector analysis, Jacobi matrix. 6. Functions defined implicitly by one or se	veral equations.				
01ANB4 Ca	Iculus B 4			Z	Z,ZK	6
[1] Diferenciální po et funkcí	více prom nných a funkcionálních vektor . [2] Funkce zadané implicitn . [3] Tay	lorovy ady funkce více	e prom nný	ch. [4] Regu	lární zobrazer	ní, zám na
prom nných, nekartézské so	oustavy sou adnic. [5] Lokální, vázané a globální extrémy funkce více prom nný	ch. [6] Základy teorie m	ıíry a obrys	konstrukce l	_ebesgueovy	míry. [7]
Integrální po et funkce více	prom nných - Riemann v a Lebesgue v integrál, základní vlastnosti, Fubiniova	v ta, v ta o substituci.	Leviho a Le	ebesgueova <sup>1</sup>	v ta. Limita, s	pojitost a
derivace integrálu podle para	ametru. [8] Integrály po k ivkách a plochách. Integrální v ty.					
12NME1 Nu	merical Methods 1			Z	Z,ZK	4
There are explained the basi	ic principles of numerical mathematics important for numerical solving of problem	s important for physics	and techno	ology. Method	ds for solution	of tasks very
important for physicists (ordi	nary differential equations, random numbers) are included in addition to the basi	c numerical methods. I	ntegrated c	omputationa	l environment	MATLAB is
used as a principle programm	ming language as a demonstration tool. The seminars are held in computer labo	ratory.				
12PAS Co	mputer Algebra Systems				Z	2
· ·	ion to computer algebra systems (CAS): their main characteristics, ways and me	ans of using them. Cor	nstituent pa	rt is realized	in computer of	classrooms:
students acquire basic skills	with CAS by solving relatively simple and basic tasks from mathematics and physical	sics.				
18PRC1 Pro	ogramming in C++ 1				Z	4
	be C programming language and non-object oriented features of the C++ language	ae.		I	_ ,	-
	ogramming in C++ 2				KZ	4
	ct oriented programming and othesr advanced constructs in the C+;+ programmi	ng language and the S	tandard Ter	I	<b>I</b>	
	eoretical Physics 1	ig ianguage and are c			Z.ZK	4
-	n to analytical mechanics. The students acquire knowledge of the basic concepts	of the Lagrange and Ha	miltonian fo		, ,	•
	Newton's, Lagrange, Hamilton and Hamilton-Jacobi equations). The efficiency of					
, ,	tem of constrained mass points, and of a rigid body. Advanced parts of the cours				•	
	classical theoretical physics (02TEF1, 02TEF2).		•	•		,
02TEF2 The	eoretical Physics 2			7	Z.ZK	4
	in physics. Mechanics of point mass, rigid body and continuum. The special the	orv of relativity: relativis	stic mechan	1	, ,	
	sical electrodynamics: Maxwell's equations in the Minkowski space-time, electror					•
approximation.						·
02TSFA The	ermodynamics and Statistical Physics			7	Z,ZK	4
	ics and statistical physics. Thermodynamic potential, the Joule Thomson effect, co	nditions of equilibrium,	the Braun-L			=
	otionfrom a statistical point of view (classical and quasiclassical regime within the	· ·		-	-	
of crystals and the black bod	ly radiation). The Boltzmann equation is usedto discusses simple transport phen	omena.	Ū			
12UVP Inti	roduction to Scientific Computing				Z	2
	tion to scientific computing. Constituent part of the course is realized in compute	r classroom.Students d	et acquinte	d with some		
•	ata analysis, data visualisation and algorithm development.					
	aves, Optics and Atomic Physics			7	Z,ZK	6
	nics and electromagnetism: modes, standing and travelling waves, wave packets	indispersive media. Wa	ave optics:			-
•	cs. Introduction toquantum physics: black body radiation, quantum of energy, pho	•				
equation, stationary states a		, , , , , , , , , , , , , , , , , , , ,			,.	<b>.</b>
12VPMF Se	lected Topics in Modern Physics				Z	3
1	mprove students' knowledge in modern parts of physics (such as measuring of g	ravitational waves. neu	trinos, disc	overy of Higg	1	_
	artial help of computer algebra systems (e.g. Maple). Apart from the other course				-	
. , ,	matical formalism of studied phenomena. Therefore, the secondary aim is the inc		•			
and its laws in their following	study			-	-	
	easurement and Data Processing			7	Z,ZK	2
	asurements and data processing and result interpretation: errors, precision, accu	racv. normal distribution	n and its or			
signal from the noise.	5	y,	p.	, ,	3,	
- 5						

Code of the group: BSPFIPF3

Name of the group: BS P\_FIB PF 3rd year

Bachelor Project 1

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 14 courses

Credits in the group: 0

12BPFI1

Note on the group: Zkoušku z předmětu 01RMAF lze skládat až po složení všech zkoušek z Matematické

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
12BPFI1	Bachelor Project 1 Ivan Richter Ladislav Kalvoda (Gar.)	Z	5	0P+5C		PS
12BPFI2	Bachelor Project 2 Ivan Richter Ladislav Kalvoda (Gar.)	Z	10	0P+10C		PS
02KM1	Quantum Mechanics 1 Martin Štefa ák Martin Štefa ák (Gar.)	Z,ZK	6	4P+2C	Z	PS
12POAL	Computer Algebra Richard Liska Richard Liska (Gar.)	KZ	2	2	Z	PS
01RMAF	Equations of Mathematical Physics Václav Klika Václav Klika Václav Klika (Gar.)	Z,ZK	7	4P+2C		PS
11BSEM	Bachelor Seminar Radka Mika Havlíková, Ladislav Kalvoda Ladislav Kalvoda (Gar.)	Z	1	0P+2C	L	PS
01DYKO	Introduction to Continuum Dynamics Pavel Strachota, Radek Fu ik Pavel Strachota Radek Fu ik (Gar.)	Z,ZK	3	2P+1C		PS
12UPF1	Introduction to Computational Physics 1 Milan Kucha ík, Richard Liska Milan Kucha ík Milan Kucha ík (Gar.)	Z,ZK	2	1P+1C	Z	PS
12UPF2	Introduction to Computational Physics 2 Milan Kucha ík, Richard Liska Milan Kucha ík Milan Kucha ík (Gar.)	Z,ZK	2	1P+1C	L	PS
12PYTH	Scientific Programming in Python Pavel Váchal, Jakub Urban Pavel Váchal Pavel Váchal (Gar.)	Z	2	0+2	L	PS
12ZELD	Fundamentals of Electrodynamics Milan Ši or Ivan Richter Ivan Richter (Gar.)	Z,ZK	2	2+0	Z	PS
11ZFPL	Basic to Solid State Physics Ladislav Kalvoda, Eva Mihóková Eva Mihóková Ladislav Kalvoda (Gar.)	KZ	2	26P+0C	Z	PS
12ZFP	Principles of Plasma Physics Martin Jirka, Ji í Limpouch Martin Jirka Ji í Limpouch (Gar.)	Z,ZK	4	3+1	L	PS
12ZAOP	Fundamentals of Optics Ivan Richter, Pavel Kwiecien Ivan Richter Ivan Richter (Gar.)	Z,ZK	2	2+0	Z	PS

Characteristics of the courses of this group of Study Plan: Code=BSPFIPF3 Name=BS P\_FIB PF 3rd year

12BPFI2	Bachelor Project 2	Z	10
The bachelor proje	ect 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 commo
regular meetings a	and discussions.		
02KM1	Quantum Mechanics 1	Z,ZK	6
Abstract: The lectu	re describes the birth of quantum mechanics and description of one particle and more particles by elements of the Hilbert space as	s well as its time ev	olution Reside
	the described the birth of quartant medicance and description of one particle and more particle by dictricine of the rimbert space at	o well as its time ev	olution. Deside
	scription of observable quantities by operators in the Hilbert space and calculation of their spectra.	o well as its time ev	rolation. Deside
that it includes des		KZ	2
that it includes des 12POAL	scription of observable quantities by operators in the Hilbert space and calculation of their spectra.	KZ	2
that it includes des 12POAL Lisp, representation	cription of observable quantities by operators in the Hilbert space and calculation of their spectra.  Computer Algebra	KZ	2 reatest commo
that it includes des 12POAL Lisp, representation divisor, resultant, of	cription of observable quantities by operators in the Hilbert space and calculation of their spectra.  Computer Algebra  n of basic objects (integers, rational and algebraic numbers, polynomials, rational functions, radicals, algebraic functions), arithmetic	KZ cs, simplification, g bstitution and patte	2 reatest commo ern matching,

Z

01RMAF | Equations of Mathematical Physics | Z,ZK | 7
The subject of this course is solving integral equations, theory of generalized functions, classification of partial differential equations, theory of integral transformations, and solution of

The subject of this course is solving integral equations, theory of generalized functions, classification of partial differential equations, theory of integral transformations, and solution partial differential equations (boundary value problem for eliptic PDE, mixed boundary problem for eliptic PDE).

11BSEM Bachelor Seminar Z 1
In the first part of the seminar, students familiarize themselves with the general principles of publishing and presenting scientific work and the formal requirements for bachelor's degree projects at the faculty. The second part is designed as a practical training for the defence of the bachelor's degree project. The students give oral presentations of the current state of

the research results achieved during the work on their projects. Each presentation is followed by a discussion on scientific matters as well as on the possibilities of improving the student's performance.

O1DYKO Introduction to Continuum Dynamics Z,ZK 3

The course provides a rigorous introduction to the mathematical description of continuum dynamics. In the first part, the necessary mathematical tools are summarized, focusing on vector and tensor calculus, differential forms, and integration on manifolds. Next, the fundamental concepts such as several deformation tensors and the substantial (material) derivative are defined. They are used subsequently in the derivation of the conservation laws of mass, momentum and energy in both integral and differential forms. The conservation laws are further adapted to the specific cases of viscous and inviscid fluid and linear/nonlinear elastic body.

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

library. We show how to generate efficient code, how to combine Python with other languages, what tools are available.

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.

12PYTH Scientific Programming in Python

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

12ZELD Fundamentals of Electrodynamics Z,ZK

Subject starts by derivation of Maxwell-Lorentz microscopic equations followed by transition to Maxwell macroscopic theory. Using special theory of relativity formulae are found for transformation of field vectors between two inertial systems of coordinates with appropriate invariants. Wave and Helmholtz equations are derived. By expansion into plane monochromatic waves methods of solving these equations are studied in homogeneous media with gradually increasing complexity: isotropic without losses, with absoption, with dispersion, and non-isotropic. Finally, solution in weakly non-homogeneous madia is presented using the method of eiconal. Individual chapters are illustrated by appropriate examples

11ZFPL Basic to Solid State Physics K7

2

Description of fundamental properties of solids following the regular long distance ordering of atoms in a crystal lattice. Based on the introduced bonding interaction between atoms in solids, various types of crystals and their properties are defined. The model of crystalline lattice dynamics in harmonic approximation is described and basic thermal properties of crystals are derived. The periodic potential of the crystal lattice is introduced and its relation to the following model describing the energetic state of electrons in solids by means of electron energy bands explained. The special consequences of band approach to the physical properties of solids are elucidated. The aim of the course is to systematically introduce and interpret a broad phenomenological basis of physical properties of crystalline solids

Principles of Plasma Physics 12ZFP

Z,ZK

Basic physics of high temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, linear theory of waves in plasmas and propagation of electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parametric instabilities are explained. It comprises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are introduced

12ZAOP **Fundamentals of Optics** 

The lecture covers the very basics of optics - electromagnetic theory, linear optical physics and material effects, basics of nonlinear effects, and geometrical optics. The main goal of the lecture is to obtain, on the bachelor level, broad and general information on optics, giving an essential orientation in the field, especially with respect to character of the bachelor work. Particular topics are further elaborated during departmental masters program. The lecture stems from the electrodynamic notion of plane waves in vacuum (including polarization effects), and further from material medium. It explains basics of linear and nonlinear response in material medium and dispersion properties. It next informs on consequences in anisotropic media, it explains processes induced by boundary conditions at interfaces. It also discusses the consequences of statistics on interference processes, explains elements of two-wave interference and their applications in interferometers. Based on the Fresnel diffraction integral, diffraction processes are presented in a graphical form, including fundamentals of grating diffraction. Based on this diffraction principle, basic functioning of holography is clarified. Finally, the lecture unravels the geometrical optics limit. It takes notice on geometrical approach imaging, substitutive schema of a paraxial imaging system, and optical aberrations. It shows fundamentals of imaging in optical instruments.

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-ANGL.PR. 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) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
00RET	Rhetoric Jana Ková ová <b>Jana Ková ová</b>	Z	1	0+2		PV

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

The course is focused on the acquisition of speech and voice techniques and on the rules of correct pronounciation. 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.

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) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
04XAMZK	English for Intermediate Students Examination	ZK	4		Z	PV
04XAPZK	English for Advanced Students Examination	ZK	4		Z	PV
04XCESZZK	Czech for Foreigners – Beginners - Examination Jana Ková ová, Slav na Brownová	ZK	4		Z	PV
04XCESMZK	Czech for Intermediate Students Examination Jana Ková ová Jana Ková ová (Gar.)	ZK	4		Z	PV
04XCESPZK	Czech for Foreign Students - Advanced Examination Jana Ková ová Jana Ková ová (Gar.)	ZK	4		Z	PV
04XFMZK	French for Intermediate Students Examination	ZK	4		Z	PV
04XFPZK	French for Advanced Students Examination	ZK	4		Z	PV
04XFZZK	French for Beginners Examination  V ra Šlechtová	ZK	3		L	PV
04XNMZK	German for Intermediate Students Examination	ZK	4		Z	PV
04XNPZK	German for Advanced Students Examination	ZK	4		Z	PV
04XRMZK	Russian for Intermediate Students Examination	ZK	4		Z	PV
04XRPZK	Russian for Advanced Students Examination	ZK	4		Z	PV
04XRZZK	Russian for Beginners Examination V ra Šlechtová	ZK	3		L	PV
04XSMZK	Spanish for Intermediate Students Examination	ZK	4		Z	PV
04XSPZK	Spanish for Advanced Students Examination	ZK	4		Z	PV
04XSZZK	Spanish for Beginners Examination V ra Šlechtová	ZK	3		L	PV

Characteristics of the courses of this group of Study Plan: Code=BSPJAZYKYZK Name=BS P languages 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. English for Advanced Students Examination 04XAPZK ZK 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. Czech for Foreigners – Beginners - Examination 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. Czech for Intermediate Students Examination 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 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. French for Advanced Students Examination ZK 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 7K 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. German for Intermediate Students Examination 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. German for Advanced Students Examination 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 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. Russian for Advanced Students Examination 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. Russian for Beginners Examination 04XRZZK ZK 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.

O4XSMZK Spanish for Intermediate Students Examination

The course content is the examination as given by the study plan. SMZK examination consists of two parts - written and oral; to be eligible for the written part, students will have obtained non-graded assessment for course SM3. Oral examination follows the written part.

O4XSPZK Spanish for Advanced Students Examination

The course content is the examination as given by the study plan. Examination SPZK 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 SP1, SP2, and SP3 or on an individual study plan of the student.

O4XSZZK Spanish for Beginners Examination

The course content is the examination as given by the study plan. Examination consists of two parts - written and oral. Student can register for oral examination only if he/she has passed the written examination test.

Name of the block: Elective courses Minimal number of credits of the block: 0

The role of the block: V

Code of the group: BSPFIPFV

Name of the group: BS P\_FIB PF Optional courses

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0 Note on the group:

Note on the g	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their members)	Completion	Credits	Scope	Semester	Role
	Tutors, authors and guarantors (gar.)					
12AUX	Administration of UNIX System  Milan Ši or Milan Ši or Milan Ši or (Gar.)	KZ	2	2+0	L	V
02DEF2	History of Physics 2 Igor Jex Miroslav Myška Igor Jex (Gar.)	Z	2	2+0	L	V
02PRA1	Experimental Laboratory 1 Libor Škoda, Katarína K ížková Gajdošová, Barbara Antonina Trzeciak, Jaroslav Biel ík Jaroslav Biel ík Jaroslav Biel ík (Gar.)	KZ	6	0+4	Z	V
02PRA2	Experimental Laboratory 2 Libor Škoda, Jaroslav Biel ík Jaroslav Biel ík (Gar.)	KZ	6	0+4	L	V
B0B36JUL	Julia for optimization and learning Lukáš Adam, Václav Mácha <b>Lukáš Adam</b> Lukáš Adam (Gar.)	KZ	4	1P+3C	Z	V
04AKS	English Conversation Jana Ková ová Jana Ková ová (Gar.)	Z	1	0+2	L	V
02KM2	Quantum Mechanics 2 Martin Štefa ák Martin Štefa ák Martin Štefa ák (Gar.)	Z,ZK	6	4P+2C	L	V
00MAM1	Essentials of High School Course 1  David Be Martin Stefa ák	Z	1	0+1		V
00MAM2	Essentials of High School Math Course 2 Lukáš Heriban Severin Pošta Lukáš Heriban (Gar.)	Z	1	0+1		V
12MOF	Molecular Physics Jan Proška, Martin Michl Martin Michl Jan Proška (Gar.)	ZK	2	2+0	L	V
12NT	Nanotechnology Jan Proška, Eduard Hulicius Jan Proška Eduard Hulicius (Gar.)	ZK	2	2+0	Z	V
15CH1	General Chemistry 1 Ond ej Holas, Petr Distler, Václav uba Petr Distler Petr Distler (Gar.)	Z	3	2+1	Z	V
15CH2	General Chemistry 2 Ond ej Holas, Petr Distler, Václav uba Petr Distler Petr Distler (Gar.)	Z,ZK	3	2+1	L	V
01PGR1	Computer Graphics 1 Pavel Strachota Pavel Strachota (Gar.)	Z,ZK	2	1P+1C		V
01PGR2	Computer Graphics 2 Pavel Strachota Pavel Strachota (Gar.)	Z,ZK	2	1P+1C		V
01SITE1	Computer Networks 1 Miroslav Minárik Miroslav Minárik (Gar.)	Z	2	1+1	Z	V
01SITE2	Computer Networks 2 Miroslav Minárik Miroslav Minárik (Gar.)	Z	2	1+1	L	V
18PROP	Practical training in programming  Jakub Klinkovský Jakub Klinkovský (Gar.)	KZ	3	2C	Z	V
18PJ	Programming in Java Miroslav Virius Miroslav Virius (Gar.)	Z,ZK	5	2P+2C	Z	V
01PSL	LaTeX - Publication Instrument Petr Ambrož Petr Ambrož Petr Ambrož (Gar.)	Z	2	0+2	L	V
11SFIPL	Seminar on Solid State Physics Ladislav Kalvoda Ladislav Kalvoda (Gar.)	KZ	2	1+1		V
02SMF	Seminar of Mathematical Physics  Martin Štefa ák Ladislav Hlavatý (Gar.)	Z	2	0+2	Z	V
01SOS1	Software Seminar 1 Zden k ulík Zden k ulík Zden k ulík (Gar.)	Z	2	0+2	Z	V

01SOS2	Software Seminar 2  Zden k ulík Zden k ulík Zden k ulík (Gar.)	Z	2	0+2	L	V
ΓV-1	Physical Education	Z	1		Z	V
V-2	Physical Education	Z	1		L	V
V-3	Physical education	Z	1	0+2	Z	V
V-4	Physical education	Z	1	0+2	L	V
4TED	Creating Electronic Documents  Aleš Materna Aleš Materna Aleš Materna (Gar.)	Z	2	26C		V
2UFN	Introduction to Photonics and Nanostructures Ivan Richter, Pavel Kwiecien, Jan Proška Ivan Richter Ivan Richter (Gar.)	KZ	3	2P+1C	L	V
2ULTB	Introduction to Laser Technique Helena Jelínková, Jan Šulc, Michal N mec Jan Šulc Helena Jelínková (Gar.)	KZ	3	2P+1C	L	V
1UP1	Introduction to Probability 1 Jan Vybíral Jan Vybíral (Gar.)	Z,ZK	3	1P+1C		V
1UP2	Introduction to Probability 2 Milan Krbálek Milan Krbálek Milan Krbálek (Gar.)	Z,ZK	3	1P+1C		V
2VTV	Scientific and Technical Computing Ivan Procházka Ivan Procházka Ivan Procházka (Gar.)	Z	2	1+1	L	V
8ZALG	Basics of Algorithmization  Vladimír Jarý, Miroslav Virius, Petr Pauš, František Vold ich, Zuzana Pet í ková, František Gašpar Vladimír Jarý Miroslav Virius (Gar.)	Z,ZK	4	2+2	L	V
2ZEL1	Basic Electronics 1 Jaroslav Pavel Jaroslav Pavel (Gar.)	Z,ZK	3	2+1	Z	V
2ZEL2	Basic Electronics 2  Jaroslav Pavel Jaroslav Pavel (Gar.)	Z,ZK	3	2+1	L	V
2ZFS	Fundamentals of Photonic Structures Ivan Richter, Jií tyroký Ivan Richter Ivan Richter (Gar.)	Z,ZK	2	2P	L	V
)2ZM1	Foundations of Physical Measurements 1 Libor Škoda, Solangel Rojas Torres, Petr Chaloupka Martin Štefa ák Petr Chaloupka (Gar.)	ZK	2	2P+0C	Z	V
2ZM2	Foundations of Physical Measurements 2 Petr Chaloupka Martin Štefa ák Petr Chaloupka (Gar.)	KZ	4	0P+4L	L	V
2ZJFB	Nuclear Physics B Vladimír Wagner Martin Štefa ák Vladimír Wagner (Gar.)	KZ	3	3+0	Z	V
1ZPB1	Introduction to Computer Security 1 Petr Voká Petr Voká Petr Voká (Gar.)	Z	2	1+1		V
2ZFD	Physical Data Visualization Josef Blažej Josef Blažej Josef Blažej (Gar.)	KZ	2	1P+1C	Z	V
haracteristics of	the courses of this group of Study Plan: Code=BSPFIPFV Name=E	SS P_FIB PI	F Option	al courses	<b>;</b>	
2AUX	Administration of UNIX System ad administration of Unix operating system		-		⟨Z	2
evelopment of classical	History of Physics 2 I mechanics after Newton, Bernoulli's, Euler, Lagrange. Historical development of optics, co, electrodynamics and electromagnetism, Faraday and Maxwell. Thermodynamics and its la	•		ach. Electricity	•	

standard model. The concept of Nature and Universe of today.

## Experimental Laboratory 1

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

#### 02PRA2 Experimental Laboratory 2

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

#### B0B36JUL Julia for optimization and learning

ΚZ

Julia programming language is increasingly known by the community for its suitability in the field of numerical calculations. The course consists of two parts. The first part presents the basics of Julia. The second part introduces mathematical optimization and its application in machine learning, statistics and optimal control of differential equations. While the first part shows the individual concepts of Julia, the second part combines them into longer logical sections of code. We explain each application theoretically. Students are encouraged both to write simple functions by themselves and compare them with already existing packages. The course ends with a final project. Students can either choose a topic connected to their theses or join a Kaggle competition with real data. This course is also part of the inter-university programme prg.ai Minor. It pools the best of Al education in Prague to provide students with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.

### **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.

#### 02KM2 Quantum Mechanics 2

Z,ZK

Abstract: The lecture expands the introduction to quantum mechanics with more general formalism of quantum theory, approximate methods and path integral. It summarizes the terminology and methods used in various applications of quantum mechanics and prepares the students for an effective scientific research and further study, in particular, of the modern formulations of quantum field theory.

00MAM1 Essentials of High School Course 1

200MANIZ   Essentials of High School Math Course 2   2   1
State class on nutri-security medicates and melecular matter and on structure-objectory properties relations. Methods of molecular institute determination.    Namonlechnology   Security   Namonlechnology   Security   Security   Namonlechnology   Security   Security   Namonlechnology   Security   Security   Namonlechnology   Security   Secu
2KT   Nanotechnology
existence subdivides involves indestinating to modern externological methods of preparation of semiconductors, retail and delectric renormatures. Physical and colorisal continuously with sexplaned subdissional indexinguists indexinductions which the substantial to be accounted to principle with the resolution will be produced as well. Some support to technical methods: throughpy, diffusion, supportation, or methods and odderfor loyer preparations. For this control of the methods of an all and of each for each recommend.  General Chemistry 1  General Chemistry 1  General Chemistry 2  In a General Chemistry 2  In a support is the continuous of the course General Chemistry. Their significance and practical use an ellustrated by examples under the recommendation of the course General Chemistry. Their significance and practical use an ellustrated by examples under the recommendation of the course General Chemistry. Their significance and practical use an ellustrated by examples under the recommendation of the course General Chemistry. Their significance and practical use an ellustrated by examples subset of the continuous of the course General Chemistry. The main selection is paid to general principles governing chemical processes. Uses a subset of the course General Chemistry is a subset of the course General Chemistry. The significance and practical use of explaint general processes is documentated. The significance and practical use of explaint general processes is documentated. The significance and practical use of explaint general processes is documentated. The significance and practical use of explaint general processes is documentated. The significance and practical use of explaint general processes. Uses a subset of the art behaviorages. Further, the significance and practical use of explaint general processes. In a subset of the processes of the processes of the processes. The processes of the processes of the processes of the processes. The processes of the processes of the processes of the processes of th
international properation. Particular emphasis will be focused on detail chanderization of "in shift and "is shift techniques, their applications for histoprosperity expensional properation or product as well as one approximation for histoprosperity. (Philips of the property of the pro
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The purpose of the seminar is to iluminate mathematical physics by virtue of solved examples. It is supposed that the teachers of the physics department will present simple tasks concerning their scientific activities that could become the topics of the student?s bachelor theses in the next year  O1SOS1   Software Seminar 1   Z   2  Dava, Java Beans, Assembly language programming for microprocessors Intel 80x86  O1SOS2   Software Seminar 2   Z   2  Graphical libraries GTK+ and Qt. Development of graphical user interface using C and C++ programming languages. Portable applications for Unix like operating systems, especially for Linux systems. Portability to Microsoft Windows.  TV-1   Physical Education   Z   1  TV-2   Physical Education   Z   1  TV-3   Physical education   Z   1  TV-4   Physical education   Z   1  TV-4   Physical education   Z   1  ATED   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
O1SOS1   Software Seminar 1   Z   2   Java, Java Beans, Assembly language programming for microprocessors Intel 80x86  O1SOS2   Software Seminar 2   Z   2   Graphical libraries GTK+ and Qt. Development of graphical user interface using C and C++ programming languages. Portable applications for Unix like operating systems, especially for Linux systems. Portability to Microsoft Windows.  TV-1   Physical Education   Z   1   TV-2   Physical Education   Z   1   TV-3   Physical education   Z   1   TV-4   Physical education   Z   1   TV-4   Physical education   Z   1   TV-4   Physical education   Z   1   TV-5   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
Java, Java Beans, Assembly language programming for microprocessors Intel 80x86  O1SOS2   Software Seminar 2   Z   2  Graphical libraries GTK+ and Qt. Development of graphical user interface using C and C++ programming languages. Portable applications for Unix like operating systems, especially for Linux systems. Portability to Microsoft Windows.  TV-1   Physical Education   Z   1  TV-2   Physical Education   Z   1  TV-3   Physical education   Z   1  TV-4   Physical education   Z   1  TV-4   Physical education   Z   1  4TED   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
Software Seminar 2 Graphical libraries GTK+ and Qt. Development of graphical user interface using C and C++ programming languages. Portable applications for Unix like operating systems, especially for Linux systems. Portability to Microsoft Windows.  TV-1 Physical Education Z 1 TV-2 Physical Education Z 1 TV-3 Physical education Z 1 TV-4 Physical education Z 1 TV-4 Physical education Z 1 TV-4 Physical education Z 1 TV-5 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
for Linux systems. Portability to Microsoft Windows.  TV-1 Physical Education Z 1  TV-2 Physical Education Z 1  TV-3 Physical education Z 1  TV-4 Physical education Z 1  TV-4 Physical education Z 1  TV-5 Physical education Z 1  TV-6 Physical education Z 1  TV-7 Physical education Z 1  TV-8 Physical education Z 1  TV-9 Physical education Z 1  TV-9 Physical education Z 1  TV-1 Physical education Z 1  TV-1 Physical education Z 1  TV-2 Physical education Z 1  TV-3 Physical education Z 1  TV-4 Physical education Z 1  TV-4 Physical education Z 1  TV-5 Physical education Z 1  TV-6 Physical education Z 1  TV-7 Physical education Z 1  TV-8 Physical education Z 1  TV-9 Physical educat
TV-1 Physical Education Z 1 TV-2 Physical Education Z 1 TV-3 Physical education Z 1 TV-4 Physical education Z 1 TV-4 Physical education Z 1 TV-5 Physical education Z 1 TV-6 Physical education Z 1 TV-7 Physical education Z 1 TV-8 Physical education Z 1 TV-9 Physical education Z 1 TV-1 Physical education Z 1 TV-1 Physical education Z 1 TV-1 Physical education Z 1 TV-2 Physical education Z 1 TV-3 Physical education Z 1 TV-4 Physical education Z 1 TV-5 Physical education Z 1 TV-6 Physical education Z 1 TV
TV-2 Physical Education Z 1  TV-3 Physical education Z 1  TV-4 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
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
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
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.  12UFN Introduction to Photonics and Nanostructures KZ 3
Overview of nanostructures and nanotechnologies; quantum technologies; quantum nanostructures; photonic structures; nanophotonics and nanoplasmonics; optical waveguides and
ibers; integrated photonics; computer simulations; technological realization; student presentations

		1/7	
12ULTB	Introduction to Laser Technique	KZ	3
	nagnetic radiation sources; laser principle; classification of lasers; characterization and rough application of various types of las- itching, mode-locking.	ers; laser safety pr	ecautions. The
		7 71/	
01UP1	Introduction to Probability 1	Z,ZK	3
	inite set of possible results, classical probability, independent random events 2. Probability and combinatorics 3. Probability and	•	•
•	ility, Bayes' theorem, medical diagnosis, Simpson's paradox 5.Random variable with discrete state space, its distribution and m an value 7.Probabilistic method in graph theory 8.Random algorithms, Morris algorithm and its variants	nean value 6.Probl	ems involving
		7.71/	
01UP2	Introduction to Probability 2	Z,ZK	3
	continuous random variable and its statistical description. 2. Distribution function and probability density. 3. Axiomatic introduction		
•	umerical characteristics of continuous random variables. 5. Selected variants of continuous distributions and their characteristic	s. 6. Elementary n	nethods for poil
	rating pseudorandom numbers from the selected distribution.	_	
12VTV	Scientific and Technical Computing	Z	2
•	niliar with methods of solving of computational problems in the scientific and technical practice, and with methods of their progra	amming. The cours	e is oriented
, , ,	ng in the Fortran language.	1	
18ZALG	Basics of Algorithmization	Z,ZK	4
This course is devote	ed to selected algorithms and methods for algorithm design. This course intruduces selected methods for the determination of t	he algorithm comp	lexity.
I2ZEL1	Basic Electronics 1	Z,ZK	3
The subject provides	primary knowledge of circuit theory concerning principles of electronic circuits in both stationary and harmonic stable state. Ci	rcuit analysis meth	ods for linear
circuits include symb	olic and complex method are explained. Proper circuit analysis is also lectured. The subject's final part deals with transient effe	cts inside linear ci	rcuits.
12ZEL2	Basic Electronics 2	Z,ZK	3
The subject follows ι	with the Basic Electronics 1. Semiconductor elements basic properties are explained. Thecourse's final part deals with basic	themes of logical	circuits field.
12ZFS	Fundamentals of Photonic Structures	Z.ZK	2
The lecture covers th	e basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes thei	r preparation and	characterization
Specifically, the lectu	re discusses the basic physics and technology of optical waveguides; it introduces basic linear, nonlinear, and active structures	s of integrated pho	tonics for
applications in optica	l communications and sensors. Next, the attention is given to introduction of plasmonic structures and plasmonics, periodic str	uctures and photo	nic crystals,
metamaterials, meta	surfaces, and finally to photonic structures for quantum technologies. Finally, the lecture is closed with student presentations or	n selected relevant	tonics and
			topics and
excursions to selecte	ed photonic laboratories.		topics and
	Foundations of Physical Measurements 1	ZK	2
)2ZM1		1	2
02ZM1 The lecture is design	Foundations of Physical Measurements 1	r, it can be attende	2 d by students o
02ZM1 The lecture is designother branches. The	Foundations of Physical Measurements 1  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of	r, it can be attende	2 d by students o
D2ZM1 The lecture is design other branches. The basic habits of work	Foundations of Physical Measurements 1  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of in a physics lab.	r, it can be attende	2 d by students o
D2ZM1 The lecture is design other branches. The pasic habits of work D2ZM2	Foundations of Physical Measurements 1  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of	r, it can be attende data on a PC. Stud	2 d by students of lents learn the
D2ZM1 The lecture is design other branches. The basic habits of work D2ZM2 The lecture is design	Foundations of Physical Measurements 1  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of in a physics lab.  Foundations of Physical Measurements 2	, it can be attende data on a PC. Stud KZ r, it can be attende	2 d by students of ents learn the  4 d by students of
D2ZM1 The lecture is design other branches. The basic habits of work D2ZM2 The lecture is design other branches. The	Foundations of Physical Measurements 1  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of a physics lab.  Foundations of Physical Measurements 2  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of	, it can be attende data on a PC. Stud KZ r, it can be attende	2 d by students clents learn the  4 d by students c
D2ZM1 The lecture is design other branches. The basic habits of work D2ZM2 The lecture is design other branches. The basic habits of work	Foundations of Physical Measurements 1  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of a physics lab.  Foundations of Physical Measurements 2  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of in a physics lab.	r, it can be attended data on a PC. Studender KZ r, it can be attended data on a PC. Studender Constant Constan	2 d by students dents learn the  4 d by students dents learn the
D2ZM1 The lecture is design other branches. The basic habits of work D2ZM2 The lecture is design other branches. The basic habits of work D2ZJFB	Foundations of Physical Measurements 1  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of a physics lab.  Foundations of Physical Measurements 2  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired of	r, it can be attended data on a PC. Student KZ r, it can be attended data on a PC. Student KZ	2 d by students of ents learn the  4 d by students of ents learn the
D2ZM1 The lecture is design other branches. The pasic habits of work D2ZM2 The lecture is design other branches. The pasic habits of work D2ZJFB This scientific field properties are the pasic habits of work D2ZJFB	Foundations of Physical Measurements 1  led for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired in a physics lab.  Foundations of Physical Measurements 2  led for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired in a physics lab.  Nuclear Physics B	r, it can be attended data on a PC. Student KZ r, it can be attended data on a PC. Student KZ	2 d by students of ents learn the  4 d by students of ents learn the
D2ZM1 The lecture is design other branches. The pasic habits of work D2ZM2 The lecture is design other branches. The pasic habits of work D2ZJFB This scientific field puntuition regarding the	Foundations of Physical Measurements 1  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired in a physics lab.  Foundations of Physical Measurements 2  ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired in a physics lab.  Nuclear Physics B  resents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic does be behaviour of objects fails us. The lecture is a basic introduction to very interesting regions of subatomic physics.	r, it can be attended data on a PC. Student KZ r, it can be attended data on a PC. Student KZ	2 d by students of ents learn the  4 d by students of ents learn the  3 n of our classic
02ZM1 The lecture is design other branches. The basic habits of work 02ZM2 The lecture is design other branches. The basic habits of work 02ZJFB This scientific field properties and the properties of the proper	Foundations of Physical Measurements 1  led for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired in a physics lab.  Foundations of Physical Measurements 2  led for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired in a physics lab.  Nuclear Physics B  resents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic do	r, it can be attended data on a PC. Student KZ r, it can be attended data on a PC. Student KZ KZ KZ KZ KZ KZ KZ KMAR KZ KZ KZ KZ	2 d by students of ents learn the  4 d by students of ents learn the

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:

Note on the g	·		1			
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
04XAM1	English for Intermediate Students M1	Z	2	0+2	Z	٧
04XAM2	English for Intermediate Students M2 V ra Šlechtová	Z	2	0+2	L	V
04XAM3	English for Intermediate Students M3 V ra Šlechtová	Z	2	0+2	Z	V
04XAP1	English for Advanced Students P1 V ra Šlechtová	Z	2	0+2	Z	V
04XAP2	English for Advanced Students P2 V ra Šlechtová	Z	2	0+2	L	V
04XAP3	English for Advanced Students P3 V ra Šlechtová	Z	2	0+2	Z	V
04XCESZ1	Czech for Foreigners - Beginners 1  Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	Z	V
04XCESZ2	Czech for Foreigners - Beginners 2 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	L	V
04XCESZ3	Czech for Foreigners - Beginners 3 Jana Ková ová (Gar.)	Z	2	2S	Z	V

Czech for Foreigners - Intermediate 2	l				
Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	L	V
Czech for Foreigners - Intermediate 3 V ra Šlechtová Jana Ková ová (Gar.)	Z	2	0+2	Z	V
Czech for Foreign Students - Advanced 1	Z	2	0+2	Z	V
Czech for Foreigners - Advanced 2	Z	2	0+2	L	V
Czech for Foreigners - Advanced 3	Z	2	0+2	Z	V
French for Intermediate Students M1	Z	2	0+2	Z	V
French for Intermediate Students M2	Z	2	0+2	L	V
French for Intermediate Students M3	Z	2	0+2	Z	V
French for Advanced Students P1	Z	2	0+2	Z	V
French for Advanced Students P2	Z	2	0+2	L	V
French for Advanded Students P3	Z	2	0+2	Z	V
French for Beginners Z1	Z	2	0+4	L	V
French for Beginners Z2	Z	2	0+4	Z	V
French for Beginners Z3	Z	2	0+4	L	V
French for Beginners Z4	Z	2	0+4	Z	V
French for Beginners Z5	Z	2	0+4	L	V
German for Intermediate Students M2	Z	2	0+2	L	V
German for Intermediate Students M1	Z	2	0+2	Z	V
German for Intermediate Students M3	Z	2	0+2	Z	V
German for Advanced Students P1	Z	2	0+2	Z	V
German for Advanced Students P2	Z	2	0+2	L	V
German for Advanced Students P3	Z	2	0+2	Z	V
Russian for Intermediate Students M1	Z	2	0+2	Z	V
Russian for Intermediate Students M2	Z	2	0+2	L	V
Russian for Intermediate Students M3	Z	2	0+2	Z	V
Russian for Advanced Students P1	Z	2	0+2	Z	V
Russian for Advanced Students P2	Z	2	0+2	L	V
Russian for Advanced Students P3	Z	2	0+2	Z	V
Russian for Beginners Z1	Z	2	0+4	L	V
Russian for Beginners Z2	Z	2	0+4	Z	V
Russian for Beginners Z3	Z	2	0+4	L	V
Russian for Beginners Z4		2	0+4	Z	V
Russian for Beginners Z5		2		L	V
Spanish for Intermediate Students M1		2	0+2	Z	V
Spanish for Intermediate Students M3		1			V
Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)  Spanish for Intermediate Students M3		-			V
V ra Šlechtová		1			V
	Czech for Foreign Students - Advanced 1 Jana Ková ová Jana Ková ová (Gar.) Czech for Foreigners - Advanced 2 Jana Ková ová Jana Ková ová (Gar.) Czech for Foreigners - Advanced 3 V ra Šlechtová Jana Ková ová (Gar.) French for Intermediate Students M1 V ra Šlechtová V ra Šlechtová (Gar.) French for Intermediate Students M2 V ra Šlechtová V ra Šlechtová (Gar.) French for Intermediate Students M3 V ra Šlechtová V ra Šlechtová (Gar.) French for Advanced Students P1 V ra Šlechtová V ra Šlechtová (Gar.) French for Advanced Students P2 V ra Šlechtová V ra Šlechtová (Gar.) French for Advanced Students P3 V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z1 V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z2 V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z3 V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z4 V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z4 V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z4 V ra Šlechtová V ra Šlechtová (Gar.) German for Intermediate Students M2 Miloslava echová (Miloslava echová (Gar.) German for Intermediate Students M3 V ra Šlechtová Miloslava echová (Gar.) German for Intermediate Students M3 V ra Šlechtová Miloslava echová (Gar.) German for Advanced Students P1 V ra Šlechtová Miloslava echová (Gar.) German for Advanced Students P2 Miloslava echová Miloslava echová (Gar.) German for Intermediate Students M3 V ra Šlechtová Miloslava echová (Gar.) German for Intermediate Students M1 V ra Šlechtová Zhanna Isaeva (Gar.) Russian for Intermediate Students P2 Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Intermediate Students M3 V ra Šlechtová Zhanna Isaeva (Gar.) Russian for Intermediate Students M3 V ra Šlechtová Zhanna Isaeva (Gar.) Russian for Beginners Z1 Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Beginners Z3 Zhana Isaeva Zhanna Isaeva (Gar.) Russian for Beginners Z3 Zhana Isaeva Zhanna Isaeva (Gar.) Russian for Beginners Z3 Zhana Isaeva Zhanna Isaeva (Gar.) Russian for Beginners Z5 V ra Šlechtová Spanish for Intermediate S	V ra Slechtova Jana Kova ova (Gar.)   Z   Czech for Foreigh Students - Advanced 1   Jana Kova ova Jana Kova ova Jana Kova ova Jana Kova ova (Gar.)   Z   Czech for Foreighers - Advanced 2   Jana Kova ova Jana Kova ova (Gar.)   Z   Czech for Foreighers - Advanced 3   V ra Slechtova Jana Kova ova (Gar.)   Z   Czech for Foreighers - Advanced 3   V ra Slechtova Jana Kova ova (Gar.)   Z   V ra Slechtova V ra Slechtova (Gar.)   Z   V ra Slechtova (Gar.)	Va Silecthroad Jana Rova oud (Gar.)   Z   2   2   2   2   2   2   2   2   2	V ra Silectrova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Kova ova Jama Rosa ova (latar)   Z   Q + Q     Jama Siechtova (latar)   Z   Q + Q     Jama Si	Va Stechtowa Jana Rowa (val (Sat)   Z   Z   Q+2   Z   Z   Z   Q+2   Z   Z   Z   Q+2   Z   Z   Z   Q+2   Z   Z   Z   Z   Z   Z   Z   Z   Z

04XSP2	Spanish for Advanced Students P2 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+2	L	V
04XSP3	Spanish for Advanced Students P3 V ra Šlechtová	Z	2	0+2	Z	V
04XSZ1	Spanish for Beginners Z1  Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+4	L	V
04XSZ2	Spanish for Beginners Students Z2 V ra Šlechtová Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+4	Z	V
04XSZ3	Spanish for Beginners Z3 Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+4	L	V
04XSZ4	Spanish for Beginners Z4 V ra Šlechtová	Z	2	0+4	Z	V
04XSZ5	Spanish for Beginners Z5 V ra Šlechtová	Z	2	0+4	L	V
Characteristics of	of the courses of this group of Study Plan: Code=BSPJAZYKY	ZAP Name=BS P	jazyky za	р		
04XAM1	English for Intermediate Students M1			-	Z	2

04/10/24	V ra Šlechtová			0+4		V
04XSZ5 Spanish for Beginners Z5 Z 2 0.		0+4	L	V		
Characteristics of the	courses of this group of Study Plan: Code=BSPJAZYKYZAP I	Name=BS P i	azvkv za	p		
	plish for Intermediate Students M1			<u> </u>	Z	2
	udents who have successfully completed the full secondary school English language	course at least at t	the A2 level	of the Com	_	
	CEFR). It provides an introduction into English for Specific and Academic Purposes (				•	
	communication situations. Thus it covers topics related to the student's life and needs	•			-	
extending the knowledge of g	·					
04XAM2 End	alish for Intermediate Students M2				Z	2
1	student to have completed the AM1 course. It develops their skills for work with subte	echnical texts. focu	ısina also m	nore on spec	_	
and lexical items typical of ES	P and EAP (e.g., definition, existence and classification of phenomena, object descripti	ions). Part of the c	ourse is als	o guided wri	ting. If necess	ary, grammar
revision is included.						
04XAM3 End	glish for Intermediate Students M3				Z	2
, ,	s that enable students to cope with features typical of professional style. Increasing atte	ntion is paid to dev	veloping sub	otechnical vo	ocabulary and	l independent
	I texts. Great emphasis is placed on distinguishing different levels of formal and inform	•			-	
equivalents. The course also	includes studying abstracts and rules for writing them as well as basic rules for prepar	ring and giving a s	short preser	ntation on a	chosen topic	related to the
student's field.						
04XAP1 End	lish for Advanced Students P1				Z	2
	udents who have successfully completed the full secondary school English language	course (at least th	ne B1 level	of the Comn	non Europear	n Framework
of Reference for Languages -	CEFR). It provides an introduction into English for Specific and Academic Purposes	(ESP, EAP), i.e., ii	nto the fund	amentals of	vocabulary, t	unctions,
grammar, and style typical of	professional oral and written communication situations (fundamentals of terms in mat	thematics and phy	sics, definit	ions, graph	descriptions,	etc). It also
covers professional oral and w	ritten communication on topics related to the undergraduate's life and needs. It develop	os skills for free pro	ofessional w	riting (writin	g a CV, letter	of application,
polite request). If necessary, r	revision of selected grammar topics is included.					
04XAP2 Eng	glish 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 cho	sen branch	es of science	According to
the students' needs it concen	strates on chosen grammar topics, but mainly intends to develop understanding of syr	ntactic structures a	and typical i	hetorical fur	nctions (e.g.,	various types
of descriptions, and, if possib	le, a case study). Increasing emphasis is placed on the undergraduate's independent	t work with and rea	ading of ling	guistically m	ore demandir	ng materials.
The course extends the stude	ent's subtechnical vocabulary, and includes fundamental notions of chosen branches of	of science. It is foo	used on for	mal writing i	ncluding the	sentence and
paragraph structure, linking, o	cohesion and coherence in texts.					
04XAP3 Eng	glish for Advanced Students P3				Z	2
	AP2 and expects the student to work without any guidance with authentic professional		-		_	
	ctions (e.g., expressing an opinion, agreement, and objections; taking part in discussi	=	_	_	-	-
1 ' ' - ' '	given or chosen topic and presenting it. The course places emphasis on distinguishin	g levels of formal	and informa	al language	both in oral a	nd written
communication.					_	
1	ech for Foreigners - Beginners 1				Z	2
_	udents on the English programme. Students will become acquainted with the main cha			-		-
1 .	peaking skills. The course focuses on pronounciation exercises, simple social phrase					
	e course covers roughly lessons 1-5 in "Chcete mluvit esky" by H. Remediosová and	E. ecnova. At the	e ena or tne	course, the	students will	nave reached
A1 (CEFR) approximately.					_	
	ech for Foreigners - Beginners 2			<u> </u>	Z	2
	ation competences acquired in CESZ1 are further developed. Students extend their kn					
have reached A2 (CEFR) app	pics. The course covers roughly lessons 6-10 in "Chcete mluvit esky" by H. Remedio	sova and E. ecr	iova. At the	end of the d	ourse, the st	udents will
	· · · · · · · · · · · · · · · · · · ·			-	7	
	ech for Foreigners - Beginners 3	O TI /			Z	2
-	the language and communication competences acquired in the XCESZ1 and XCESZ		_			-
	ning grammar, including grammar practice, and introducing Czech culture. Students a e understanding texts in terms of main ideas or looking for specific details in texts. The	•	-			
<del></del>		e course covers re	Jugilly 16330	1 113 3-7 111 ,	Z	2
	ech for Foreigners - Intermediate 1	rh forms on wall or			_	
	ect pronunciation, important morphological phenomena, prepositional phrases, and ve	erb forms as well as	s on extendi	ng the stude	ent s vocabula	ary for various
social situations.	ash for Foreigners Intermediate 2			1	7	2
	ech for Foreigners - Intermediate 2	rootiooo veeltie -	naakir - ·	d rood!: '	Z	2
	cs covered in CESM1 and is then focused on more difficult grammar phenomena. It p	ractices writing, sp	peaking, an	u reading sk	uus and trains	s ine student
	breviations, abbreviated words, and mathematical terms and formulas.				7	
	ech for Foreigners - Intermediate 3				Z	2
1	hological topics covered earlier and extends the student's knowledge of more difficult	i ianguage phenor	nena. It is e	specially for	cused on styli	stics and
lexicology and on developing					_	
	ech for Foreign Students - Advanced 1				Z	2
The prerequisite of the course	e is very good knowledge of the Czech language, i.e., communicative competences at	least at level B2 of	the Comm	on Europear	n Framework	ot Reterence.

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 emphasis on individual	student's knowledge acquired in CESP1 and focuses on difficult language phenomena. It practises working with technical a work.	nd specialist texts	placing greater
04XCESP3	Czech for Foreigners - Advanced 3	Z	2
-	e student's knowledge from CESP2. It includes working with authentic specialist materials, their interpretation and presentation	on, and, finally, pre	esentation of the
	g skills necessary for professional communication are trained.	7	
04XFM1	French for Intermediate Students M1  M The objective of this three-semester course is to improve and further develop communication in the French language in bo	Z   th written and oral	2 I form Students
	cate in social interaction and in academic, scientific and professional environment. They will be able to use the language to tra		
	problems. FM1 The course builds on and further develops linguistic competence acquired at secondary school. It revises, sy	=	
• .	study. The following topics are covered: University studies in our country and in France, writing of transactional letters, CV, per		
	ture and geography, Paris. Topics of specialization: mathematics, physics. Reading technical and popular science texts, work		
04XFM2 Course FM2 builds on F	French for Intermediate Students M2 M1. Linguistic structures and competence acquired in previous study are systemized and expanded. Reading popular science	Z   texts. features typi	2 ical for technical
	(passives, nominalization, word formation). Topics: physics, power engineering, environment, Internet, success of French scie		
scientists, artists and ar	chitects. Description of an object, device, shapes, dimensions, material.		
04XFM3	French for Intermediate Students M3	Z	2
	n improvement and further development of linguistic competence acquired during the follow-up courses. Syntactic structures (a mpound tenses). Text summaryStudents prepare a written paper which will be delivered in form of an oral presentation in-cl		
	specialisation or to their interest and generally covers a technical /applied science topic. It is not a translation but a creative w		
and one's own knowled	ge/experienceLonger monologues on topics /situations set for the examination are prepared. Text structure, cohesion and c	coherence.	
04XFP1	French for Advanced Students P1	Z	2
	e objective of this three-semester course is to improve and further develop communication in the French language in both wr		
	· in social interaction and in academic, scientific and work environment. They will be able to use the language to transmit gene The course builds on and further develops linguistic competence acquired at secondary school. Difficult grammar topics are re		
•	it, pronouns. The following specific topics are covered: University studies in our country and in France, writing of transactiona	-	- 1
request, answer to an a	dvert, environmental issues, success of French science and technology, chosen topics from French regional culture, Paris. Topi	cs of specializatio	n: mathematics,
	stry. Reading of technical and popular science texts, further work with these texts and interpretation.		
04XFP2	French for Advanced Students P2	Z	2
	ents, the course further develops language skills. Focus is put on reading popular science texts and on oral communication or communication are stressed (passive voice, nominalization, word formation).	n given topics. Fea	atures typical of
04XFP3	French for Advanded Students P3	Z	2
	n systemization and improvement of acquired linguistic competence, skills and knowledge, and their use for communication in	engineering envir	onment. Special
	ter texts (both from and into the language). Writing of a paper and making oral presentation in-class. The paper generally cov	ers a technical /ap	pplied science
-	k compiled from 3 French sources. Preparation of several set topics for oral examination.		
0.4VE74	French for Deginners 74	7	
	French for Beginners Z1 e objective of this 5-level course is to be able to communicate in French grally and in writing in situations of everyday life, in s	Z socializing and in r	2 professional life.
French for beginners Th	French for Beginners Z1 e objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life, in sench for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able	socializing and in p	orofessional life.
French for beginners Th The course includes Fre	e objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life, in s	socializing and in perfect to communicate	orofessional life. at elementary
French for beginners Th The course includes Fre level, actively using the (Francouzština pro za á	e objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life, in sench for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able knowledge of chosen elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbook Pravda - Pravdoute ky). It is extended with situations of communication and functions from the textbook Espaces I, lessons 1-4: introductions,	socializing and in p to communicate ová, French for be personal informa	orofessional life. at elementary ginners
French for beginners Th The course includes Fre level, actively using the (Francouzština pro za a giving the directions, sin	e objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life, in sench for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able knowledge of chosen elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbook Pravda - Pravdoute ky). It is extended with situations of communication and functions from the textbook Espaces I, lessons 1-4: introductions, nple instructions and questions. Special attention is paid to pronunciation. Spelling is explained in connection with pronunciation.	socializing and in p to communicate ová, French for be personal informa	orofessional life. at elementary ginners tion, asking and
French for beginners The The course includes Fre level, actively using the (Francouzština pro za a giving the directions, sin 04XFZ2	e objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life, in sench for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able knowledge of chosen elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbook Pravda - Pravda te ky). It is extended with situations of communication and functions from the textbook Espaces I, lessons 1-4: introductions, nple instructions and questions. Special attention is paid to pronunciation. Spelling is explained in connection with pronunciat French for Beginners Z2	socializing and in particle to communicate ová, French for begován personal information and grammar.	orofessional life. at elementary ginners tion, asking and
French for beginners The Course includes Fre level, actively using the (Francouzština pro za a giving the directions, sir 04XFZ2 The course is linking up	e objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life, in sench for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able knowledge of chosen elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbook Pravda - Pravdoute ky). It is extended with situations of communication and functions from the textbook Espaces I, lessons 1-4: introductions, nple instructions and questions. Special attention is paid to pronunciation. Spelling is explained in connection with pronunciation.	socializing and in page to communicate by french for beginning personal information and grammar.  Z he textbook: Prave	orofessional life. at elementary ginners tion, asking and  2 da - Pravdová:
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French for beginners The course includes Frelevel, actively using the (Francouzština pro za a giving the directions, sin 04XFZ2 The course is linking up French for Beginners . A thanking, travelling, may How does the machine	e objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life, in sench for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able knowledge of chosen elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbook Pravda - Pravdoute key). It is extended with situations of communication and functions from the textbook Espaces I, lessons 1 - 4: introductions, and ple instructions and questions. Special attention is paid to pronunciation. Spelling is explained in connection with pronunciate French for Beginners Z2  with FZ1. Elementary linguistic knowledge and communication skills are expanded. The scope is given by lessons 8 - 13 of the additional topics and skills are filled in from the textbook Espaces I, lesson 1 - 5 (introductions, invitation, welcoming, agreement of France, food, expression of will, wish, order, prohibition, pleasure). Correct pronunciation is practiced. Stress on oral communication work? A few expressions concerning the study. Name of University and Faculty.	socializing and in particular to communicate ová, French for beginner personal information and grammar.  Z he textbook: Pravient - disagreemen unication. Specific	orofessional life. at elementary ginners tion, asking and  2 da - Pravdová: t, apology, topics covered:
French for beginners The course includes Frelevel, actively using the (Francouzština pro za a giving the directions, sin 04XFZ2 The course is linking up French for Beginners . A thanking, travelling, may How does the machine 04XFZ3	e objective of this 5-level course is to be able to communicate in French orally and in writing in situations of everyday life, in sench for specific / technical communication and reading of popular science and scientific texts. FZ1 The objective is to be able knowledge of chosen elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbook Pravda - Pravdoute key). It is extended with situations of communication and functions from the textbook Espaces I, lessons 1-4: introductions, and ple instructions and questions. Special attention is paid to pronunciation. Spelling is explained in connection with pronunciate French for Beginners Z2  with FZ1. Elementary linguistic knowledge and communication skills are expanded. The scope is given by lessons 8 - 13 of the additional topics and skills are filled in from the textbook Espaces I, lesson 1 - 5 (introductions, invitation, welcoming, agreement of France, food, expression of will, wish, order, prohibition, pleasure). Correct pronunciation is practiced. Stress on oral communication for Beginners Z3  French for Beginners Z3	socializing and in the to communicate by a french for being personal information and grammar.  Z he textbook: Pravient - disagreemen unication. Specific	orofessional life. at elementary ginners tion, asking and  2 da - Pravdová: t, apology, topics covered:
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04XNM3 German for Intermediate Students M3		Z	2
The course introduces other more complex grammatical structures and their application the world at the beginning of the 21st century, linguistically more demanding texts on the structure of the course introduced their application.			
practise reading for information and reading aloud, and appropriate language for various		٠.	
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 goo			
course. The course is then focused on working with technical and scientific texts and p more difficult grammar structures necessary for understanding a subtechnical text (passiv		,	•
i.e., telephoning.		r	,
04XNP2 German for Advanced Students P2		Z	2
The course develops the students' skills in working with professional scientific texts (under vessions). It introduces mathematical expressions and texts of puclear power on			
vocabulary range. It introduces mathematical expressions and texts of nuclear power en- both written and oral (CV, letter of application, interview, scholarship), and more compl		a practising torma	communication,
04XNP3 German for Advanced Students P3		Z	2
The course consists of $\overset{.}{3}$ main parts (general communicative situations, grammar and		-	
(traffic problems and car accidents, accident report, filling in a form, complaints). Based		· -	
nuclear power engineering, the environment, computer science, and car technology, w students are trained to process information gained from their reading of complex and dif	•	=	•
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 secondar			
basic vocabulary for communication in everyday situations (introductions, socializing, g			-
they can use basic grammar structures (verbal and nominal forms, irregular verbs, pro- contents and scope of the course correspond approximately to the RZ3 course, but for	,	level of the RZZ	course. The
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 conter in the timetable.	ats and scope are roughly at the same level as those of RZ5, h	owever, for half of	the time allotted
04XRP1 Russian for Advanced Students P1		Z	2
The entrance requirement for the course is to achieve the B1 CEFR level. The objective	e of the course is revision of standard language structures, pro		l
structures, understanding the fundamentals of technical language and training writing			
04XRP2 Russian for Advanced Students P2		Z	2
The course is based on RP1. It expands grammatical structures important for understa	nding technical texts (verbal adjectives, participles, passives,	verb aspects, spe	ecific syntactic
structures). Stress is put on independent oral and written communication.  04XRP3 Russian for Advanced Students P3		7	2
04XRP3 Russian for Advanced Students P3 The course is based on RP2 and is mainly focused on working with technical and scien	ntific texts (reading comprehension, oral and written paraphra	_	_
courses require good previous knowledge of general language at secondary level (liste	· · · · · · · · · · · · · · · · · · ·		
these skills. Further study is aimed at professional and technical skills (reading technic		•	,
develop their subtechnical vocabulary and practice quick and correct communication in technical topics.	professional situations. They will be able to both speak write	accurately and wi	th confidence on
04XRZ1 Russian for Beginners Z1		7	2
The course represents the first stage of the five-semester programme, its final aim bein	g reading and understanding professional texts written in Russ	ı <del>⊂</del> sian. Thus it begin	
the Russian alphabet (for both reading and writing skills) and fundamentals of gramma	r necessary for everyday communication (listening and speak	ing). Students wil	I be able to read
a short text with marked stress, understand its contents and summarize it.			1
04XRZ2   Russian for Beginners Z2		Z	2
The second semester of the programme is designed to teach skills for basic communic able to communicate using short sentences and appropriate structures, and read aloud			
master further grammatical structures. They will have mastered with confidence the Ru		also develop also.	. rocabaidi, aira
04XRZ3 Russian for Beginners Z3		Z	2
The course is based on RZ2 and includes further everyday topics, develops understand		J	J
and listening) and introduces new grammar. Students will be trained to distinguish into		e able to respond	l so as to be
understood, and to express their opinion. Writing skills will be trained on guided writing 04XRZ4 Russian for Beginners Z4	tasks and note-taking.	Z	2
The course is based on RZ3. It improves and expands the knowledge of general language	ge in all four skills (reading and understanding longer texts with		l
words, oral communication in everyday situations, writing longer texts). Students are tra		•	-
from Czech, modality, imperatives, conditionals). They practice and develop communication	ation skills for everyday situations (food, travelling, free time),	and practice oral	and written
communication on more specific topics (environment, addictions, the green movement		g., Siberia), learn	how to fill in
forms, look up the information from the timetable, learn about Russian holidays and type 04XRZ5 Russian for Beginners Z5	olcal meals.	Z	2
The course expects the student to have completed RZ4. It concentrates predominantly	on reading skills (working with professional texts, i.e. understa	_	_
information from a specialized text) and speaking, and to a certain extent, writing about		-	_
everyday topics. Studying grammar is based on professional and technical texts and or		` '	es, participles,
passive voice). Students develop their technical and economic vocabulary, and are also	o trained in some professional skills (writing a CV, polite reque		
04XSM1   Spanish for Intermediate Students M1 The course is designed for students whose competence is at level B1 of CEFR, i.e. tho	se who studied Spanish in the secondary school. The 3-seme	Z ester course deve	2 lons standard
vocabulary and pays attention to further grammar topics (e.g., perifrasis verbales, future			-
subjunctive), to written and oral communication on a given everyday or easy subtechni			
04XSM2 Spanish for Intermediate Students M3		Z	2
The course develops the students' knowledge from the previous course (SM1). Studer	ts are gradually acquainted with fundamentals of Spanish for	specific purposes	s 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 s	pplemented with additional subtechnical materials, so the students will be gradually acquainted with the peculiarities of acade	mic style. They w	ill be competent
enough to use the Inter-	net in Spanish and search for information of their specialization or field of interest. Students will use the information to write sl	nort articles and s	summaries. The
final part of the program	me, 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 or of CEFR.	more difficult grammar topics, revision of vocabulary, basics of Spanish for specific purposes as well as written communication	on. Course prered	juisites: level B2
04XSP2	Spanish for Advanced Students P2	Z	2
Course SP2 is the seco	nd part of the advanced Spanish course, extending Spanish for specific purposes topics. It comprises more grammar and syr	ntax and focuses	on independent
written communication.			
04XSP3	Spanish for Advanced Students P3	Z	2
Course SP3 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 t	ocused on written	communication
based on what students	will need in their career.		
04XSZ1	Spanish for Beginners Z1	Z	2
Course SZ1 is the first s	tage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and fundam	ental grammar str	ructures 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 ar	nd will develop it.	
04XSZ2	Spanish for Beginners Students Z2	Z	2
Course SZ2 is based on	course SZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures and le	xis will be chosen	so as to enable
them to understand sho	rt adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries and ott	ners such as the (	Ozech Republic.
Realia of Spanish-speal	king countries are also included.		
04XSZ3	Spanish for Beginners Z3	Z	2
The course is based on	course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of	the Spanish-spea	aking countries,
mainly of Spain. It pays	attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative	). It includes writt	en and oral
communication on a giv	en general topic, for which the student is trained by reading texts or listening to them.		
04XSZ4	Spanish for Beginners Z4	Z	2
The course is based on	course SZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanis	h speaking count	ries, mainly of
Spain. It pays attention	to further grammar topics (perífrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of ti	ne imperative, and	d subjunctive),
to written and oral comr	nunication 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 s	upplemented with additional subtechnical materials, so the students will be gradually acquainted with peculiarities of Spanish	for specific purpo	oses. In its final
part, the general Spanis	ch course based on the course book will end with presentations and, finally, a written and oral examination.		

# 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	Z	1
	Review of basics of high school mathematics.	'	
00PT	Preparatory Week	Z	2
00RET	Rhetoric	Z	1
The course is foo	used on the acquisition of speech and voice techniques and on the rules of correct pronounciation. The course is also devoted to the	composition of pub	olic speech
as well as to its	s 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	e course.
01ANB3	Calculus B 3	Z,ZK	8
1. Functional se	quences and series - convergence range, criteria of uniform convergence, continuity, limit, differentiation and integration of functional	series, power serie	s, Series
Expansion, Tayl	or's theorem. 2. Ordinary differential equations - equations of first order (method of integration factor, equation of Bernoulli, separation	of variables, home	ogeneous
equation and exac	t equation) and equations of higher order (fundamental system, reduction of order, variation of parameters, equations with constant coel	fficients and specia	al right-hand
side, Euler differen	ntial equation). 3. Metric spaces - metric, norm, scalar product, neighborhood, interior and exterior points, boundary point, isolated and	d non-isolated poin	it, boundary
	iss of space, Hilbert spaces. Orthogonal polynomials. Complete orthogonal systems. 4. Fourier series - expansion of functions into Fourie		
series and their c	onvergence. 5. Differential calculus of functions of several variables - limit, continuity, partial and directional derivative, gradient, total d		gent plane,
	Taylor series, elementary terms of vector analysis, Jacobi matrix. 6. Functions defined implicitly by one or several equations	3.	
01ANB4	Calculus B 4	Z,ZK	6
[1] Diferenciální p	o et funkcí více prom nných a funkcionálních vektor . [2] Funkce zadané implicitn . [3] Taylorovy ady funkce více prom nných. [4] F	Regulární zobrazer	ní, zám na
prom nných, ne	ekartézské soustavy sou adnic. [5] Lokální, vázané a globální extrémy funkce více prom nných. [6] Základy teorie míry a obrys konstr	ukce Lebesgueovy	y míry. [7]
Integrální po et	funkce více prom nných - Riemann v a Lebesgue v integrál, základní vlastnosti, Fubiniova v ta, v ta o substituci. Leviho a Lebesgu	eova v ta. Limita, s	spojitost a
	derivace integrálu podle parametru. [8] Integrály po k ivkách a plochách. Integrální v ty.		
01DYKO	Introduction to Continuum Dynamics	Z,ZK	3
The course provide	des a rigorous introduction to the mathematical description of continuum dynamics. In the first part, the necessary mathematical tools	are summarized, f	ocusing on
	calculus, differential forms, and integration on manifolds. Next, the fundamental concepts such as several deformation tensors and the s	,	•
	are used subsequently in the derivation of the conservation laws of mass, momentum and energy in both integral and differential form	ns. The conservation	on laws are
are defined. They	3,		
are defined. They	further adapted to the specific cases of viscous and inviscid fluid and linear/nonlinear elastic body.		
are defined. They	• •	Z	2
01LAL	further adapted to the specific cases of viscous and inviscid fluid and linear/nonlinear elastic body.	_	_
01LAL	further adapted to the specific cases of viscous and inviscid fluid and linear/nonlinear elastic body.  Linear Algebra 1  Linear dependence and independence. 3. Basis and dimension. 4. Subspaces of vector spaces. 5. Linear mappings. 6. Matrices of linear dependence.	_	_
01LAL 1. Vector space.	further adapted to the specific cases of viscous and inviscid fluid and linear/nonlinear elastic body.  Linear Algebra 1  2. Linear dependence and independence. 3. Basis and dimension. 4. Subspaces of vector spaces. 5. Linear mappings. 6. Matrices of litheorem.	near mappings. 7.	Frobenius 4

of determinants.	<ol> <li>Calculation of eigenvalues and eigenvectors. 4. Hermitian and quadratic forms. Canonical form. 5. Scalar product and orthogonalit complements. 6. Geometry – exercises and examples. 7. Adjoint operators.</li> </ol>	y. Calculation of or	thogonal
01LALZ	Linear Algebra 1, exam	ZK	2
01MAN	Calculus 1	Z	4
	Basic calculus (real analysis, functions of one real variable, differential calculus).		l
01MAN2	Calculus 2	Z,ZK	8
	differential calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence, operations on series, absolute ar		_
Real and complex p	power series, the Cauchy-Hadamard theorem, expansion of function into power series, summation of infinite series. 4. Theory of integral (Riemann definition), techniques of integration and application of integrals, Generalized Riemann integral	als: primitives, def	nite integrai
01MANZ	Calculus 1, exam	ZK	4
01PGR1	Computer Graphics 1	Z,ZK	2
	two-semester "Computer Graphics" course is devoted to the specifics of digital display devices spanning from history up to the state of	•	_
a survey of fundame	ental problems in 2D computer graphics is given together with their solutions. Focus is put on mathematical description of problems and ex	planation of the co	rresponding
algorithms using k	nowledge previously obtained in a variety of subjects available at FNSPE. The final part of the course covers the applications of com the process of authoring scientific documents and presentations.	puter graphics app	roaches in
01PGR2	Computer Graphics 2	Z,ZK	2
	of the two-semester "Computer Graphics" course begins with a brief introduction to signal theory in the context of aliasing - a phenom	,	
	a well structured survey of fundamental problems in 3D computer graphics is given together with their solutions, from the description		
_	put on mathematical description of problems and explanation of the corresponding algorithms using knowledge previously obtained in		
at FNSPE. The aigo	orithm implementation aspect such as data structures design etc. is also a matter of concern. In the last lecture, a number of theoretic using Blender, an open-source 3D modeling and rendering software instrument.	ai concepts are de	emonstrated
01PSL	LaTeX - Publication Instrument	Z	2
011 02	The course is devoted to the basics and facilities of computer typography, particularly to the system LaTeX	_	_
01RMAF	Equations of Mathematical Physics	Z,ZK	7
The subject of this	course is solving integral equations, theory of generalized functions, classification of partial differential equations, theory of integral tr	ansformations, and	d solution of
	partial differential equations (boundary value problem for eliptic PDE, mixed boundary problem for eliptic PDE).		
01SITE1	Computer Networks 1	. Z	2
_	history and present network (LAN, WAN, use the principles and technologies). Architecture of reference model ISO/OSI. Network pro tions. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification author	-	
	actice. Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the se	· · · · · · · · · · · · · · · · · · ·	
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 pro	tocols, practical ex	ercises with
	tions. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification authorized to the communication of the comm	· · · · · · ·	
	actice. Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the se		
01SOS1	Software Seminar 1 Java, Java Beans, Assembly language programming for microprocessors Intel 80x86	Z	2
01SOS2	Software Seminar 2	Z	2
Graphical libraries	GTK+ and Qt. Development of graphical user interface using C and C++ programming languages. Portable applications for Unix like for Linux systems. Portability to Microsoft Windows.	operating systems	, especially
01UP1	Introduction to Probability 1	Z,ZK	3
1.Random trial w	ith finite set of possible results, classical probability, independent random events 2. Probability and combinatorics 3. Probability and ge		s paradox
4.Conditional prob	pability, Bayes' theorem, medical diagnosis, Simpson's paradox 5.Random variable with discrete state space, its distribution and mea		s involving
041100	the calculation of mean value 7.Probabilistic method in graph theory 8.Random algorithms, Morris algorithm and its variant		
01UP2	Introduction to Probability 2 I continuous random variable and its statistical description. 2. Distribution function and probability density. 3. Axiomatic introduction of	Z,ZK	3
	Numerical characteristics of continuous random variables. 5. Selected variants of continuous distributions and their characteristics. 6.		
,	estimations. 7. Generating pseudorandom numbers from the selected distribution.	•	
01ZPB1	Introduction to Computer Security 1	Z	2
02DEF1	History of Physics 1	Z	2
	ace in the system of sciences. The relationship of man and nature. Natural sciences in ancient Orientand Greece, Greek natural philo	-	-
Helenistic period,	Archimed. Arabic science, European science in Middle Ages. Renaissance - da Vinci, Giordano Bruno. Copernicus, Kepler, Galileo, Fase experimental science. Newton and his work.	luygens. The birth	or physics
02DEF2	History of Physics 2	Z	2
	f classical mechanics after Newton, Bernoulli's, Euler, Lagrange. Historical development of optics, corpuscular and wave approach. E	<del>-</del>	
electrostatics, galv	vanism, electrodynamics and electromagnetism, Faraday and Maxwell. Thermodynamics and its laws, statistical physics, Boltzmann.	The birth of moder	n quantum
and relativistic p	hysics, Planck and Einstein. Discovery of radioaktivity, structure of atom, atomic nucleus, Rutherford and Bohr. The way to nuclear er	ergy, Elementary	particles,
OOFLMA	standard model. The concept of Nature and Universe of today.	7 71/	•
02ELMA Electric charge Co	Electricity and Magnetism pulomb's law, electrostatic field, Gauss' law. Electric dipole, polarization. Conductors anddielectrics. Electric current and circuits, cond	Z,ZK uctivity Basics of t	6 he relativity
_	Electrodynamic forces, magnetic field. Magnetic dipole, magnetics. Electromagnetic induction, ac currents. Electromagnetic waves, N	=	o roidiivity
02KM1	Quantum Mechanics 1	Z,ZK	6
Abstract: The lectur	e describes the birth of quantum mechanics and description of one particle and more particles by elements of the Hilbert space as we	II as its time evolut	on. Besides
0014440	that it includes description of observable quantities by operators in the Hilbert space and calculation of their spectra.	7 71/	
02KM2	Quantum Mechanics 2 ture expands the introduction to quantum mechanics with more general formalism of quantum theory, approximate methods and path	Z,ZK	6 arizes the
	ture expands the introduction to quantum mechanics with more general formalism of quantum theory, approximate methods and patr ethods used in various applications of quantum mechanics and prepares the students for an effective scientific research and further stu	_	
5,	formulations of quantum field theory.	,	
02MECH	Mechanics	Z	4
	ics, physical quantities and units. Particle kinematics, basic types of motion and theirsuperposition. Particle dynamics, one-dimension	-	
in central force fi	eld, forces innoninertial reference frames. Mechanics of system of free particles, two-body problem, collisions. Mechanics ofrigid bod	y, rotatíon. Fundan	nentals of
	continuum mechanics, elasticity, hydrodynamics. Sound.		

02MECHZ	Mechanics - Examination  The content of the subject is the examination according to the plan of studies.	ZK	2
000004	The content of the subject is the examination according to the plan of studies.	KZ	6
02PRA1	Experimental Laboratory 1  d especially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nuclear Eng		
	ts interested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work with theli		
=	nt (acquire of different experimental procedures and routines), willteach writing the records of measurement, processing and evaluation		· -
	practically extendthe knowledge gained in lectures on physics.		
02PRA2	Experimental Laboratory 2	KZ	6
ecture is intended	d especially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nuclear Eng		t can be also
ttended by student	ts interested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work with theli	terature), the im	nplementatio
of the measuremen	nt (acquire of different experimental procedures and routines), willteach writing the records of measurement, processing and evaluation	of results. At the	ne same time
	practically extendthe knowledge gained in lectures on physics.		
02SMF	Seminar of Mathematical Physics	Z	2
The purpose of th	ne seminar is to iluminate mathematical physics by virtue of solved examples. It is supposed that the teachers of the physics department	nt will present s	imple tasks
	concerning their scientific activities that could become the topics of the student?s bachelor theses in the next year		1 .
02TEF1	Theoretical Physics 1	Z,ZK	4
	troduction to analytical mechanics. The students acquire knowledge of the basic concepts of the Lagrange and Hamiltonian formalism as		
•	lynamics (Newton's, Lagrange, Hamilton and Hamilton-Jacobi equations). The efficiency of these methods is illustrated on elementary on of a system of constrained mass points, and of a rigid body. Advanced parts of the course cover differential and integral principles of the course of classical theoretical physics (02TEF1, 02TEF2).		-
02TEF2	Theoretical Physics 2	Z.ZK	4
- 1	sformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and c	,	1
	me. Classical electrodynamics: Maxwell's equations in the Minkowski space-time, electromagnetic waves in dielectric media, electroma		•
	approximation.		
02TER	Heat and Molecular Physics	Z,ZK	4
hermal expansion	of materials, heat transfer; stationary and non-stationary heat conduction, heat transfer and penetration; 1st and 2nd thermodynamic	principle, ideal	and real gas
ntropy; non-chemi	ical systems: dielectric and magnetic materials; Maxwell relations and thermodynamic potentials; kinetic theory: Maxwell's velocity distrib	oution,equiparti	tion theorem
02TSFA	Thermodynamics and Statistical Physics	Z,ZK	4
oundation of thern	nodynamics and statistical physics. Thermodynamic potential, the Joule Thomson effect, conditions of equilibrium, the Braun-Le Chatelier	principle. Stati	stical entropy
Basics of many boo	dy descriptionfrom a statistical point of view (classical and quasiclassical regime within the frame of a canonical and grand-canonical en	nsemble, Fermi	i gas, model
	of crystals and the black body radiation). The Boltzmann equation is used to discusses simple transport phenomena.		
02VOAF	Waves, Optics and Atomic Physics	Z,ZK	6
Wave phenomena	a in mechanics and electromagnetism: modes, standing and travelling waves, wave packets indispersive media. Wave optics: polarizatio		-1:ff 4:
•	and travelling and disciniting fields. House, standing and travelling waves, wave packets indispersive media. Wave optios. Polarization	on, interference	, diffraction,
	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Brogl		
coherence. Geor	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Brogl equation, stationary states and spectra of finite systems.	ie waves,the So	chrodinger
coherence. George	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglequation, stationary states and spectra of finite systems.  Nuclear Physics B	ie waves,the So	chrodinger 3
coherence. George	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglequation, stationary states and spectra of finite systems.  Nuclear Physics B  presents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic domain,	KZ where much of	chrodinger 3
coherence. George Coherence Coherenc	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Brogle equation, stationary states and spectra of finite systems.  Nuclear Physics B  presents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic domain, intuition regarding the behaviour of objects fails us. The lecture is a basic introduction to very interesting regions of subatomic physics.	KZ where much of sics.	chrodinger  3 f our classica
coherence. Georgia Construction	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Brogle equation, stationary states and spectra of finite systems.  Nuclear Physics B  presents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic domain, intuition regarding the behaviour of objects fails us. The lecture is a basic introduction to very interesting regions of subatomic physical Measurements 1	KZ where much of sics. ZK	chrodinger  3 f our classica
coherence. Georgia Control Con	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglequation, stationary states and spectra of finite systems.  Nuclear Physics B  presents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic domain, intuition regarding the behaviour of objects fails us. The lecture is a basic introduction to very interesting regions of subatomic physical measurements 1  gned for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however, it car	KZ where much of sics. ZK n be attended by	3 four classica 2 by students c
coherence. Georgia Control Con	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglequation, stationary states and spectra of finite systems.  Nuclear Physics B  presents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic domain, intuition regarding the behaviour of objects fails us. The lecture is a basic introduction to very interesting regions of subatomic physical for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however, it carne goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired data of	KZ where much of sics. ZK n be attended by	3 four classica 2 by students c
coherence. George Coherence. George Coherence. George Coherence Co	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglequation, stationary states and spectra of finite systems.  Nuclear Physics B  presents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic domain, intuition regarding the behaviour of objects fails us. The lecture is a basic introduction to very interesting regions of subatomic physical for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however, it carne goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired data of basic habits of work in a physics lab.	KZ where much of sics. ZK n be attended bon a PC. Studen	3 f our classica 2 oy students cents learn the
coherence. George Coherence. George Coherence. George Coherence Co	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglequation, stationary states and spectra of finite systems.  Nuclear Physics B  presents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic domain, intuition regarding the behaviour of objects fails us. The lecture is a basic introduction to very interesting regions of subatomic physical for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however, it carne goal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired data of basic habits of work in a physics lab.  Foundations of Physical Measurements 2	KZ where much of sics. ZK n be attended bon a PC. Studen	3 f our classica 2 py students cents learn the
coherence. George Coherence. George Coherence. George Coherence Co	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglequation, stationary states and spectra of finite systems.    Nuclear Physics B	KZ where much of sics. ZK n be attended bon a PC. Studen KZ n be attended b	shrodinger  3 f our classica  2 by students onts learn the  4 by students of
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O2ZJFB This scientific field of the lecture is designed other branches. The O4AKS	metrical optics. Introduction toquantum physics: black body radiation, quantum of energy, photoeffect, the Compton effect, the de Broglequation, stationary states and spectra of finite systems.    Nuclear Physics B	KZ where much of sics.  ZK n be attended bon a PC. Studen KZ n be attended bon a PC. Studen	3 f our classica 2 by students conts learn the 4 by students conts learn the
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covers professional oral and written communication on topics related to the undergraduate's life and needs. It develops skills for free professional writing (writing a CV, letter of application, polite request). If necessary, revision of selected grammar topics is included. 04XAP2 English for Advanced Students P2 7 2 The AP2 course is based on AP1, thus extending the student's skills for working with subtechnical texts, and even with professional texts of chosen branches of science. According to the students' needs it concentrates on chosen grammar topics, but mainly intends to develop understanding of syntactic structures and typical rhetorical functions (e.g., various types of descriptions, and, if possible, a case study). Increasing emphasis is placed on the undergraduate's independent work with and reading of linguistically more demanding materials. The course extends the student's subtechnical vocabulary, and includes fundamental notions of chosen branches of science. It is focused on formal writing including the sentence and paragraph structure, linking, cohesion and coherence in texts. 04XAP3 English for Advanced Students P3 The AP3 course is based on AP2 and expects the student to work without any guidance with authentic professional materials and to interpret the text. It includes training oral and written communication skills and functions (e.g., expressing an opinion, agreement, and objections; taking part in discussion, note-taking; summarizing, writing an abstract) and, if possible, also preparing a project on a given or chosen topic and presenting it. The course places emphasis on distinguishing levels of formal and informal language both in oral and written communication. 04XAPZK English for Advanced Students Examination 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. Czech for Foreigners - Intermediate 1 04XCESM1 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 Ζ 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. Czech for Foreigners - Intermediate 3 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 7K 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 Ζ 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 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 7 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 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 Z Czech for Foreigners - Beginners 1 2 The course is designed for students on 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 pronounciation exercises, simple social phrases, and oral and written communication in the most common communicative situations. The course covers roughly lessons 1-5 in "Chcete mluvit esky" by H. Remediosová and E. echová. At the end of the course, the students will have reached A1 (CEFR) approximately. 04XCESZ2 Czech for Foreigners - Beginners 2 The language and communication competences acquired in CESZ1 are further developed. Students extend their knowledge of Czech declension and conjugation system and practise communication of frequent topics. The course covers roughly lessons 6-10 in "Chcete mluvit esky" by H. Remediosová and E. echová. At the end of the course, the students will have reached A2 (CEFR) approximately. 04XCESZ3 Czech for Foreigners - Beginners 3 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, correct pronunciation, deepening grammar, including grammar practice, and introducing 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 "eština expres 1". Czech for Foreigners – Beginners - Examination 04XCFSZZK 7K 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. French for Intermediate Students M1 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. French for Intermediate Students M2 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 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

· · · · · · · · · · · · · · · · · · ·	terest and generally covers a technical /applied science topic. It is not a translation bLonger monologues on topics /situations set for the examination are prepared. Text	•
04XFMZK	French for Intermediate Students Examination	ZK 4
The content is the examination as given by the st	tudy programme. The whole French programme is ended with an examination coveri	ing the contents of FM1-FM3. The examination
consists of a written a	and oral part and is organized according to Examination Instructions, a document av	railable on the web.
04XFP1	French for Advanced Students P1	Z 2
FP advanced course The objective of this three-se	emester course is to improve and further develop communication in the French langu	uage in both written and oral form. Students will
be able to communicate in social interaction and in	n academic, scientific and work environment. They will be able to use the language to	transmit general and technical information and
•	urther develops linguistic competence acquired at secondary school. Difficult gramma	
-	g specific topics are covered: University studies in our country and in France, writing	·
•	s, success of French science and technology, chosen topics from French regional cult	· · · · · ·
	emistry. Reading of technical and popular science texts, further work with these texts	
04XFP2	French for Advanced Students P2	Z   2
	evelops language skills. Focus is put on reading popular science texts and on oral con	
	and scientific communication are stressed (passive voice, nominalization, word form	
04XFP3	French for Advanded Students P3	Z 2
	vement of acquired linguistic competence, skills and knowledge, and their use for com nto the language). Writing of a paper and making oral presentation in-class. The pape	
•	ative work compiled from 3 French sources. Preparation of several set topics for oral	
04XFPZK	French for Advanced Students Examination	ZK 4
	mination covering the contents of FP1-FP3. The examination consists of a written an	' '
. 5	a document available on the web. Assessment of the presentation is included into the	
04XFZ1	French for Beginners Z1	Z 2
· · · · · · · · · · · · · · · · · · ·	course is to be able to communicate in French orally and in writing in situations of eve	· '
-	al communication and reading of popular science and scientific texts. FZ1 The object	
· · · · · · · · · · · · · · · · · · ·	elementary language. The contents is roughly outlined by lessons 1 - 7 of the textbo	-
(Francouzština pro za áte ky). It is extended with s	situations of communication and functions from the textbook Espaces I, lessons 1-4	: introductions, personal information, asking and
giving the directions, simple instructions ar	nd questions. Special attention is paid to pronunciation. Spelling is explained in conn	nection with pronunciation and grammar.
04XFZ2	French for Beginners Z2	Z 2
The course is linking up with FZ1. Elementary ling	guistic knowledge and communication skills are expanded. The scope is given by less	sons 8 - 13 of the textbook: Pravda - Pravdová :
French for Beginners . Additional topics and skill	lls are filled in from the textbook Espaces I, lesson 1 - 5 (introductions, invitation, we	lcoming, agreement - disagreement, apology,
	on of will, wish, order, prohibition, pleasure). Correct pronunciation is practiced. Stress	· · · · · · · · · · · · · · · · · · ·
How does t	the machine work? A few expressions concerning the study. Name of University and	
04XFZ3	French for Beginners Z3	Z   2
	wledge and skills are developed. The contents is given by lessons 14 - 18 of the textb	_
Topics, functions and situations are complement	ted from other materials. Stress is put on oral communication in dialogues and on re-	ading both for information and loud as part of
	· · · · · · · · · · · · · · · · · · ·	
pronunciation pra	actice. Reading covers short adapted texts of general interest first, and later popular	science texts.
pronunciation pra	actice. Reading covers short adapted texts of general interest first, and later popular French for Beginners Z4	science texts.
pronunciation pra  04XFZ4  The course builds up on FZ3. Basic linguistic known	actice. Reading covers short adapted texts of general interest first, and later popular  French for Beginners Z4  pwledge and skills are further developed. Oral communication and reading skills are	science texts.  Z 2 practiced. The contents is roughly covered with
pronunciation pra  04XFZ4  The course builds up on FZ3. Basic linguistic knowlessons 19 - 23 of the textbook French for Beginners	French for Beginners Z4 owledge and skills are further developed. Oral communication and reading skills are presented with topics and functions from other materials. Reading is developed.	science texts.
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more difficult gramn	nar structures necessary for understanding a subtechnical text (passive voice, participles, participle structures) and it also focuses on practice., telephoning.	ctical everyday com	munication,
04XNP2	German for Advanced Students P2	Z	2
	is the students' skills in working with professional scientific texts (understanding, summarising, note-taking, interpreting) while extending		
-	introduces mathematical expressions and texts of nuclear power engineering. Increasing emphasis is placed on understanding and pra	-	
bo	oth written and oral (CV, letter of application, interview, scholarship), and more complex grammatical structures (i.e., subjunctive, india	rect speech).	· ·
04XNP3	German for Advanced Students P3	Z	2
The course consis	ts of 3 main parts (general communicative situations, grammar and technical topics). Students will develop their vocabulary in a varie	ety of less common	situations
(traffic problems ar	nd car accidents, accident report, filling in a form, complaints). Based on presentations and technical and subtechnical texts, the voca	abulary range in field	ds such as
nuclear power en	gineering, the environment, computer science, and car technology, will also be extended. Only authentic professional texts are used.	By means of a pres	sentation,
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 c	ourse also includes	translation
	practice to and from German.		
04XNPZK	German for Advanced Students Examination	ZK	4
The course conten	t is the examination as given by the study plan. The whole German for Advanced Students Course is completed by an examination c	onsisting of two par	ts - written
and oral, which c	over the courses NP1 - NP3. The oral part follows after passing the written part successfully and after obtaining the 04NP3 ungraded	d assessment. More	detailed
	information is to be obtained from the teacher.		
04XRM1	Russian for Intermediate Students M1	Z	2
	ned for students with previous knowledge of Russian from secondary schools. Students are supposed to know the Russian alphabet (	both printed and ha	ındwritten),
basic vocabulary fo	r communication in everyday situations (introductions, socializing, greetings, shopping for food and objects of everyday need, asking	the way and giving	directions),
	sic grammar structures (verbal and nominal forms, irregular verbs, pronouns). The initial knowledge corresponds to the achievement I		
•	contents and scope of the course correspond approximately to the RZ3 course, but for half of the time allotted in the timetab		
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		_
04XRM3	Russian for Intermediate Students M3	Z	2
	is the knowledge and skills acquired in RM1 and RM2 and its contents and scope are roughly at the same level as those of RZ5, howe	l I	
The course develop	in the timetable.	voi, ioi riali oi tiio ti	inc anotted
04XRMZK	Russian for Intermediate Students Examination	ZK	4
-			•
	t is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowled	-	
	ents are eligible for the oral examination only after a prior pass in RM3 and a successful written examination. Students are given instr		
04XRP1	Russian for Advanced Students P1	Z	2
The entrance req	uirement for the course is to achieve the B1 CEFR level. The objective of the course is revision of standard language structures, prac	ticing 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 bas	ed on RP1. It expands grammatical structures important for understanding technical texts (verbal adjectives, participles, passives, ve	rb aspects, specific	syntactic
	structures). Stress is put on independent oral and written communication.		
04XRP3	Russian for Advanced Students P3	Z	2
	d on RP2 and is mainly focused on working with technical and scientific texts (reading comprehension, oral and written paraphrasing	,	
	od previous knowledge of general language at secondary level (listening, reading, correct communication in everyday situations). The		
	er study is aimed at professional and technical skills (reading technical literature according to the students´ specialization, oral and wr	• •	
develop their subte	chnical vocabulary and practice quick and correct communication in professional situations. They will be able to both speak write accumulations.	urately and with cor	nfidence on
	technical topics.		
04XRPZK	Russian for Advanced Students Examination	ZK	4
	t is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowled		
	ents are eligible for the oral examination only after a prior pass in RP3 and a successful written examination. Students are given instr	uctions by the teac	
04XRZ1	Russian for Beginners Z1	Z	2
The course represe	ents 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 alphab	et (for both reading and writing skills) and fundamentals of grammar necessary for everyday communication (listening and speaking)	). Students will be a	ble to read
	a short text with marked stress, understand its contents and summarize it.		
04XRZ2	Russian for Beginners Z2	Z	2
The second semes	ter of the programme is designed to teach skills for basic communication in everyday situations and for reading easy and short subte	echnical texts. Stude	ents will be
able to communica	te using short sentences and appropriate structures, and read aloud with confidence a short text without marked stress. They will also	develop their voca	bulary and
		develop their voca	
	master further grammatical structures. They will have mastered with confidence the Russian alphabet and will be able to use it in	=	
04XRZ3		=	2
	master further grammatical structures. They will have mastered with confidence the Russian alphabet and will be able to use it in  Russian for Beginners Z3 d on RZ2 and includes further everyday topics, develops understanding of short compact texts on new subtechnical topics (for training	writing.	
The course is base	Russian for Beginners Z3	writing.  Z various forms of re	ading skills
The course is base	Russian for Beginners Z3 d on RZ2 and includes further everyday topics, develops understanding of short compact texts on new subtechnical topics (for training	writing.  Z various forms of re	ading skills
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The course is base and listening) and 04XRZ4	Russian for Beginners Z3 d on RZ2 and includes further everyday topics, develops understanding of short compact texts on new subtechnical topics (for training d introduces new grammar. Students will be trained to distinguish intonation patterns while listening to spoken language. They will be understood, and to express their opinion. Writing skills will be trained on guided writing tasks and note-taking.  Russian for Beginners Z4	writing.  Z various forms of re able to respond so	ading skills as to be
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The course is based and listening) and of the course is based words, oral communication of the course expects information from a severyday topics. Spassiv 04XRZZK  The course contents	Russian for Beginners Z3 d on RZ2 and includes further everyday topics, develops understanding of short compact texts on new subtechnical topics (for training d introduces new grammar. Students will be trained to distinguish intonation patterns while listening to spoken language. They will be understood, and to express their opinion. Writing skills will be trained on guided writing tasks and note-taking.  Russian for Beginners Z4 d on RZ3. It improves and expands the knowledge of general language in all four skills (reading and understanding longer texts with a cunication in everyday situations, writing longer texts). Students are trained to use grammar structures effectively (e.g., irregular verbs dality, imperatives, conditionals). They practice and develop communication skills for everyday situations (food, travelling, free time), a n more specific topics (environment, addictions, the green movement). They become acquainted with various geographical data (e.g. forms, look up the information from the timetable, learn about Russian holidays and typical meals.  Russian for Beginners Z5 sthe student to have completed RZ4. It concentrates predominantly on reading skills (working with professional texts, i.e. understandin specialized text) and speaking, and to a certain extent, writing about the professional information obtained by reading the texts. Commutudying grammar is based on professional and technical texts and only includes items typically used in professional communication (see voice). Students develop their technical and economic vocabulary, and are also trained in some professional skills (writing a CV, po	writing.  Z various forms of re able to respond so  Z ertain percentage o , differences in vert and practice oral and , Siberia), learn hor  Z  g, extracting and su nunication skills are (verbal adjectives, p olite request, etc.)  ZK  dge and skills acqui	ading skills as to be  2 f unfamiliar to patterns d written w to fill in  2 ummarizing trained on participles,  3 red in RZ1

0476144	Spanish for Intermediate Students M1	Z	2
04XSM1 The course is des	Spanish for intermediate Students will signed for students whose competence is at level B1 of CEFR, i.e. those who studied Spanish in the secondary school. The 3-semeste	<del>-</del>	1
	ays attention to further grammar topics (e.g., perifrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative ), to written and oral communication on a given everyday or easy subtechnical topic, for which the students are trained by reading text		
04XSM2	Spanish for Intermediate Students M3	Z	2
he course develo	ps the students' knowledge from the previous course (SM1). Students are gradually acquainted with fundamentals of Spanish for special students in the Internet.	ecific purposes in	order to be
04XSM3	Spanish for Intermediate Students M3	Z	2
	are supplemented with additional subtechnical materials, so the students will be gradually acquainted with the peculiarities of academic		
lough 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		nmaries. Th
047014714	final part of the programme, general Spanish course based on course books, covers presentations and, finally, a written and oral exa	mination. ZK	4
04XSMZK	Spanish for Intermediate Students Examination   t is the examination as given by the study plan. SMZK examination consists of two parts - written and oral; to be eligible for the written pa		1
	non-graded assessment for course SM3.Oral examination follows the written part.	. ,	
04XSP1	Spanish for Advanced Students P1	Z	2
ourse concentrate	es on more difficult grammar topics, revision of vocabulary, basics of Spanish for specific purposes as well as written communication. of CEFR.	Course prerequis	sites: level l
04XSP2	Spanish for Advanced Students P2	Z	2
ourse SP2 is the	second part of the advanced Spanish course, extending Spanish for specific purposes topics. It comprises more grammar and syntax written communication.	and focuses on	independe
04XSP3	Spanish for Advanced Students P3	Z	2
ourse SP3 is the f	final part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is focus based on what students will need in their career.	sed on written co	mmunicatio
04XSPZK	Spanish for Advanced Students Examination	ZK	4
	t is the examination as given by the study plan. Examination SPZK consists of two parts, namely oral and written. The prerequisite for a		1
	passed the written test. Examination content is based on syllabi of courses SP1, SP2, and SP3 or on an individual study plan of the		
04XSZ1	Spanish for Beginners Z1	Z	2
	first stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and fundamenta	-	
	communicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spanish for Regionary Students 72	sn and will devel	op it. 2
04XSZ2 ourse SZ2 is base	Spanish for Beginners Students Z2 ed on course SZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures and lexis	_	1
	d short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries and others  Realia of Spanish-speaking countries are also included.		
04XSZ3	Spanish for Beginners Z3	7	
		_	2
	ed on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the	Spanish-speaki	ng countrie
	or course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the It pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative).	Spanish-speaki	ng countrie
mainly of Spain.	od on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the lt pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative).  communication on a given general topic, for which the student is trained by reading texts or listening to them.	Spanish-speaki	ng countrie en and oral
mainly of Spain.  04XSZ4	do on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the lt pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative).  communication on a given general topic, for which the student is trained by reading texts or listening to them.  Spanish for Beginners Z4	Spanish-speaki It includes writte	ng countrie en and oral
mainly of Spain.  04XSZ4 The course is base	od on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the lt pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative).  communication on a given general topic, for which the student is trained by reading texts or listening to them.	Spanish-speaki It includes writte  Z speaking countrie	ng countrie en and oral 2 es, mainly o
mainly of Spain.  04XSZ4  The course is base pain. It pays atter	d on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the lt pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative).  communication on a given general topic, for which the student is trained by reading texts or listening to them.  Spanish for Beginners Z4  ed on course SZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanish solution to further grammar topics (perífrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the to written and oral communication on a given general or subtechnical topic, for which the student is trained by reading texts or listening	Spanish-speaki It includes writte  Z speaking countries imperative, and s	ng countrie en and oral 2 es, mainly o
mainly of Spain.  04XSZ4 he course is basipain. It pays atter	do on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the It pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative) communication on a given general topic, for which the student is trained by reading texts or listening to them.  Spanish for Beginners Z4  ed on course SZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanish solution to further grammar topics (perifrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the to written and oral communication on a given general or subtechnical topic, for which the student is trained by reading texts or listenin Spanish for Beginners Z5	Spanish-speaki It includes writte  Z speaking countrie imperative, and s g to them.	ang countrie en and oral 2 es, mainly of subjunctive
mainly of Spain.  04XSZ4 The course is base spain. It pays atter  04XSZ5	do on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the It pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative) communication on a given general topic, for which the student is trained by reading texts or listening to them.  Spanish for Beginners Z4  ed on course SZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanish sontion to further grammar topics (perifrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the to written and oral communication on a given general or subtechnical topic, for which the student is trained by reading texts or listenin  Spanish for Beginners Z5  are supplemented with additional subtechnical materials, so the students will be gradually acquainted with peculiarities of Spanish for	Spanish-speaki It includes writte  Z speaking countrie imperative, and s g to them.  Z specific purpose	ang countrie en and oral 2 es, mainly countrive
mainly of Spain.  04XSZ4 The course is basispain. It pays attered to 04XSZ5 The course books	d on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the It pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative) communication on a given general topic, for which the student is trained by reading texts or listening to them.  Spanish for Beginners Z4  ed on course SZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanish solution to further grammar topics (perifrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the to written and oral communication on a given general or subtechnical topic, for which the student is trained by reading texts or listenin  Spanish for Beginners Z5  are supplemented with additional subtechnical materials, so the students will be gradually acquainted with peculiarities of Spanish for part, the general Spanish course based on the course book will end with presentations and, finally, a written and oral examinate.	Spanish-speaki It includes writte  Z speaking countrie imperative, and s g to them.  Z specific purpose ion.	ng countrie and oral 2 es, mainly c subjunctive 2 es. In its fin:
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mainly of Spain.  04XSZ4 he course is base pain. It pays atter  04XSZ5 he course books  04XSZZK	do on course SZ2, and develops the student's vocabulary and grammar structure. The course covers realia (history and culture) of the It pays attention to further grammar topics (pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund and the imperative) communication on a given general topic, for which the student is trained by reading texts or listening to them.  Spanish for Beginners Z4  ed on course SZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanish solution to further grammar topics (perifrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the to written and oral communication on a given general or subtechnical topic, for which the student is trained by reading texts or listenin  Spanish for Beginners Z5  are supplemented with additional subtechnical materials, so the students will be gradually acquainted with peculiarities of Spanish for part, the general Spanish course based on the course book will end with presentations and, finally, a written and oral examinat  Spanish for Beginners Examination	Spanish-speaki It includes writte  Z speaking countrie imperative, and s g to them.  Z specific purpose ion.	ng countrie 2 es, mainly c subjunctive 2 es. In its fin
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12BPFI1								
	Bachelor Project 1	Z	5					
The bachelor proje	ct is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the proje	ect supervisor duri	ng common					
	regular meetings and discussions.							
12BPFI2	Bachelor Project 2	Z	10					
The bachelor proje	ct is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the proje	ect supervisor duri	ng common					
	regular meetings and discussions.							
12MOF	Molecular Physics	ZK	2					
Basic i	ldeas on multi-atomic molecules and molecular matter, and on structure-to-physical properties relations. Methods of molecular structu	re determination.						
12NME1	Numerical Methods 1	Z,ZK	4					
	d the basic principles of numerical mathematics important for numerical solving of problems important for physics and technology. Met	<i>'</i>	f tasks very					
important for phys	icists (ordinary differential equations, random numbers) are included in addition to the basic numerical methods. Integrated computati	onal environment	MATLAB is					
	used as a principle programming language as a demonstration tool. The seminars are held in computer laboratory.							
12NT	Nanotechnology	ZK	2					
	duce students mainly to modern technological methods of preparation of semiconductor, metal and dielectric nanostructures. Physical							
	gies (MBE, MOVPE, EBL, sol-gel and colloidal solution) will be explained. Substantive attention will be devoted to epitaxial technolog							
	paration. Particular emphasis will be focused on detail characterization of "in situ" and "ex situ" techniques, their applications for heter							
growths will be dis	cussed as well. Some supportive technical methods - lithography, diffusion, evaporation, ion implantation, contact and dielectric layer	preparation will be	mentioned					
	as well as soldering and encasement.							
12PAS	Computer Algebra Systems	Z	2					
	d introduction to computer algebra systems (CAS): their main characteristics, ways and means of using them. Constituent part is reali	ized in computer c	lassrooms:					
	students acquire basic skills with CAS by solving relatively simple and basic tasks from mathematics and physics.							
12POAL	Computer Algebra	KZ	2					
	n of basic objects (integers, rational and algebraic numbers, polynomials, rational functions, radicals, algebraic functions), arithmetics, si							
	derivation, series summation, integration, ordinary differential equations, factorization, equations solving, quantifier elimination, substi	-						
	ning, graphics, Maple - detailed introduction and solving of practical examples, applications, overview of other systems (Axiom, Macsyn	· · · · · · · · · · · · · · · · · · ·	- 1					
12PYTH	Scientific Programming in Python	7	2					
	rse is to learn the fundamentals of the modern Python programming language with a focus on scientific computing. Emphasis is place	d on effective solu	- 1					
	ourse is performed in an interactive form of practical exercises, whose topics can be tailored to the content of other subjects or studer							
-	ng research. In the introductory part of the course, students learn the basic features of Python?from basic types to object oriented or f							
•	le course focuses on specific features of Python for scientific programming. Presented are the main numerical libraries NumPy, SciPy		٠ ا					
	library. We show how to generate efficient code, how to combine Python with other languages, what tools are available.	·						
12UFN	Introduction to Photonics and Nanostructures	KZ	3					
_	tructures and nanotechnologies; quantum technologies; quantum nanostructures; photonic structures; nanophotonics and nanoplasm	onics; optical wave	eguides and					
	fibers; integrated photonics; computer simulations; technological realization; student presentations							
12ULTB	Introduction to Laser Technique	KZ	3					
	omagnetic radiation sources; laser principle; classification of lasers; characterization and rough application of various types of lasers;		-					
	laser amplifier, Q-switching, mode-locking.	,,						
12UNXAP	Introduction to UNIX	Z	2					
	pperating systems. Personal computer, workstation and supercomputers. Processor, memory, bus, devices, hard disk, network interfac							
Principles of opera	ting systems. Operating system UNIX. Basic principles, kernel, kernel services. Documentation. File system, file atributes, working wit	h files. Text editors	: vi, emacs.					
Command interpr	eter (shell) bash and its programming (scripts). Controlling processes, process status, computer load a process priorities. Standard to							
X-windows. Cor	nputer networks. Local computer networks. Global computer networks. Addresses and protocols TCP/IP. Network configutation of a co	ools. Graphical use	r interface					
	nputer networks. Local computer networks. Global computer networks. Addresses and protocols 101/11. Network configuration of a co	=						
	hardware sharing, mail, scp, etc. Network applications	=						
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12ZEL1	Basic Electronics 1	Z,ZK	3					
The subject provide	des primary knowledge of circuit theory concerning principles of electronic circuits in both stationary and harmonic stable state. Circu	it analysis method	s for linear					
circuits include	e symbolic and complex method are explained. Proper circuit analysis is also lectured. The subject's final part deals with transient effe	ects inside linear c	ircuits.					
12ZEL2	Basic Electronics 2	Z,ZK	3					
The subject follow	vs up with the Basic Electronics 1. Semiconductor elements basic properties are explained. Thecourse's final part deals with basic the	emes of logical cire	cuits field.					
12ZELD	Fundamentals of Electrodynamics	Z,ZK	2					
Subject starts by	derivation of Maxwell-Lorentz microscopic equations followed by transition to Maxwell macroscopic theory. Using special theory of rel	ativity formulae are	e found for					
transformation of fie	eld vectors between two inertial systems of coordinates with appropriate invariants. Wave and Helmholtz equations are derived. By expan	sion into plane mor	nochromatic					
	of solving these equations are studied in homogeneous media with gradually increasing complexity: isotropic without losses, with abs							
·	c. Finally, solution in weakly non-homogeneous madia is presented using the method of eiconal. Individual chapters are illustrated by							
12ZFD	Physical Data Visualization	KZ	2					
	Vector graphics basics, scientific plots, dala visualization basics, measurements results presentation							
12ZFP	Principles of Plasma Physics	Z,ZK	4					
Basic physics of hig	ph temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line	ar theory of waves	in plasmas					
	electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parame		e explained.					
	comprises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas ar	e introduced.						
12ZFS	Fundamentals of Photonic Structures	Z,ZK	2					
	the basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes their pre	•						
	lecture discusses the basic physics and technology of optical waveguides; it introduces basic linear, nonlinear, and active structures	0 1						
	otical communications and sensors. Next, the attention is given to introduction of plasmonic structures and plasmonics, periodic struc	•						
metamaterials, n	netasurfaces, and finally to photonic structures for quantum technologies. Finally, the lecture is closed with student presentations on s	elected relevant to	opics and					
	excursions to selected photonic laboratories.							
12ZMDT	Measurement and Data Processing	Z,ZK	2					
Basic knowledge f	or the measurements and data processing and result interpretation: errors, precision, accuracy, normal distribution and its propeties,	data fitting, separa	ation of the					
	signal from the noise.		_					
14TED	Creating Electronic Documents	Z	2					
Basic skills for crea	ting and presenting student theses. Individual exercises focus on creating and formatting texts, equations, charts, tables, presentation	ns and entire docu	ments in an					
	office suite.		_					
15CH1	General Chemistry 1	Z	3					
The most important	t concepts, quantities and units used in chemistry are introduced in the course General Chemistry I. Their significance and practical u	se are illustrated b	by examples					
	solved in exercises.							
15CH2	General Chemistry 2	Z,ZK	3					
	continuation of the course General chemistry I. The main attention is paid to general principles governing chemical processes. Using v							
the validity of these	principles is not restricted only to chemical processes is documented. The significance and practical use of explained principles are	illustrated by exam	nples solved					
40D I	in exercises.	7.71/	_					
18PJ	Programming in Java  This source is deviated to the Java platform and to the development of the basis types of applications for this platform.	Z,ZK	5					
400004	This course is devoted to the Java platform and to the development of the basic types of applications for this platform.	7						
18PRC1	Programming in C++ 1	Z	4					
	This course covers mainly the C programming language and non-object oriented features of the C++ language.							
18PRC2	Programming in C++ 2	KZ	4					
	ourse covers the object oriented programming and othesr advanced constructs in the C+;+ programming language and the Standard	<del>`</del>						
18PROP	Practical training in programming	KZ	3					
•	ourse is to understand advanced topics related to programming, code design and software project development. Students will practic							
principles on concr	ete real-world examples. Emphasis is put on the review of freely available software tools that can improve the programmer's work effic	iency and ensure	high quality					
4070	of the final source code.							
18ZALG	Basics of Algorithmization	Z,ZK	4					
	devoted to selected algorithms and methods for algorithm design. This course intruduces selected methods for the determination of							
18ZPRO	Basics of Programming	Z	4					
This course is in	ntended mainly for students with little or no experience in programming. It familiarizes the students with the basic concepts in progran	nming and with the	Python					
	programming language.							
B0B36JUL	Julia for optimization and learning	KZ	4					
	language is increasingly known by the community for its suitability in the field of numerical calculations. The course consists of two particles in the field of numerical calculations.							
	basics of Julia. The second part introduces mathematical optimization and its application in machine learning, statistics and optimal control of differential equations. While the first part							
	all concepts of Julia, the second part combines them into longer logical sections of code. We explain each application theoretically. S		- 1					
	tions by themselves and compare them with already existing packages. The course ends with a final project. Students can either cho							
theses or join a Kao	agle competition with real data. This course is also part of the inter-university programme prg.ai Minor. It pools the best of Al education		ide students					
	with a deeper and broader insight into the field of artificial intelligence. More information is available at https://prg.ai/minor.							
TV-1	Physical Education	Z	1					
TV-2	Physical Education	Z	1					
T\/ 2	Physical adjugation	7	1					

For updated information see <a href="http://bilakniha.cvut.cz/en/FF.html">http://bilakniha.cvut.cz/en/FF.html</a> Generated: day 2024-05-20, time 09:46.

Physical education