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: Compulsory courses in the specialization

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 Martin Štefa ák Igor Jex (Gar.)	Z	2	2+0	Z	PS
02ELMA	Electricity and Magnetism Iskender Yalcınkaya, Josef Schmidt, Ji í Hrivnák, Goce Chadzitaskos, Jan Vysoký Jan Vysoký Josef Schmidt (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 Pavel Strachota, Miroslav Kolá, Edita Pelantová Pavel Strachota Pavel Strachota (Gar.)	Z	4	4+4		PS
01MANZ	Calculus 1, exam Pavel Strachota, Miroslav Kolá, Edita Pelantová Pavel Strachota Pavel Strachota (Gar.)	ZK	4	0P+0C		PS
01MAN2	Calculus 2 Miroslav Kolá, Edita Pelantová, Maksym Dreval Edita Pelantová Maksym Dreval (Gar.)	Z,ZK	8	4P+4C		PS
02MECH	Mechanics David Be Antonín Hoskovec David Be (Gar.)	Z	4	4+2	Z	PS
02MECHZ	Mechanics - Examination Iskender Yalcinkaya, Goce Chadzitaskos, Stanislav Skoupý, Petr Novotný, David Be, Filip Petrásek, Antonín Hoskovec 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 ík Milan Kucha ík Milan Kucha ík Gar.)	Z	2	1P+1C	L	PS

18ZPRO	Maksym Dreval, Ñichita Vatamaniuc, Jan Vondruška, Vladimír Jarý, Miroslav Virius, Jakub Klinkovský, Petr Pauš, František Vold ich, Jan Tomsa, Miroslav Virius Miroslav Virius (Gar.)	Z	4	4C	Z	PS
haracteristics of the	ne courses of this group of Study Plan: Code=BSPFIPF1 Name=B	S P_FIB PF	1st year			
02DEF1 F	listory of Physics 1				Z	2
Physics and its place in th	e system of sciences. The relationship of man and nature. Natural sciences in ancient Orie	ntand Greece,	Greek natur	al philosoph	ers, Aristot	le. Physics in
Helenistic period, Archime	d. Arabic science, European science in Middle Ages. Renaissance - da Vinci, Giordano Bro	uno. Copernicı	ıs, Kepler, G	alileo, Huyge	ns. The bir	th of physics
as experimental science. I	Newton and his work.					
D2ELMA E	Electricity and Magnetism			Z	ZK	6
Electric charge, Coulomb's	s law, electrostatic field, Gauss' law. Electric dipole, polarization. Conductors and dielectrics	s. Electric curre	ent and circu	its, conductiv	ity. Basics	of the relativity
	ces, magnetic field. Magnetic dipole, magnetics. Electromagnetic induction, RLC circuits. E					
01LAL L	inear Algebra 1				Z	2
- 1	dependence and independence. 3. Basis and dimension. 4. Subspaces of vector spaces. 5.	. Linear mappii	ngs. 6. Matrio	ces of linear i	mappings.	7. Frobenius
heorem.			J		-11 3-	
O1LALZ L	inear Algebra 1, exam				ZK	2
	inear Algebra 2				ZK	4
	and operator. 2. Permutation and determinant. 3. Spectral theory (eigenvalue, eigenvector,	diagonalization) 4 Hermitia		· .	•
	6. Metric geometry. 7. Riesz theorem and adjoint operator. Outline of the exercises: 1. Metric	•	•			
	ation of eigenvalues and eigenvectors. 4. Hermitian and quadratic forms. Canonical form. 5.					
	y exercises and examples. 7. Adjoint operators.	, , , , , , , , , , , , , , , , , , ,		,,		
	Calculus 1				Z	4
1 7				ı	_	7
	sis functions of one real variable, differential calculus)					
· , ,	sis, functions of one real variable, differential calculus).				7K	1
1MANZ C	Calculus 1, exam				ZK	4
01MANZ C	Calculus 1, exam Calculus 2	4		Z	,ZK	8
01MANZ CONTINUATION OF DIFFERENCE OF THE PROPERTY OF THE PROPE	Calculus 1, exam Calculus 2 ial calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence			Z colute and co	,ZK nditional co	8 onvergence 3.
01MANZ CONTINUE CONTIN	Calculus 1, exam Calculus 2 ial calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence eries, the Cauchy-Hadamard theorem, expansion of function into power series, summation			Z colute and co	,ZK nditional co	8 onvergence 3.
O1MANZ CO1MANZ CO1MAN2 CO1. Continuation of different Real and complex powers Riemann definition), tech	Calculus 1, exam Calculus 2 ial calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence eries, the Cauchy-Hadamard theorem, expansion of function into power series, summation niques of integration and application of integrals, Generalized Riemann integral			Z colute and co	,ZK nditional co primitives,	8 onvergence 3. definite integra
O1MANZ CO1MANZ CO1MAN2 CO1MAN2 CO1MAN2 CO1MAN2 CO1MANA CONTINUATION OF CONTINU	Calculus 1, exam Calculus 2 ial calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence eries, the Cauchy-Hadamard theorem, expansion of function into power series, summation niques of integration and application of integrals, Generalized Riemann integral Mechanics	of infinite serie	es. 4. Theory	Z colute and co of integrals:	,ZK nditional co primitives,	8 onvergence 3. definite integra
O1MANZ O1MAN2 CONTINUATION OF DIFFERENCE OF THE PROPERTY OF TH	Calculus 1, exam Calculus 2 ial calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence eries, the Cauchy-Hadamard theorem, expansion of function into power series, summation niques of integration and application of integrals, Generalized Riemann integral Mechanics ysical quantities and units. Kinematics of a particle, basic types of motion and their superp	of infinite serie	es. 4. Theory	Z solute and co of integrals:	,ZK nditional coprimitives,	8 onvergence 3. definite integra 4 of motion for
O1MANZ O1MAN2 Continuation of different Real and complex power's Riemann definition), tech O2MECH Introduction to physics, physice, dimensional motion, red	Calculus 1, exam Calculus 2 ial calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence eries, the Cauchy-Hadamard theorem, expansion of function into power series, summation niques of integration and application of integrals, Generalized Riemann integral Mechanics	of infinite serie	es. 4. Theory	Z solute and co of integrals:	,ZK nditional coprimitives,	8 onvergence 3. definite integra 4 of motion for
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D1MANZ D1MANZ D1MANZ D1 CONTINUATION Real and complex power's Riemann definition), tech D2MECH Introduction to physics, ph pro-dimensional motion, r of a rigid body, rotation. D2MECHZ Intercontent of the subject D0PT D2TER Intermal expansion of mate entropy; non-chemical sys 12UNXAP Computer and operating sys Command interpreter (she K-windows. Computer net	Calculus 1, exam Calculus 2 ial calculus: Taylor's Polynomials, Taylor's formula 2. Infinite series: criteria of convergence eries, the Cauchy-Hadamard theorem, expansion of function into power series, summation inques of integration and application of integrals, Generalized Riemann integral Mechanics ysical quantities and units. Kinematics of a particle, basic types of motion and their superponotion in a central force field, forces in non-inertial reference frames. Mechanics of a system Mechanics - Examination is the examination according to the plan of studies. Preparatory Week Meat and Molecular Physics erials, heat transfer; stationary and non-stationary heat conduction, heat transfer and peneterms: dielectric and magnetic materials; Maxwell relations and thermodynamic potentials; knotroduction to UNIX ystems. Personal computer, workstation and supercomputers. Processor, memory, bus, destems. Operating system UNIX. Basic principles, kernel, kernel services. Documentation. Fill) bash and its programming (scripts). Controlling processes, process status, computer lose	osition. Dynamm of particles, estration; 1st and inetic theory: N evices, hard dis ille system, file ad a process p	d 2nd thermodaxwell's velock, network in atributes, woriorities. Star	olute and co of integrals: icle, solving oblems, particle oblems, particl	nditional corprimitives, Z equations of the collision of the collision, equipation, example of the collision of the collisi	8 convergence 3. definite integra 4 of motion for ns. Mechanics 2 4 al and real gas ritition theorem 2 software. tors: vi, emacs ser interface
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Code of the group: BSPFIPF2

Name of the group: BS P_FIB PF 2nd year

Basics of Programming

Requirement credits in the group:

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

Credits in the group: 0

Note on the group: Předmět 02TEF1 lze absolvovat až po absolvování předmětu 02MECHZ.Předmět 02TEF2 lze absolvovat až po absolvování předmětů 02FL MA a 02TEF1

	ize absolvovat az po absolvovani predmeti	u uzelivia a	021EF1			
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
01ANB3	Calculus B 3 Miroslav Kolá, Milan Krbálek Milan Krbálek Miroslav Kolá (Gar.)	Z,ZK	8	4P+4C		PS
01ANB4	Calculus B 4 Ji í Mikyška, Miroslav Kolá Ji í Mikyška Milan Krbálek (Gar.)	Z,ZK	6	2P+4C		PS
12NME1	Numerical Methods 1 Pavel Váchal Pavel Váchal (Gar.)	Z,ZK	4	2+2	L	PS
12PAS	Computer Algebra Systems Milan Ši or Milan Ši or (Gar.)	Z	2	1P+1C	Z	PS
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 Miroslav Virius Miroslav Virius (Gar.)	KZ	4	2+2	L	PS
02TEF1	Theoretical Physics 1 Petr Novotný Michal Jex Igor Jex (Gar.)	Z,ZK	4	2+2	Z	PS
02TEF2	Theoretical Physics 2 Petr Novotný, Filip Petrásek 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 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 Psikai Jan Psikai Jan Psikai (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 Name	=BS P_FIB PF	2nd year	ar		
01ANB3 Ca	Ilculus B 3			Z	Z,ZK	8
1. Functional sequences and	d series - convergence range, criteria of uniform convergence, continuity, limit, differ	entiation and integr	ation of fund	ctional series,	, power serie	s, Series
Expansion, Taylor's theorem	n. 2. Ordinary differential equations - equations of first order (method of integration fa	actor, equation of Be	ernoulli, sep	aration of val	riables, home	ogeneous
equation and exact equation) and equations of higher order (fundamental system, reduction of order, variation of	parameters, equation	ons with con	stant coefficie	ents and spe	cial right-haı
side, Euler differential equati	ion). 3. Metric spaces - metric, norm, scalar product, neighborhood, interior and ext	erior points, bounda	ry point, iso	lated and no	n-isolated po	oint, bounda
•	e, Hilbert spaces. Orthogonal polynomials. Complete orthogonal systems. 4. Fourier	•			-	
· ·	e. 5. Differential calculus of functions of several variables - limit, continuity, partial ar		tive, gradier	nt, total deriva	atives and tar	ngent plane
<u> </u>	rms of vector analysis, Jacobi matrix. 6. Functions defined implicitly by one or sever	al equations.				
	alculus B 4				z,zk	6
	í více prom nných a funkcionálních vektor . [2] Funkce zadané implicitn . [3] Taylor					
·	oustavy sou adnic. [5] Lokální, vázané a globální extrémy funkce více prom nných.					
	prom nných - Riemann v a Lebesgue v integrál, základní vlastnosti, Fubiniova v	ta, v ta o substituci.	Leviho a Le	ebesgueova v	/ ta. Limita, s	spojitost a
	ametru. [8] Integrály po k ivkách a plochách. Integrální v ty.					
1	imerical Methods 1				Z,ZK	4
· · · · · · · · · · · · · · · · · · ·	ic principles of numerical mathematics important for numerical solving of problems i					
	inary differential equations, random numbers) are included in addition to the basic r		Integrated c	omputational	environmen	it MATLAB is
	ming language as a demonstration tool. The seminars are held in computer laborate	ory.				
ļ ,	mputer Algebra Systems				Z	2
•	tion to computer algebra systems (CAS): their main characteristics, ways and mean	ŭ	nstituent pa	rt is realized	in computer	classrooms
	with CAS by solving relatively simple and basic tasks from mathematics and physic	CS.				
18PRC1 Pro	ogramming in C++ 1				Z	4
his course covers mainly th	ne C programming language and non-object oriented features of the C++ language.					
	ogramming in C++ 2				KZ	4
This course covers the object	ct oriented programming and othesr advanced constructs in the C+;+ programming	language and the S	tandard Ter	nplate Library	y .	
02TEF1 Th	eoretical Physics 1			Z	Z,ZK	4
The course is an introduction	n to analytical mechanics. The students acquire knowledge of the basic concepts of the	ne Lagrange and Ha	miltonian foi	rmalisms as v	vell as difere	nt approach
o description of dynamics (I	Newtons, Lagrange, Hamilton and Hamilton-Jacobi equations). The efficiency of the	se methods is illusti	rated on ele	mentary exar	mples like the	e two-body
	stem of constrained mass points, and of a rigid body. Advanced parts of the course	cover differential and	d integral pr	inciples of m	echanics. Th	e subject is
	f classical theoretical physics (02TEF1, 02TEF2).					
D2TEF2 Th	eoretical Physics 2			Z	z,zk	4
	s in physics. Mechanics of point mass, rigid body and continuum. The special theory	=				-
· · · · · · · · · · · · · · · · · · ·	sical electrodynamics: Maxwell's equations in the Minkowski space-time, electroma	gnetic waves in diele	ectric media	, electromagr	netic radiatio	n in the dipo
approximation.						
	ermodynamics and Statistical Physics			1	Z,ZK	4
oundation of thermodynam	ics and statistical physics. Thermodynamic potential, the Joule Thomson effect, condi	tions of equilibrium,	the Braun-L	e Chatelier p	rinciple. Stat	istical entro
	otionfrom a statistical point of view (classical and quasiclassical regime within the fr		and grand-c	canonical ens	emble, Ferm	ıi gas, mode
	dy radiation). The Boltzmann equation is usedto discusses simple transport phenom	iena.				
	roduction to Scientific Computing				Z	2
Practically oriented Introduct	tion to scientific computing. Constituent part of the course is realized in computer cl	assroom.Students (get acquinte	d with some	basic tools fo	ort scientific
and technicval computing, d	ata analysis, data visualisation and algorithm development.					
D2VOAF Wa	aves, Optics and Atomic Physics			Z	Z,ZK	6
Vave phenomena in mecha	nics and electromagnetism: modes, standing and travelling waves, wave packets in	dispersive media. W	ave optics:	polarization, i	interference,	diffraction,
coherence. Geometrical opti	cs. Introduction to quantum physics: black body radiation, quantum of energy, photo	effect, the Comptor	n effect, the	de Broglie wa	aves,the Sch	ırodinger
equation, stationary states a	and spectra of finite systems.					
2VPMF Se	elected Topics in Modern Physics				Z	3
The aim of this course is to i	improve students knowledge in modern parts of physics (such as measuring of grav					
mitting diodes,) with a pa	artial help of computer algebra systems (e.g. Maple). Apart from the other courses re	elated to modern phy	ysics taught	in this study	program, thi	s course do
not deal with detailed mathe	matical formalism of studied phenomena. Therefore, the secondary aim is the increase	ase of students moti	vation for de	eeper unders	tanding of m	odern phys
and its laws in their following	g study					
12ZMDT Me	easurement and Data Processing			Z	Z,ZK	2
	asurements and data processing and result interpretation: errors, precision, accurac	cy, normal distribution	on and its pr	opeties, data	fitting, sepa	ration of the
ignal from the noise	. • • • • • • • • • • • • • • • • • • •	•			J	

Code of the group: BSPFIPF3

signal from the noise.

Name of the group: BS P_FIB PF 3rd 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:

Zkoušku z předmětu 01RMFB lze skládat až po složení všech zkoušek z Matematické

analýzy a Lineární algebry.

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
01RMFB	Equations of Mathematical Physics B Václav Klika	Z,ZK	5	2P+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 Eva Mihóková	KZ	2	26P+0C	Z	PS
11ZFP	Basic to Solid State Physics Ladislav Kalvoda, Eva Mihóková Eva Mihóková Ladislav Kalvoda (Gar.)	ZK	3		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

12211	Martin Jirka, Ji í Limpouch Martin Jirka Ji í Limpouch (Gar.)	2,21	T	5.,	_	'5
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 yea	r		
12BPFI1	Bachelor Project 1				Z	5
The bachelor project i regular meetings and	is based on a topic approved by the administrators of the programme, department and by the discussions.	dean. The student	is guided by	y the project s	upervisor d	uring commor
12BPFI2	Bachelor Project 2				Z	10
The bachelor project i regular meetings and	is based on a topic approved by the administrators of the programme, department and by the discussions.	dean. The student	is guided by	y the project s	upervisor d	uring commor
02KM1	Quantum Mechanics 1			Z	,ZK	6
Abstract: The lecture	describes the birth of quantum mechanics and description of one particle and more particles	by elements of the	Hilbert spa	ce as well as	its time evo	lution. Besides
that it includes descri	ption of observable quantities by operators in the Hilbert space and calculation of their spec	otra.				
12POAL	Computer Algebra			h	ΚZ	2
	of basic objects (integers, rational and algebraic numbers, polynomials, rational functions, radi	. •				
	ivation, series summation, integration, ordinary differential equations, factorization, equation	0, 1		•	•	0,
	ng, graphics, Maple - detailed introduction and solving of practical examples, applications, over	erview of other syst	ems (Axion			
01RMFB	Equations of Mathematical Physics B				,ZK	5
The subject of this co partial differential equ	ourse is solving integral equations, theory of generalized functions, classification of partial di uations.	fferential equations	, theory of i	ntegral transf	ormations, a	and solution o
11BSEM	Bachelor Seminar				Z	1
In the first part of the	seminar, students familiarize themselves with the general principles of publishing and preser	nting scientific work	cand the for	mal requirem	ents for bad	chelors degree
	The second part is designed as a practical training for the defence of the bachelors degree		•	•		
	chieved during the work on their projects. Each presentation is followed by a discussion on so	cientific matters as v	well as on th	e possibilities	of improvin	ng the students
performance.						
01DYKO	Introduction to Continuum Dynamics				,ZK	3
•	a rigorous introduction to the mathematical description of continuum dynamics. In the first p					
	culus, differential forms, and integration on manifolds. Next, the fundamental concepts such a				•	,
are defined. They are	used subsequently in the derivation of the conservation laws of mass, momentum and ene	rgy in both integral	and differer	ntial forms. Th	ie conserva	tion laws are

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,

further adapted to the specific cases of viscous and inviscid fluid and linear/nonlinear elastic body.

12UPF2 Introduction to Computational Physics 2 Nonlinear models, complex systems, chaotic systems, fractals and their applications in physics. Artificial intelligence methods: neural networks, machine learning, genetic algorithms,

expert systems and their applications in physics. Quantum computing. Virtual reality. 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 library. We show how to generate efficient code, how to combine Python with other languages, what tools are available.

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

11ZFP Basic to Solid State Physics ZK

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

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

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 Beatriz Vadillo Gonzalo (Gar.)	Z	1	0+2		PV

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

00RET Rhetoric 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:

04XAPZK

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 Jana Ková ová, Slav na Brownová Jana Ková ová Jana Ková ová (Gar.)	ZK	4		Z	PV
04XAPZK	English for Advanced Students Examination Slav na Brownová, Darren Copeland Jana Ková ová Darren Copeland (Gar.)	ZK	4		Z	PV
04XCESZZK	Czech for Foreigners Beginners - Examination Slav na Brownová Jana Ková ová Jana Ková ová (Gar.)	ZK	4		Z	PV
04XCESMZK	Czech for Intermediate Students Examination Jana Ková ová Jana Ková ová Jana Ková ová (Gar.)	ZK	4		Z	PV
04XCESPZK	Czech for Foreign Students - Advanced Examination Jana Ková ová Jana Ková ová Jana Ková ová (Gar.)	ZK	4		Z	PV
04XFMZK	French for Intermediate Students Examination V ra Šlechtová V ra Šlechtová (Gar.)	ZK	4		Z	PV
04XFPZK	French for Advanced Students Examination V ra Šlechtová V ra Šlechtová V ra Šlechtová (Gar.)	ZK	4		Z	PV
04XFZZK	French for Beginners Examination V ra Šlechtová V ra Šlechtová V ra Šlechtová (Gar.)	ZK	3		L	PV
04XNMZK	German for Intermediate Students Examination Miloslava echová Miloslava echová (Gar.)	ZK	4		Z	PV
04XNPZK	German for Advanced Students Examination Miloslava echová Miloslava echová (Gar.)	ZK	4		Z	PV
04XRMZK	Russian for Intermediate Students Examination Zhanna Isaeva Zhanna Isaeva (Gar.)	ZK	4		Z	PV
04XRPZK	Russian for Advanced Students Examination Zhanna Isaeva Zhanna Isaeva Zhanna Isaeva (Gar.)	ZK	4		Z	PV
04XRZZK	Russian for Beginners Examination Zhanna Isaeva Zhanna Isaeva Zhanna Isaeva (Gar.)	ZK	3		L	PV
04XSMZK	Spanish for Intermediate Students Examination Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	ZK	4		Z	PV
04XSPZK	Spanish for Advanced Students Examination Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.) Spanish for Advanced Students Examination Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo	ZK	4		Z	PV
04XSZZK	Spanish for Beginners Examination Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.) Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo	ZK	3		L	PV

04XAMZK English for Intermediate Students Examination ZK 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.

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

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 (100 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

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.

04XCESMZK 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

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.

French for Intermediate Students Examination

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

04XFPZK French for Advanced Students Examination

7K

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.

French for Beginners Examination

4

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

04XNMZK German for Intermediate Students Examination

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

04XNPZK German for Advanced Students Examination

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

04XRMZK	Russian for Intermediate Students Examination	ZK	4
The course content	s the examination as given by the study plan. The course is completed by taking a written and oral examination testing the know	vledge and skills a	cquired 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 instruc	tions by the teach	er.
04XRPZK	Russian for Advanced Students Examination	ZK	4
The course content	s the examination as given by the study plan. The course is completed by taking a written and oral examination testing the know	vledge and skills a	cquired 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 instruct	ions by the teache	er.
04XRZZK	Russian for Beginners Examination	ZK	3
The course content	s the examination as given by the study plan. The course is completed by taking a written and oral examination testing the know	vledge and skills a	cquired 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 instructi	ons by the teache	r.
04XSMZK	Spanish for Intermediate Students Examination	ZK	4
The course content	s the examination as given by the study plan. XSMZK examination consists of two parts: written and oral; to be eligible for the w	, ritten part, studer	its will have
obtained non-graded	assessment for course XSM3. Oral examination follows the written part.		
04XSPZK	Spanish for Advanced Students Examination	ZK	4
The course content	s the examination as given by the study plan. Examination XSPZK consists of two parts, namely oral and written. The prerequis	ite for admission t	o oral part is
having passed the w	ritten test. Examination content is based on syllabi of courses XSP1, XSP2, and XSP3 or on an individual study plan of the study	dent.	
04XSZZK	Spanish for Beginners Examination	ZK	3
The course content	s the examination as given by the study plan. Examination consists of two parts - written and oral. Student can register for oral	examination only i	f he/she has
passed the written e	xamination 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:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Titles outborn and guarantee (gar)	Completion	Credits	Scope	Semester	Role
12AUX	Tutors, authors and guarantors (gar.) Administration of UNIX System Milan Ši or Milan Ši or (Gar.)	KZ	2	2+0	L	V
02DEF2	History of Physics 2 Igor Jex Igor Jex (Gar.)	Z	2	2+0	L	V
02PRA1	Experimental Laboratory 1 Libor Škoda, Jaroslav Biel ík Jaroslav Biel ík (Gar.)	KZ	6	0+4	Z	٧
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 Milan Papež, Šimon Soldát, Václav Mácha Milan Papež Milan Papež (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 (Gar.)	Z,ZK	6	4P+2C	L	٧
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		٧
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	٧

18PJ	Programming in Java Miroslav Virius Miroslav Virius (Gar.)	Z,ZK	5	2P+2C	Z	V
01PSL	LaTeX - Publication Instrument 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 (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
TV-1	Physical Education	Z	1		Z	V
TV-2	Physical Education	Z	1		L	V
TV-3	Physical education	Z	1	0+2	Z	V
TV-4	Physical education	Z	1	0+2	L	V
14TED	Creating Electronic Documents Aleš Materna, Ji í Martin ík Aleš Materna Aleš Materna (Gar.)	Z	2	26C		V
12UFN	Introduction to Photonics and Nanostructures Ivan Richter, Pavel Kwiecien, Jan Proška Ivan Richter Ivan Richter (Gar.)	KZ	3	2P+1C	L	V
12ULTB	Introduction to Laser Technique Helena Jelínková, Jan Šulc, Michal N mec Jan Šulc Helena Jelínková (Gar.)	KZ	3	2P+1C	L	V
01UP1	Introduction to Probability 1 Jan Vybíral Jan Vybíral Jan Vybíral (Gar.)	Z,ZK	3	1P+1C		V
01UP2	Introduction to Probability 2 Milan Krbálek, Michaela Krbálková Milan Krbálek (Gar.)	Z,ZK	3	1P+1C		V
12VTV	Scientific and Technical Computing Ivan Procházka Ivan Procházka Ivan Procházka (Gar.)	Z	2	1+1	L	V
18ZALG	Basics of Algorithmization Vladimír Jarý, Miroslav Virius, Petr Pauš, František Vold ich, Jan Tomsa, Zuzana Pet í ková, František Gašpar Vladimír Jarý Miroslav Virius (Gar.)	Z,ZK	4	2+2	L	V
12ZEL1	Basic Electronics 1 Jaroslav Pavel Jaroslav Pavel (Gar.)	Z,ZK	3	2+1	Z	V
12ZEL2	Basic Electronics 2 Jaroslav Pavel Jaroslav Pavel (Gar.)	Z,ZK	3	2+1	L	V
12ZFS	Fundamentals of Photonic Structures Ivan Richter, Ji í tyroký Ivan Richter Ivan Richter (Gar.)	Z,ZK	2	2P	L	V
02ZM1	Foundations of Physical Measurements 1 Solangel Rojas Torres, Petr Chaloupka Martin Štefa ák Petr Chaloupka (Gar.)	ZK	2	2P+0C	Z	V
02ZM2	Foundations of Physical Measurements 2 Petr Chaloupka Martin Štefa ák Petr Chaloupka (Gar.)	KZ	4	0P+4L	L	V
02ZJFB	Nuclear Physics B Vladimír Wagner Martin Štefa ák Vladimír Wagner (Gar.)	KZ	3	3+0	Z	V
01ZPB1	Introduction to Computer Security 1 Petr Voká Petr Voká Petr Voká (Gar.)	Z	2	1+1		V
12ZFD	Physical Data Visualization Josef Blažej Josef Blažej Josef Blažej (Gar.)	KZ	2	1P+1C	Z	V

Characteristics of	the courses of this group of Study Plan: Code=BSPFIPFV Name=BS P_FIB PF Optional co	ourses	
12AUX	Administration of UNIX System	KZ	2
Basic and more advance	ed administration of Unix operating system	·	'
02DEF2	History of Physics 2	Z	2
Development of classic	al mechanics after Newton, Bernoulli's, Euler, Lagrange. Historical development of optics, corpuscular and wave approach. E	lectricity and mag	netism -
electrostatics, galvanisi	n, electrodynamics and electromagnetism, Faraday and Maxwell. Thermodynamics and its laws, statistical physics, Boltzman	n. The birth of mo	dern quantum
and relativistic physics,	Planck and Einstein. Discovery of radioaktivity, structure of atom, atomic nucleus, Rutherford and Bohr. The way to nuclear e	nergy, Elementary	y particles,
standard model. The co	ncept of Nature and Universe of today.		
02PRA1	Experimental Laboratory 1	KZ	6
Lecture is intended esp	ecially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nucleal	Engineering). Bu	ıt it can be also
attended by students int	erested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work witl	n theliterature), the	e implementation
of the measurement (ac	equire of different experimental procedures and routines), willteach writing the records of measurement, processing and evalu	ation of results. A	At the same time
practically extendthe kr	owledge gained in lectures on physics.		
02PRA2	Experimental Laboratory 2	KZ	6
Lecture is intended esp	ecially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nucleai	Engineering). Bu	ıt it can be also
attended by students int	erested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work witl	n theliterature), the	e implementation
of the measurement (a	equire of different experimental procedures and routines), willteach writing the records of measurement, processing and evalu	ation of results. A	At the same time
practically extendthe kr	owledge gained in lectures on physics.		
B0B36JUL	Julia for optimization and learning	KZ	4
Julia programming lang	uage is increasingly known by the community for its suitability in the field of numerical calculations. The course consists of tw	o parts. The first p	part presents the
basics of Julia. The sec	ond part introduces mathematical optimization and its application in machine learning, statistics and optimal control of differe	ntial equations. W	hile the first part
shows the individual co	ncepts of Julia, the second part combines them into longer logical sections of code. We explain each application theoretically	. Students are end	couraged 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.

04AKS	English Conversation	Z	1
	the student's communication skills acquired throughout their previous studies. It aims to improve all aspects of oral commun ous communication situations and will master their communication strategy. They will also practise their listening skills in ordi		
	dent will be trained to express their ideas clearly and according to current English usage, and become a more confident spea		and participate
02KM2	Quantum Mechanics 2	Z,ZK	6
	. rpands the introduction to quantum mechanics with more general formalism of quantum theory, approximate methods and pa	-	
I	ds used in various applications of quantum mechanics and prepares the students for an effective scientific research and furthe	r study, in particula	ar, of the modern
formulations of quantum 00MAM1	Essentials of High School Course 1	Z	1
	d to mathematical concepts and methods used in the introductory physics course.	_	'
00MAM2	Essentials of High School Math Course 2	Z	1
Review of basics of high		_	-
12MOF Basic ideas on physics	Molecular Physics of molecules and molecular matter, and on structure-to-physical properties relationship. Methods of molecular structure dete	ZK rmination.	2
12NT	Nanotechnology	ZK	2
Lectures will introduce :	students mainly to modern technological methods of preparation of semiconductor, metal and dielectric nanostructures. Phys	ical and chemical	fundaments of
	MBE, MOVPE, EBL, sol-gel and colloidal solution) will be explained. Substantive attention will be devoted to epitaxial technol	-	
1	on. Particular emphasis will be focused on detail characterization of "in situ" and "ex situ" techniques, their applications for he ed as well. Some supportive technical methods - lithography, diffusion, evaporation, ion implantation, contact and dielectric la		
as well as soldering and		yer preparation w	iii be memoned
15CH1	General Chemistry 1	Z	3
The most important cor	ncepts, quantities and units used in chemistry are introduced in the course General Chemistry I. Their significance and practic	al use are illustra	ted by examples
solved in exercises.			
15CH2	General Chemistry 2	Z,ZK	3
_ ·	nuation of the course General chemistry I. The main attention is paid to general principles governing chemical processes. Us		
in exercises.	nciples is not restricted only to chemical processes is documented. The significance and practical use of explained principles	are illustrated by	examples solved
01PGR1	Computer Graphics 1	Z,ZK	2
The first part of the two-	semester "Computer Graphics" course is devoted to the specifics of digital display devices spanning from history up to the sta		ologies. Further,
	problems in 2D computer graphics is given together with their solutions. Focus is put on mathematical description of problems are	-	
1 -	edge previously obtained in a variety of subjects available at FNSPE. The final part of the course covers the applications of co	omputer graphics	approaches in
01PGR2	g scientific documents and presentations. Computer Graphics 2	Z,ZK	2
	two-semester "Computer Graphics" course begins with a brief introduction to signal theory in the context of aliasing - a phen	· ′	
	I structured survey of fundamental problems in 3D computer graphics is given together with their solutions, from the descript	-	
	on mathematical description of problems and explanation of the corresponding algorithms using knowledge previously obtained	-	
_	m implementation aspect such as data structures design etc. is also a matter of concern. In the last lecture, a number of theo	retical concepts a	re demonstrated
01SITE1	-source 3D modeling and rendering software instrument. Computer Networks 1	Z	2
	pry and present network (LAN, WAN, use the principles and technologies). Architecture of reference model ISO/OSI. Network	_	
	s. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification a		
(PKI). Use in practice. N	Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the s	erial control lines,	modems)
01SITE2	Computer Networks 2	Z	2
	ory and present network (LAN, WAN, use the principles and technologies). Architecture of reference model ISO/OSI. Network		
	s. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification a letwork security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the s		,
18PROP	Practical training in programming	KZ	3
	is to understand advanced topics related to programming, code design and software project development. Students will prac	l	_
principles on concrete r	eal-world examples. Emphasis is put on the review of freely available software tools that can improve the programmers work	efficiency and en	sure high quality
of the final source code			
18PJ	Programming in Java	Z,ZK	5
	to the Java platform and to the development of the basic types of applications for this platform.	7	2
01PSL The course is devoted t	LaTeX - Publication Instrument to the basics and facilities of computer typography, particularly to the system LaTeX	Z	2
11SFIPL	Seminar on Solid State Physics	KZ	2
_	minar and ?SSS? software features. 2.Module "bravais" - crystal structure and X-ray diffraction in 2D ? theory 3.Simulations	l	
to following themes: cry	stal lattice versus crystal structure, primitive cell, elementary cell, lattice plane, reciprocal grid, Laue and Bragg condition, ato	omic scattering fac	ctor, structural
1	ral structural analysis 4.Module "laue" - Diffraction on perfect and imperfect crystals 5.Simulations: influence of structural disorde	=	
	s, quasi crystals 6."born" module - dynamics of crystalline grid in 1D ? theory 7.Simulations: planar waves, traveling and stand I momentum transport, infinite chain, chain of finite lenght, boundary conditions, wave packets, group and phase velocity, disper	•	
l ·	monicity 8. "debye" module - lattice dynamics and thermal capacity ? theory 9. Simulations: Brillouine zone, dispersion relation	-	
	e" module - dynamics of classical electron gas in 2D ? theory 11. Simulations: diffuse electron movement, electron drift in an e	-	
	lectron mobility, electron motion in magnetic field, cyclotron frequency, Hall experiment, magnetorezistence 12.Assignment, e	laboration and pr	esentation of the
seminar work.	One-in-an of Mathematical Division		
02SMF	Seminar of Mathematical Physics inar is to iluminate mathematical physics by virtue of solved examples. It is supposed that the teachers of the physics depart	Z ment will present	2 simple tasks
1 ' '	fic activities that could become the topics of the student?s bachelor theses in the next year	mont will biesellt	ompio tasks
01SOS1	Software Seminar 1	Z	2
	embly language programming for microprocessors Intel 80x86	· 	<u>'</u>
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 I	ike operating syst	ems, especially
for Linux systems. Porta	+ and Qt. Development of graphical user interface using C and C++ programming languages. Portable applications for Unix I ability to Microsoft Windows. Physical Education	ike operating syst	ems, especially

TV-2	Physical Education	Z	1
TV-3		Z	1
	Physical education		-
TV-4	Physical education	Z	1
14TED	Creating Electronic Documents	Z	2
	g and presenting student theses. Individual exercises focus on creating and formatting texts, equations, charts, tables, preser	ntations and entire	documents in an
office suite.		1	
12UFN	Introduction to Photonics and Nanostructures	KZ	3
	ctures and nanotechnologies; quantum technologies; quantum nanostructures; photonic structures; nanophotonics and nanop	olasmonics; optical	waveguides and
	onics; computer simulations; technological realization; student presentations	147	
12ULTB	Introduction to Laser Technique	KZ	3_,
	agnetic radiation sources; laser principle; classification of lasers; characterization and rough application of various types of lasers are also lastices.	sers; laser safety pi	recautions. The
laser amplifier, Q-swit		7.71	
01UP1	Introduction to Probability 1	Z,ZK	3
	nite set of possible results, classical probability, independent random events 2.Probability and combinatorics 3.Probability and	-	-
•	ity, Bayes theorem, medical diagnosis, Simpsons paradox 5.Random variable with discrete state space, its distribution and m	iean value 6.Proble	ems involving the
	alue 7.Probabilistic method in graph theory 8.Random algorithms, Morris algorithm and its variants	7.71	
01UP2	Introduction to Probability 2	Z,ZK	3
	ontinuous random variable and its statistical description. 2. Distribution function and probability density. 3. Axiomatic introducti		
,	merical characteristics of continuous random variables. 5. Selected variants of continuous distributions and their characteristics are supposed from the collected distribution.	cs. 6. Elementary r	nethods for point
	ating pseudorandom numbers from the selected distribution.	7	
12VTV	Scientific and Technical Computing	Z	2
•	liar with methods of solving of computational problems in the scientific and technical practice, and with methods of their progr	ramming. The cours	se is oriented
	g in the Fortran language.	7.71/	
18ZALG	Basics of Algorithmization	Z,ZK	4
	d to selected algorithms and methods for algorithm design. This course intruduces selected methods for the determination of	, , , , , , , , , , , , , , , , , , , 	
12ZEL1	Basic Electronics 1	Z,ZK	3
	primary knowledge of circuit theory concerning principles of electronic circuits in both stationary and harmonic stable state. C		
	olic and complex method are explained. Proper circuit analysis is also lectured. The subject's final part deals with transient efforts and complex method are explained. Proper circuit analysis is also lectured. The subject's final part deals with transient efforts and complex method are explained.	7	
12ZEL2	Basic Electronics 2	Z,ZK	3
	with the Basic Electronics 1. Semiconductor elements basic properties are explained. Thecourse's final part deals with basic	1	
12ZFS	Fundamentals of Photonic Structures	Z,ZK	2
	e basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes the		
	e discusses the basic physics and technology of optical waveguides; it introduces basic linear, nonlinear, and active structure		
• •	communications and sensors. Next, the attention is given to introduction of plasmonic structures and plasmonics, periodic st	•	=
	urfaces, and finally to photonic structures for quantum technologies. Finally, the lecture is closed with student presentations of	in selected relevant	topics and
	d photonic laboratories.	71/	
02ZM1	Foundations of Physical Measurements 1	ZK	2
_	ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however		-
•	oal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired	data on a PC. Stud	dents learn the
basic habits of work in		1/7	
02ZM2	Foundations of Physical Measurements 2	KZ	4
•	ed for students of physical specializations (Experimental particle physics, Physical engineering, Nuclear engineering), however		•
•	oal of the lecture is to introduce the basics of physical measurements, the methods of processing and evaluation of acquired	data on a PC. Stud	dents learn the
basic habits of work in		1/7	2
02ZJFB	Nuclear Physics B	KZ	3
•	esents formidable challenges both experimentally and theoretically, simply because we are dealing with the submicroscopic d	omain, where muci	ii oi our ciassicai
	behaviour of objects fails us. The lecture is a basic introduction to very interesting regions of subatomic physics.	7	
01ZPB1	Introduction to Computer Security 1	Z	2
12ZFD	Physical Data Visualization	KZ	2
Vector graphics basic	s, scientific plots, dala visualization basics, measurements results presentation		

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

Credits in the group: 0
Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
04XAM1	English for Intermediate Students M1 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	Z	V
04XAM2	English for Intermediate Students M2 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	L	V
04XAM3	English for Intermediate Students M3 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	Z	V
04XAP1	English for Advanced Students P1 Jana Ková ová Darren Copeland (Gar.)	Z	2	0+2	Z	V

04XAP2	English for Advanced Students P2 Darren Copeland Darren Copeland (Gar.)	Z	2	0+2	L	V
04XAP3	English for Advanced Students P3 Jana Ková ová Darren Copeland (Gar.)	Z	2	0+2	Z	V
04XCESZ1	Czech for Foreigners - Beginners 1 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	Z	٧
04XCESZ2	Czech for Foreigners - Beginners 2 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	L	٧
04XCESZ3	Czech for Foreigners - Beginners 3 Jana Ková ová Jana Ková ová (Gar.)	Z	2	2S	Z	V
04XCESM1	Czech for Foreigners - Intermediate 1 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	Z	V
04XCESM2	Czech for Foreigners - Intermediate 2 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	L	V
04XCESM3	Czech for Foreigners - Intermediate 3 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	Z	V
04XCESP1	Czech for Foreign Students - Advanced 1 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	Z	V
04XCESP2	Czech for Foreigners - Advanced 2 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	L	V
04XCESP3	Czech for Foreigners - Advanced 3 Jana Ková ová Jana Ková ová (Gar.)	Z	2	0+2	Z	V
04XFM1	French for Intermediate Students M1 V ra Šlechtová V ra Šlechtová (Gar.)	Z	2	0+2	Z	V
04XFM2	French for Intermediate Students M2 V ra Šlechtová V ra Šlechtová (Gar.)	Z	2	0+2	L	V
04XFM3	French for Intermediate Students M3 V ra Šlechtová V ra Šlechtová (Gar.)	Z	2	0+2	Z	V
04XFP1	French for Advanced Students P1 V ra Slechtová V ra Slechtová (Gar.)	Z	2	0+2	Z	V
04XFP2	French for Advanced Students P2	Z	2	0+2	L	V
04XFP3	V ra Šlechtová V ra Šlechtová (Gar.) French for Advanded Students P3	Z	2	0+2	Z	V
04XFZ1	V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z1	Z	2	0+4	L	V
04XFZ2	V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z2	Z	2	0+4	Z	V
04XFZ3	V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z3	Z	2	0+4	L	V
04XFZ4	V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z4	Z	2	0+4	Z	V
04XFZ5	V ra Šlechtová V ra Šlechtová (Gar.) French for Beginners Z5	Z	2	0+4	L	V
04XNM2	V ra Šlechtová V ra Šlechtová (Gar.) German for Intermediate Students M2	Z	2	0+2	L	V
04XNM1	Miloslava echová Miloslava echová (Gar.) German for Intermediate Students M1	Z	2	0+2	Z	V
04XNM3	Miloslava echová Miloslava echová (Gar.) German for Intermediate Students M3	Z	2	0+2	Z	V
04XNP1	Miloslava echová Miloslava echová (Gar.) German for Advanced Students P1	Z	2	0+2	Z	V
04XNP2	Miloslava echová Miloslava echová (Gar.) German for Advanced Students P2	Z	2	0+2	L	V
04XNP3	Miloslava echová Miloslava echová (Gar.) German for Advanced Students P3	Z	2	0+2	Z	V
04XRM1	Miloslava echová Miloslava echová (Gar.) Russian for Intermediate Students M1	Z	2	0+2	Z	V
04XRM2	Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Intermediate Students M2	Z	2	0+2	L	V
04XRM3	Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Intermediate Students M3	Z	2	0+2	Z	V
04XRP1	Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Advanced Students P1	Z	2	0+2	Z	V
	Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Advanced Students P2	Z	2	0+2	_	-
04XRP2	Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Advanced Students P3				L 7	V
04XRP3	Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Beginners Z1	Z	2	0+2	Z	V
04XRZ1	Zhanna Isaeva Zhanna Isaeva (Gar.) Russian for Beginners Z2	Z	2	0+4	L	V
04XRZ2	Zhanna Isaeva Zhanna Isaeva (Gar.)	Z	2	0+4	Z .	V
04XRZ3	Russian for Beginners Z3 Zhanna Isaeva Zhanna Isaeva (Gar.)	Z	2	0+4	L	V
04XRZ4	Russian for Beginners Z4 Zhanna Isaeva Zhanna Isaeva (Gar.)	Z	2	0+4	Z	V

04XRZ5	Russian for Beginners Z5 Zhanna Isaeva Zhanna Isaeva (Gar.)	Z	2	0+4	L	V
04XSM1	Spanish for Intermediate Students M1 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+2	Z	V
04XSM2	Spanish for Intermediate Students M3 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+2	L	V
04XSM3	Spanish for Intermediate Students M3 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+2	Z	V
04XSP1	Spanish for Advanced Students P1 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+2	Z	V
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 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	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 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+4	Z	V
04XSZ3	Spanish for Beginners Z3 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+4	L	V
04XSZ4	Spanish for Beginners Z4 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+4	Z	V
04XSZ5	Spanish for Beginners Z5 Beatriz Vadillo Gonzalo Beatriz Vadillo Gonzalo (Gar.)	Z	2	0+4	L	V
Characteristics	s of the courses of this group of Study Plan: Code=BSPJAZYKY	ZAP Name=BS P	jazyky za	ар		
04XAM1	English for Intermediate Students M1				Z	2
The course is desig	ned for students who have successfully completed the full secondary school English language	guage course at least a	t the A2 leve	el of the Com	mon Europe	an Framework
of Reference for Lai	nguages (CEFR). It provides an introduction into English for Specific and Academic Purp	ooses (ESP, EAP), i.e.,	into fundam	entals of voca	abulary and	style typical of
professional oral an	nd written communication situations. Thus it covers topics related to the student's life and	I needs as well as topic	s of subtech	nical interest	t. Attention is	also paid to
extending the know	rledge of grammar issues used in EAP.					
04XAM2	English for Intermediate Students M2				Z	2
TI 4140	The state of the s			•		

The AM2 course expects the student to have completed the AM1 course. It develops their skills for work with subtechnical texts, focusing also more on specific grammar, functions, and lexical items typical of ESP and EAP (e.g., definition, existence and classification of phenomena, object descriptions). Part of the course is also guided writing. If necessary, grammar revision is included. 04XAM3 English for Intermediate Students M3 The course develops the skills that enable students to cope with features typical of professional style. Increasing attention is paid to developing subtechnical vocabulary and independent understanding of professional texts. Great emphasis is placed on distinguishing different levels of formal and informal oral and written communication and their appropriate Czech equivalents. The course also includes studying abstracts and rules for writing them as well as basic rules for preparing and giving a short presentation on a chosen topic related to the student's field. 04XAP1 English for Advanced Students P1 The course is designed for students who have successfully completed the full secondary school English language course (at least the B1 level of the Common European Framework of Reference for Languages - CEFR). It provides an introduction into English for Specific and Academic Purposes (ESP, EAP), i.e., into the fundamentals of vocabulary, functions, grammar, and style typical of professional oral and written communication situations (fundamentals of terms in mathematics and physics, definitions, graph descriptions, etc). It also covers professional oral and written communication on topics related to the undergraduate's life and needs. It develops skills for free professional writing (writing a CV, letter of application, polite request). If necessary, revision of selected grammar topics is included. 04XAP2 English for Advanced Students P2 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. 04XCESZ1 Czech for Foreigners - Beginners 1 The course is designed for students of the English programme. Students will become acquainted with the main characteristics of Czech (phonetic and grammar features) and they will acquire basic language and speaking skills. The course focuses on pronunciation exercises, simple social phrases, and oral and written communication in the most common everyday situations. The course covers roughly lessons 1-3 of eština Express (Czech Express) by L. Holá and P. Bo ilová. Czech for Foreigners - Beginners 2 The language and communication competences acquired in CESZ1 are further developed. Students deepen their knowledge of the declension and conjugation system and practise basic communication topics. The course covers roughly lessons 3-5 in Czech Express by L. Holá and P. Bo ilová. 04XCESZ3 Czech for Foreigners - Beginners 3 Ζ The course further develops the language and communication competences acquired in the XCESZ1 and XCESZ2 courses. The teaching focuses on building up basic vocabulary, fixing correct pronunciation and deepening grammar, features through practice, as well as introducing the Czech culture. Students are asked to produce simple texts and they practise frequent types of dialogue. They also practise understanding texts in terms of main ideas or looking for specific details in texts. The course covers roughly lessons 5-7 in estina expres

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

04XCESM1

social situations.

Czech for Foreigners - Intermediate 1

	r Foreigners - Intermediate 2	Z	2
	ered in CESM1 and is then focused on more difficult grammar phenomena. It practices writing, speaking, and reading	g skills and train	ns the student
-	ions, abbreviated words, and mathematical terms and formulas.	7	
	r Foreigners - Intermediate 3 al topics covered earlier and extends the student's knowledge of more difficult language phenomena. It is especially	Z	disting and
lexicology and on developing the stu		locused on sty	Allocidos aria
	r Foreign Students - Advanced 1	7	2
	γ good knowledge of the Czech language, i.e., communicative competences at least at level B2 of the Common Europe	ean Frameworl	
It is focused partly on revision of star	ndard language structures, but mainly on practising more complex grammatical structures typical of the style of scien	nce. Students a	are taught the
	ring and professional communication, both in spoken and written form. The topics include University Studies and Studies	dent Life. Writte	en practice
includes communication with teache			_
l l	r Foreigners - Advanced 2	Z	2
emphasis on individual work.	nowledge acquired in CESP1 and focuses on difficult language phenomena. It practises working with technical and s	specialist texts	placing greater
	r Foreigners - Advanced 3	7	2
l l	nowledge from CESP2. It includes working with authentic specialist materials, their interpretation and presentation, a	- 1	_
·	ssary for professional communication are trained.		
04XFM1 French fo	or Intermediate Students M1	Z	2
•	tive of this three-semester course is to improve and further develop communication in the French language in both wi		
	l interaction and in academic, scientific and professional environment. They will be able to use the language to transn	_	
·	M1 The course builds on and further develops linguistic competence acquired at secondary school. It revises, system		
	ollowing topics are covered: University studies in our country and in France, writing of transactional letters, CV, persona Ography, Paris. Topics of specialization: mathematics, physics. Reading technical and popular science texts, work base		
	or Intermediate Students M2	7	2
	c structures and competence acquired in previous study are systemized and expanded. Reading popular science texts	s, features typic	
and scientific language (passives, no	ominalization, word formation). Topics: physics, power engineering, environment, Internet, success of French science	and technolog	gy, French
scientists, artists and architects. Des	scription of an object, device, shapes, dimensions, material.		
l l	or Intermediate Students M3	Z	2
-	ent and further development of linguistic competence acquired during the follow-up courses. Syntactic structures (subc		
	ses). Text summaryStudents prepare a written paper which will be delivered in form of an oral presentation in-class. n or to their interest and generally covers a technical /applied science topic. It is not a translation but a creative work o		
·	ceLonger monologues on topics /situations set for the examination are prepared. Text structure, cohesion and cohe		Treneria di deces
	or Advanced Students P1	Z	2
l l	of this three-semester course is to improve and further develop communication in the French language in both written	n and oral form	. Students will
	eraction and in academic, scientific and work environment. They will be able to use the language to transmit general a		
to solve problems. FP1 The course b	uilde en and further devolone linguistic competence cognired et accordery cohect. Difficult grammer tenice are renec		
•	uilds on and further develops linguistic competence acquired at secondary school. Difficult grammar topics are repear	•	
passé composé-imparfait, pronouns.	. The following specific topics are covered: University studies in our country and in France, writing of transactional lett	ters, CV, perso	nal statement,
passé composé-imparfait, pronouns request, answer to an advert, environ	. The following specific topics are covered: University studies in our country and in France, writing of transactional lett nmental issues, success of French science and technology, chosen topics from French regional culture, Paris. Topics of	ters, CV, perso	nal statement,
passé composé-imparfait, pronouns. request, answer to an advert, enviror internet, physics, chemistry. Reading	. The following specific topics are covered: University studies in our country and in France, writing of transactional lett	ters, CV, perso	nal statement,
passé composé-imparfait, pronouns. request, answer to an advert, enviror internet, physics, chemistry. Reading 04XFP2 French for	. The following specific topics are covered: University studies in our country and in France, writing of transactional lett nmental issues, success of French science and technology, chosen topics from French regional culture, Paris. Topics of g of technical and popular science texts, further work with these texts and interpretation.	ters, CV, perso of specialization	nal statement, n: mathematics,
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04XNM2	German for Intermediate Students M2	Z	2
	other more complex grammatical structures and their application in communication based on technical texts, such as the relatio		
•	ing of the 21st century, linguistically more demanding texts on the environment, the language of mathematics, computers and rmation and reading aloud, and appropriate language for various purposes in oral and written communication. The course syster	• • • • • • • • • • • • • • • • • • • •	
•	for professional discourse (participles, relative clauses).	,	grammania.
04XNM1	German for Intermediate Students M1	Z	2
	urse is to level off the students' skills in the German language. The course focuses on revision of more difficult phenomena an		
•	ses (e.g. importance of verb prefixes). In the lexical part, it covers topics referring to higher education in both the Czech Repulses the suit of the process and the second of the control of the contr	· -	
	ogether with all necessary expressions and phrases, expressions and phrases needed to chemists, mathematicians, physicis s communication on related topics and is aimed at correct pronunciation, grammatical correctness and understandability.	ts, and the fundar	nentals of 11
04XNM3	German for Intermediate Students M3	Z	2
	other more complex grammatical structures and their application in communication based on technical texts, such as the relatio		
	ing of the 21st century, linguistically more demanding texts on the environment, the language of mathematics, computers and		
· -	rmation and reading aloud, and appropriate language for various purposes in oral and written communication. The course system	matically revises of	ther grammatical
· · · · · · · · · · · · · · · · · · ·	for professional discourse (participles, relative clauses).		
04XNP1	German for Advanced Students P1	Z	2
	ood grammar knowledge, extended general vocabulary, and good communication skills acquired at secondary school to be le nen focused on working with technical and scientific texts and practising reading techniques (skimming, scanning, reading for		
	structures necessary for understanding a subtechnical text (passive voice, participles, participle structures) and it also focuses on		•
i.e., telephoning.	,	,	,
04XNP2	German for Advanced Students P2	Z	2
The course develops the	e students' skills in working with professional scientific texts (understanding, summarising, note-taking, interpreting) while extend	ding their general	and subtechnical
· -	oduces mathematical expressions and texts of nuclear power engineering. Increasing emphasis is placed on understanding and	d practising formal	communication,
	CV, letter of application, interview, scholarship), and more complex grammatical structures (i.e., subjunctive, indirect speech).	_	
04XNP3	German for Advanced Students P3	Z	2
	3 main parts (general communicative situations, grammar and technical topics). Students will develop their vocabulary in a var accidents, accident report, filling in a form, complaints). Based on presentations and technical and subtechnical texts, the v	•	
	ring, the environment, computer science, and car technology, will also be extended. Only authentic professional texts are use		
·	process information gained from their reading of complex and difficult texts and present it to the class in a simplified oral form. T		
practice to and from Ge			
04XRM1	Russian for Intermediate Students M1	Z	2
_	for students with previous knowledge of Russian from secondary schools. Students are supposed to know the Russian alphal		•
=	mmunication in everyday situations (introductions, socializing, greetings, shopping for food and objects of everyday need, ask		-
	mmar structures (verbal and nominal forms, irregular verbs, pronouns). The initial knowledge corresponds to the achievement the course correspond approximately to the RZ3 course, but for half of the time allotted in the timetable.	level of the RZ2 (course. The
04XRM2	Russian for Intermediate Students M2	Z	2
-	n the RM1 course, its contents and scope correspond roughly to RZ4, however, for half of the time allotted in the timetable.		2
04XRM3	Russian for Intermediate Students M3	7	2
	e knowledge and skills acquired in RM1 and RM2 and its contents and scope are roughly at the same level as those of RZ5, h	owever, for half of	the time allotted
in the timetable.			
04XRP1	Russian for Advanced Students P1	Z	2
•	ent for the course is to achieve the B1 CEFR level. The objective of the course is revision of standard language structures, pr	acticing more diffi	cult grammar
•	ng the fundamentals of technical language and training writing skills.		
04XRP2	Russian for Advanced Students P2	Z	2
	n RP1. It expands grammatical structures important for understanding technical texts (verbal adjectives, participles, passives, at on independent oral and written communication.	verb aspects, spe	cific syntactic
04XRP3	Russian for Advanced Students P3	Z	2
	n RP2 and is mainly focused on working with technical and scientific texts (reading comprehension, oral and written paraphra		
	revious knowledge of general language at secondary level (listening, reading, correct communication in everyday situations).		
these skills. Further stu	dy is aimed at professional and technical skills (reading technical literature according to the students' specialization, oral and	l written interpreta	tion). Students
•	cal vocabulary and practice quick and correct communication in professional situations. They will be able to both speak write	accurately and wit	h confidence on
technical topics.			
04XRZ1	Russian for Beginners Z1	<u> </u>	2
· · · · · · · · · · · · · · · · · · ·	the first stage of the five-semester programme, its final aim being reading and understanding professional texts written in Russ	_	_
	or both reading and writing skills) and fundamentals of grammar necessary for everyday communication (listening and speak d stress, understand its contents and summarize it.	ing). Students will	be able to read
04XRZ2	Russian for Beginners Z2	Z	2
	of the programme is designed to teach skills for basic communication in everyday situations and for reading easy and short si		
able to communicate us	sing short sentences and appropriate structures, and read aloud with confidence a short text without marked stress. They will	also develop their	vocabulary and
master further gramma	tical structures. They will have mastered with confidence the Russian alphabet and will be able to use it in writing.		
04XRZ3	Russian for Beginners Z3	Z	2
	RZ2 and includes further everyday topics, develops understanding of short compact texts on new subtechnical topics (for train	-	-
- :	duces new grammar. Students will be trained to distinguish intonation patterns while listening to spoken language. They will b ress their opinion. Writing skills will be trained on guided writing tasks and note-taking.	e able to respond	SU AS IU DE
04XRZ4	Russian for Beginners Z4	Z	2
	RZ3. It improves and expands the knowledge of general language in all four skills (reading and understanding longer texts with		
	tion in everyday situations, writing longer texts). Students are trained to use grammar structures effectively (e.g., irregular ver		-
	mperatives, conditionals). They practice and develop communication skills for everyday situations (food, travelling, free time),	•	
	e specific topics (environment, addictions, the green movement). They become acquainted with various geographical data (e.	g., Siberia), learn	how to fill in
torms, look up the infor	mation from the timetable, learn about Russian holidays and typical meals.		

04XRZ5	D · (D · 76		_
-	Russian for Beginners Z5	Z	2
•	e student to have completed RZ4. It concentrates predominantly on reading skills (working with professional texts, i.e. understa	•	-
	ecialized text) and speaking, and to a certain extent, writing about the professional information obtained by reading the texts. C		
	ring grammar is based on professional and technical texts and only includes items typically used in professional communication	` '	es, participles,
assive voice). Studer	ts develop their technical and economic vocabulary, and are also trained in some professional skills (writing a CV, polite requ	est, etc.)	
04XSM1	Spanish for Intermediate Students M1	Z	2
he course is designe	d for students whose competence is at level B1 of CEFR, i.e. those who studied Spanish in the secondary school. The 3-semi	ester course deve	lops standard
ocabulary and pays a	attention to further grammar topics (e.g., perífrasis verbales, futuro imperfecto, direct object and indirect object pronouns, nega	ative form of the in	nperative, and
ubjunctive), to writter	n and oral communication on a given everyday or easy subtechnical topic, for which the students are trained by reading texts o	or listening to then	n.
4XSM2	Spanish for Intermediate Students M3	Z	2
he course develops t	the students' knowledge from the previous course (SM1). Students are gradually acquainted with fundamentals of Spanish for	specific purpose:	s in order to be
ble to work with spec	ialized texts on the Internet.		
4XSM3	Spanish for Intermediate Students M3	Z	2
	supplemented with additional subtechnical materials, so the students will be gradually acquainted with the peculiarities of acac	1	1
	ernet in Spanish and search for information of their specialization or field of interest. Students will use the information to write	, ,	•
· ·	Imme, general Spanish course based on course books, covers presentations and, finally, a written and oral examination.	0.1011 0.10100 0.10	ourar.oor rri
4XSP1	Spanish for Advanced Students P1	Z	2
	population Advanced Students in a specific purposes as well as written communicate more difficult grammar topics, revision of vocabulary, basics of Spanish for specific purposes as well as written communicate	_	_
CEFR.	of more united grammal topics, revision of vocabulary, basics of opanism of specific purposes as well as written communication	lion. Course prere	quisites. level D
	On any internal Advances of Objects and E	7	
4XSP2	Spanish for Advanced Students P2	Z	2
	econd part of the advanced Spanish course, extending Spanish for specific purposes topics. It comprises more grammar and s	syntax and focuses	s on independer
		_	,
	Spanish for Advanced Students P3	Z	2
4XSP3		_	_
4XSP3 ourse XSP3 is the fin	Spanish for Advanced Students P3	_	_
4XSP3 ourse XSP3 is the fin ased on what studen	Spanish for Advanced Students P3 nal part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is	_	_
4XSP3 ourse XSP3 is the fin ased on what studen 4XSZ1	Spanish for Advanced Students P3 nal part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is ts will need in their career.	focused on writte	n communicatio
4XSP3 course XSP3 is the final ased on what studen 4XSZ1 course XSZ1 is the final firm and the f	Spanish for Advanced Students P3 nal part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is ts will need in their career. Spanish for Beginners Z1	focused on writter Z damental gramma	n communicatio 2 r structures and
4XSP3 ourse XSP3 is the fin ased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun	Spanish for Advanced Students P3 nal part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is its will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and functionicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spani	focused on writter Z damental gramma	communicatio 2 r structures and
4XSP3 ourse XSP3 is the fin ased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun 4XSZ2	Spanish for Advanced Students P3 and part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is its will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and functionicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spanish for Beginners Students Z2	cfocused on writter Z damental gramma ish and will develo	n communication 2 r structures and up it.
4XSP3 ourse XSP3 is the fin ased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun 4XSZ2 ourse XSZ2 is based	Spanish for Advanced Students P3 and part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is its will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and functionicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spanish for Beginners Students Z2 d on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures	Z damental gramma ish and will develo Z and lexis will be o	2 r structures and pp it. 2 chosen so as to
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4XSP3 ourse XSP3 is the fin ased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun 4XSZ2 ourse XSZ2 is based nable them to underse epublic. Realia of Sp	Spanish for Advanced Students P3 and part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is its will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and funcinicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spani Spanish for Beginners Students Z2 d on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures stand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries are also included.	Z damental gramma ish and will develo Z and lexis will be o	2 r structures and p it. 2 chosen so as to a sthe Czech
4XSP3 ourse XSP3 is the fin ased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun 4XSZ2 ourse XSZ2 is based nable them to unders epublic. Realia of Sp 4XSZ3	Spanish for Advanced Students P3 and part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is its will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and funcinicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spani Spanish for Beginners Students Z2 d on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures stand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries are also included. Spanish for Beginners Z3	Z damental gramma ish and will develo Z and lexis will be o	2 r structures and pp it. 2 chosen so as to a sthe Czech
4XSP3 ourse XSP3 is the fin ased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun 4XSZ2 ourse XSZ2 is based nable them to unders epublic. Realia of Sp 4XSZ3 nis course builds upon	Spanish for Advanced Students P3 and part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is its will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and funcinicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spani Spanish for Beginners Students Z2 d on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures stand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countrie vanish-speaking countries are also included. Spanish for Beginners Z3 on the foundations established in course XSZ2 and further develops students vocabulary and grammatical competence. It includes	Z damental gramma ish and will develo Z and lexis will be of a sand others such	2 r structures and pp it. 2 chosen so as to a as the Czech 2 on to the realia
4XSP3 ourse XSP3 is the fin ased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun 4XSZ2 ourse XSZ2 is based nable them to unders epublic. Realia of Sp 4XSZ3 his course builds upon d cultural context of	Spanish for Advanced Students P3 and part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is its will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and function incate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spani Spanish for Beginners Students Z2 d on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures stand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries anish-speaking countries are also included. Spanish for Beginners Z3 on the foundations established in course XSZ2 and further develops students vocabulary and grammatical competence. It includes Spanish-speaking countries, with a primary focus on Spain. Particular attention is given to key grammatical structures, include	Z damental gramma ish and will develo Z and lexis will be of a sand others such	2 r structures and pp it. 2 chosen so as to a as the Czech 2 on to the realia erfecto, pretérit
4XSP3 ourse XSP3 is the finased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun 4XSZ2 ourse XSZ2 is based nable them to unders epublic. Realia of Sp 4XSZ3 his course builds upon d cultural context of definido, pretérito im	Spanish for Advanced Students P3 and part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is its will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and funcinicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spani Spanish for Beginners Students Z2 d on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures stand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countrie vanish-speaking countries are also included. Spanish for Beginners Z3 on the foundations established in course XSZ2 and further develops students vocabulary and grammatical competence. It includes the foundations of the properties of the grammatical structures, included operfecto, the gerund, and the imperative. The course also focuses on both written and spoken communication on general topic operfecto, the gerund, and the imperative. The course also focuses on both written and spoken communication on general topic operations.	Z damental gramma ish and will develo Z and lexis will be of a sand others such	2 r structures and pp it. 2 chosen so as to a as the Czech 2 on to the realia erfecto, pretérit
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4XSP3 ourse XSP3 is the finased on what studen 4XSZ1 ourse XSZ1 is the fir ill be able to commun 4XSZ2 ourse XSZ2 is based nable them to unders epublic. Realia of Sp 4XSZ3 his course builds upon d cultural context of definido, pretérito im arough targeted readi 4XSZ4 he course is based o pain. It pays attentior o written and oral con 4XSZ5	Spanish for Advanced Students P3 all part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is ts will need in their career. Spanish for Beginners Z1 st stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and function at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spani Spanish for Beginners Students Z2 d on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures stand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries are also included. Spanish for Beginners Z3 on the foundations established in course XSZ2 and further develops students vocabulary and grammatical competence. It includes the foundations established in course XSZ2 and further develops students vocabulary and grammatical structures, included perfecto, the gerund, and the imperative. The course also focuses on both written and spoken communication on general topicing and listening activities. Spanish for Beginners Z4 on course XSZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanish for Beginners Z4 on course XSZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanish on a given general or subtechnical topic, for which the student is trained by reading texts or listening to them.	Z damental gramma ish and will develor Z and lexis will be one as and others such Z udes an introduction ing the preterito pos. Students are possible presenting the imperative, are	2 r structures and pp it. 2 chosen so as to a sthe Czech 2 on to the realia erfecto, pretérit prepared for this condition and subjunctive),

List of courses of this pass:

Code	Name of the course	Completion	Credits
00MAM1	Essentials of High School Course 1	Z	1
	Students are introduced to mathematical concepts and methods used in the introductory physics course.		'
00MAM2	Essentials of High School Math Course 2	Z	1
	Review of basics of high school mathematics.		'
00PT	Preparatory Week	Z	2
00RET	Rhetoric	Z	1
The course is focu	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	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 sec	quences and series - convergence range, criteria of uniform convergence, continuity, limit, differentiation and integration of functional	series, power serie	es, Series
Expansion, Taylo	r´s theorem. 2. Ordinary differential equations - equations of first order (method of integration factor, equation of Bernoulli, separatior	n of variables, home	ogeneous

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

Taylor series, elementary terms of vector analysis, Jacobi matrix. 6. Functions defined implicitly by one or several equations.

01ANB4	Calculus B 4	Z,ZK	6
	o et funkcí více prom nných a funkcionálních vektor . [2] Funkce zadané implicitn . [3] Taylorovy ady funkce více prom nných. [4] l	-	
	kartézské soustavy sou adnic. [5] Lokální, vázané a globální extrémy funkce více prom nných. [6] Základy teorie míry a obrys konsti		
integrami po et i	unkce více prom nných - Riemann v a Lebesgue v integrál, základní vlastnosti, Fubiniova v ta, v ta o substituci. Leviho a Lebesgu derivace integrálu podle parametru. [8] Integrály po k ivkách a plochách. Integrální v ty.	eova v ta. Limita, s	spojitost a
01DYKO	Introduction to Continuum Dynamics	Z,ZK	3
	es a rigorous introduction to the mathematical description of continuum dynamics. In the first part, the necessary mathematical tools		
vector and tensor c	alculus, differential forms, and integration on manifolds. Next, the fundamental concepts such as several deformation tensors and the s	substantial (materia	l) derivative
are defined. They	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
041.41	further adapted to the specific cases of viscous and inviscid fluid and linear/nonlinear elastic body.		
01LAL	Linear Algebra 1 Linear dependence and independence. 3. Basis and dimension. 4. Subspaces of vector spaces. 5. Linear mappings. 6. Matrices of l	Z	2 Erobonius
1. Vector space. 2	theorem.	ineai mappings. 7.	i iopeilius
01LAL2	Linear Algebra 2	Z,ZK	4
	se matrix and operator. 2. Permutation and determinant. 3. Spectral theory (eigenvalue, eigenvector, diagonalization). 4. Hermitian an		
product and orthog	onality. 6. Metric geometry. 7. Riesz theorem and adjoint operator. Outline of the exercises: 1. Methods for calculation of inverse matr	ices. 2. Methods of	calculation
of determinants.	3. Calculation of eigenvalues and eigenvectors. 4. Hermitian and quadratic forms. Canonical form. 5. Scalar product and orthogonali	ty. Calculation of or	thogonal
041.41.7	complements. 6. Geometry exercises and examples. 7. Adjoint operators.	71/	
01LALZ	Linear Algebra 1, exam	ZK	2
01MAN	Calculus 1 Basic calculus (real analysis, functions of one real variable, differential calculus).	Z	4
01MAN2	Calculus 2	Z,ZK	8
-	differential calculus: Taylor´s Polynomials, Taylor´s formula 2. Infinite series: criteria of convergence, operations on series, absolute a		-
	power series, the Cauchy-Hadamard theorem, expansion of function into power series, summation of infinite series. 4. Theory of integ		-
	(Riemann definition), techniques of integration and application of integrals, Generalized Riemann integral		
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		
	ental problems in 2D computer graphics is given together with their solutions. Focus is put on mathematical description of problems and e knowledge previously obtained in a variety of subjects available at FNSPE. The final part of the course covers the applications of com-		
algorithms using k	the process of authoring scientific documents and presentations.	iputer grapriics app	ioaciies iii
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 phenon	, , ,	computer
graphics. Further,	a well structured survey of fundamental problems in 3D computer graphics is given together with their solutions, from the description	n of a 3D scene to i	ts realistic
-	put on mathematical description of problems and explanation of the corresponding algorithms using knowledge previously obtained in		
at FNSPE. The algo	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.	cal concepts are de	monstrated
01PSL	LaTeX - Publication Instrument	Z	2
OH OL	The course is devoted to the basics and facilities of computer typography, particularly to the system LaTeX	_	2
01RMFB	Equations of Mathematical Physics B	Z,ZK	5
The subject of this	course is solving integral equations, theory of generalized functions, classification of partial differential equations, theory of integral to	ansformations, and	d solution of
	partial differential equations.		
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 titions. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification auth	=	
	actice. Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the si		
01SITE2	Computer Networks 2	Z	2
	history and present network (LAN, WAN, use the principles and technologies). Architecture of reference model ISO/OSI. Network pro		
TCP/IP communica	tions. Internet services - mail, remote access, www. Secure communication, tunneling. Directory services, certificates, certification auth	orities, public key in	frastructure
	actice. Network security - firewalls (packet filters, proxies, gateways, NAT, DMZ), practical exercises. (According to the interest - the su		
01SOS1	Software Seminar 1	Z	2
040000	Java, Java Beans, Assembly language programming for microprocessors Intel 80x86	7	
01SOS2	Software Seminar 2 GTK+ and Qt. Development of graphical user interface using C and C++ programming languages. Portable applications for Unix like	. – .	2 especially
Crapilical libraries	for Linux systems. Portability to Microsoft Windows.	operating systems	, especially
01UP1	Introduction to Probability 1	Z,ZK	3
	vith finite set of possible results, classical probability, independent random events 2.Probability and combinatorics 3.Probability and g		
4.Conditional proba	ability, Bayes theorem, medical diagnosis, Simpsons paradox 5.Random variable with discrete state space, its distribution and mean	value 6.Problems i	nvolving the
	calculation of mean value 7.Probabilistic method in graph theory 8.Random algorithms, Morris algorithm and its variants		
01UP2	Introduction to Probability 2	Z,ZK	3
	Il continuous random variable and its statistical description. 2. Distribution function and probability density. 3. Axiomatic introduction o Numerical characteristics of continuous random variables. 5. Selected variants of continuous distributions and their characteristics. 6		
measure meory. 4.	estimations. 7. Generating pseudorandom numbers from the selected distribution.	. Liementary metric	ods for point
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	1	
Helenistic period,	Archimed. Arabic science, European science in Middle Ages. Renaissance - da Vinci, Giordano Bruno. Copernicus, Kepler, Galileo, I	Huygens. The birth	of physics
	as experimental science. Newton and his work.		
02DEF2	History of Physics 2	Z	2
	if classical mechanics after Newton, Bernoulli's, Euler, Lagrange. Historical development of optics, corpuscular and wave approach. E ranism, electrodynamics and electromagnetism, Faraday and Maxwell. Thermodynamics and its laws, statistical physics, Boltzmann.		
orcon ostanos, yan	ramon, stocked/hamics and stockethaghelish, i araday and maxwell. Thermodynamics and its laws, statistical physics, Dultzmailli.	c birtii di IIIddel	quantum

and relativistic ph	hysics, Planck and Einstein. Discovery of radioaktivity, structure of atom, atomic nucleus, Rutherford and Bohr. The way to nuclear en standard model. The concept of Nature and Universe of today.	ergy, Elementary p	particles,
02ELMA Electric charge, Cou	Electricity and Magnetism pulomb's law, electrostatic field, Gauss' law. Electric dipole, polarization. Conductors and dielectrics. Electric current and circuits, conductors and dielectrics.	Z,ZK	6 he relativity
_	Electrodynamic forces, magnetic field. Magnetic dipole, magnetics. Electromagnetic induction, RLC circuits. Electromagnetic waves, M	=	6
	re describes the birth of quantum mechanics and description of one particle and more particles by elements of the Hilbert space as well that it includes description of observable quantities by operators in the Hilbert space and calculation of their spectra.		
02KM2	Quantum Mechanics 2	Z,ZK	6
	eture expands the introduction to quantum mechanics with more general formalism of quantum theory, approximate methods and path ethods used in various applications of quantum mechanics and prepares the students for an effective scientific research and further students formulations of quantum field theory.	-	
02MECH	Mechanics	Z	4
	ysics, physical quantities and units. Kinematics of a particle, basic types of motion and their superposition. Dynamics of a particle, sol notion, motion in a central force field, forces in non-inertial reference frames. Mechanics of a system of particles, two-body problems, portion of a rigid body, rotation.	• .	
02MECHZ	Mechanics - Examination The content of the subject is the examination according to the plan of studies.	ZK	2
02PRA1	Experimental Laboratory 1	KZ	6
Lecture is intended attended by students	d especially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nuclear Ents interested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work with the not (acquire of different experimental procedures and routines), willteach writing the records of measurement, processing and evaluation practically extendthe knowledge gained in lectures on physics.	eliterature), the imp	can be also elementation
	Experimental Laboratory 2 d especially for students who intend to study some of the physical specializations of FNSPE(branch Physical Engineering, Nuclear Enterested in the otherspecializations. In Experimental laboratory students learn how to prepare for experiments (including work with the		
=	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.		
02SMF	Seminar of Mathematical Physics	Z	2
l l	seminar is to iluminate mathematical physics by virtue of solved examples. It is supposed that the teachers of the physics department concerning their scientific activities that could become the topics of the student?s bachelor theses in the next year	ent will present sin	nple tasks
02TEF1	Theoretical Physics 1	Z,ZK	4
	troduction to analytical mechanics. The students acquire knowledge of the basic concepts of the Lagrange and Hamiltonian formalisms a		
	dynamics (Newtons, 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	•	
	the first part of the course of classical theoretical physics (02TEF1, 02TEF2).		,
02TEF2	Theoretical Physics 2	Z,ZK	4
02TEF2 Tensors and trans	Theoretical Physics 2 sformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and me. Classical electrodynamics: Maxwell's equations in the Minkowski space-time, electromagnetic waves in dielectric media, electrom	Z,ZK classical field the	4 ory in the
02TEF2 Tensors and trans	Theoretical Physics 2 sformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and	Z,ZK classical field the	4 ory in the
02TEF2 Tensors and trans Minkowski space-tir 02TER Thermal expansion	Theoretical Physics 2 sformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and me. Classical electrodynamics: Maxwell's equations in the Minkowski space-time, electromagnetic waves in dielectric media, electrom approximation.	Z,ZK classical field theo agnetic radiation in Z,ZK c principle, ideal ar	4 ory in the n the dipole 4 nd real gas,
02TEF2 Tensors and trans Minkowski space-tir 02TER Thermal expansion	Theoretical Physics 2 sformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and me. Classical electrodynamics: Maxwell's equations in the Minkowski space-time, electromagnetic waves in dielectric media, electrom approximation. Heat and Molecular Physics of materials, heat transfer; stationary and non-stationary heat conduction, heat transfer and penetration; 1st and 2nd thermodynamic	Z,ZK classical field theo agnetic radiation in Z,ZK c principle, ideal ar	4 ory in the n the dipole 4 nd real gas,
02TEF2 Tensors and trans Minkowski space-tir 02TER Thermal expansion entropy; non-chemic 02TSFA Foundation of therm	Theoretical Physics 2 sformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and me. Classical electrodynamics: Maxwell's equations in the Minkowski space-time, electromagnetic waves in dielectric media, electromapproximation. Heat and Molecular Physics of materials, heat transfer; stationary and non-stationary heat conduction, heat transfer and penetration; 1st and 2nd thermodynamic classical systems: dielectric and magnetic materials; Maxwell relations and thermodynamic potentials; kinetic theory: Maxwell's velocity district materials and Statistical Physics Thermodynamics and Statistical Physics modynamics and statistical physics. Thermodynamic potential, the Joule Thomson effect, conditions of equilibrium, the Braun-Le Chatelier	Z,ZK classical field the agnetic radiation in Z,ZK c principle, ideal ar ribution,equipartitic Z,ZK er principle. Statisti	4 ory in the n the dipole 4 ord real gas, on theorem. 4 ical entropy.
02TEF2 Tensors and trans Minkowski space-tir 02TER Thermal expansion entropy; non-chemic 02TSFA Foundation of therm Basics of many bod	Theoretical Physics 2 sformations in physics. Mechanics of point mass, rigid body and continuum. The special theory of relativity: relativistic mechanics and me. Classical electrodynamics: Maxwell's equations in the Minkowski space-time, electromagnetic waves in dielectric media, electrom approximation. Heat and Molecular Physics of materials, heat transfer; stationary and non-stationary heat conduction, heat transfer and penetration; 1st and 2nd thermodynamic cal systems: dielectric and magnetic materials; Maxwell relations and thermodynamic potentials; kinetic theory: Maxwell's velocity district or the modynamics and statistical physics. Thermodynamics and Statistical Physics nodynamics and statistical physics. Thermodynamic potential, the Joule Thomson effect, conditions of equilibrium, the Braun-Le Chatelie dy descriptionfrom a statistical point of view (classical and quasiclassical regime within the frame of a canonical and grand-canonical of crystals and the black body radiation). The Boltzmann equation is used to discusses simple transport phenomena.	Z,ZK classical field the agnetic radiation in Z,ZK c principle, ideal ar ribution,equipartitic Z,ZK er principle. Statistiensemble, Fermi g	4 ory in the n the dipole 4 ord real gas, on theorem. 4 ical entropy, gas, models
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	English for Internal dista Children MO	7	
	English for Intermediate Students M2 expects the student to have completed the AM1 course. It develops their skills for work with subtechnical texts, focusing also more on	Z specific gramma	2
and lexical items tv	expects the student to have completed the AM1 course. It develops their skills for work with subtechnical texts, focusing also more on spical of ESP and EAP (e.g., definition, existence and classification of phenomena, object descriptions). Part of the course is also guided		
,	revision is included.	J	7, 3
04XAM3	English for Intermediate Students M3	Z	2
he course develop	s the skills that enable students to cope with features typical of professional style. Increasing attention is paid to developing subtechnical	l vocabulary and	d independen
_	professional texts. Great emphasis is placed on distinguishing different levels of formal and informal oral and written communication a		
quivalents. The co	urse also includes studying abstracts and rules for writing them as well as basic rules for preparing and giving a short presentation or student's field.	a chosen topic	related to the
04XAMZK	English for Intermediate Students Examination	ZK	4
	ent is the examination as given by the study plan. The examination covers the AM1, AM2, and AM3 courses and consists of two parts		
	io min). The student is expected to master the AM syllabus and demonstrate the ability to apply their knowledge gained in the three E		, αιτα σται
04XAP1	English for Advanced Students P1	Z	2
The course is desi	gned for students who have successfully completed the full secondary school English language course (at least the B1 level of the Co	mmon Europea	n Framework
	Languages - CEFR). It provides an introduction into English for Specific and Academic Purposes (ESP, EAP), i.e., into the fundamental control of the control		
-	e typical of professional oral and written communication situations (fundamentals of terms in mathematics and physics, definitions, gra oral and written communication on topics related to the undergraduate´s life and needs. It develops skills for free professional writing (wr		-
overs professiona	polite request). If necessary, revision of selected grammar topics is included.	iting a C v, letter	oi applicatioi
04XAP2	English for Advanced Students P2	7	2
	based on AP1, thus extending the student's skills for working with subtechnical texts, and even with professional texts of chosen bran	_	_
e students' need	s it concentrates on chosen grammar topics, but mainly intends to develop understanding of syntactic structures and typical rhetorical	functions (e.g.,	various type
• •	d, if possible, a case study). Increasing emphasis is placed on the undergraduate's independent work with and reading of linguistically	•	J
ne course extend	the student's subtechnical vocabulary, and includes fundamental notions of chosen branches of science. It is focused on formal writing	ng including the	sentence an
04XAP3	paragraph structure, linking, cohesion and coherence in texts. English for Advanced Students P3	Z	2
	pased on AP2 and expects the student to work without any guidance with authentic professional materials and to interpret the text. It inc		1
	Ils and functions (e.g., expressing an opinion, agreement, and objections; taking part in discussion, note-taking; summarizing, writing	_	
	project on a given or chosen topic and presenting it. The course places emphasis on distinguishing levels of formal and informal langu		-
	communication.		
04XAPZK	English for Advanced Students Examination	ZK	4
	is the examination as given by the study plan. The student is supposed to demonstrate mastering the AP3 syllabus and the ability to a		-
	courses. The examination consists of 2 parts - written (100 min) and oral (30 min) and includes also oral presentation of a topic from t		
04XCESM1	Czech for Foreigners - Intermediate 1 ed on correct pronunciation, important morphological phenomena, prepositional phrases, and verb forms as well as on extending the str	Z udant'a vasabula	2
Tie course is locus	ed on correct pronunciation, important morphological phenomena, prepositional phrases, and verb forms as well as on extending the sti social situations.	duent s vocabula	ary for various
04XCESM2	Czech for Foreigners - Intermediate 2	Z	2
	os the topics covered in CESM1 and is then focused on more difficult grammar phenomena. It practices writing, speaking, and reading	g skills and train	s the student
	in understanding common abbreviations, abbreviated words, and mathematical terms and formulas.		
04XCESM3	Czech for Foreigners - Intermediate 3	_	2
The last course i		Z	_
	evises morphological topics covered earlier and extends the student's knowledge of more difficult language phenomena. It is especia	-	_
047050MZK	lexicology and on developing the student's writing skills.	lly focused on st	tylistics and
	lexicology and on developing the student's writing skills. Czech for Intermediate Students Examination	lly focused on st	tylistics and
	lexicology and on developing the student's writing skills. Czech for Intermediate Students Examination It is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the CEST	lly focused on st	tylistics and
The course conte	lexicology and on developing the student's writing skills. Czech for Intermediate Students Examination It is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the CESI be taken after successful completion of the 3 courses. Detailed information is to be obtained from the teacher.	lly focused on st	tylistics and
The course conte	lexicology and on developing the student's writing skills. Czech for Intermediate Students Examination It is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the CEST	ZK M1,2,3 courses a	ylistics and 4 and can only
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04XCESZZK Czech for Foreigners Beginners - Examination ZK	4
The course content is the examination as given by the study plan. The examination consisting of a written and oral part covers all the topics of the 04XCESZ1,2,3 courses an	nd can
only be taken after successful completion of all three courses. Detailed information is to be obtained from the teacher.	
04XFM1 French for Intermediate Students M1 Z	2
French - intermediate FM The objective of this three-semester course is to improve and further develop communication in the French language in both written and oral form. St	
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 tech	nical
information and to solve problems. FM1 The course builds on and further develops linguistic competence acquired at secondary school. It revises, systemizes and expands lar	nguage
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	s.
04XFM2 French for Intermediate Students M2 Z	2
Course FM2 builds on FM1. Linguistic structures and competence acquired in previous study are systemized and expanded. Reading popular science texis, features typical for te	echnical
and scientific language (passives, nominalization, word formation). Topics: physics, power engineering, environment, Internet, success of French science and technology, French science and technology.	ench
scientists, artists and architects. Description of an object, device, shapes, dimensions, material.	
04XFM3 French for Intermediate Students M3 Z	2
The course is focused on improvement and further development of linguistic competence acquired during the follow-up courses. Syntactic structures (subordinate and infinitive c	lauses,
participle structures, compound tenses). Text summaryStudents prepare a written paper which will be delivered in form of an oral presentation in-class. The paper is linked to	to the
ield of students' future specialisation or to their interest and generally covers a technical /applied science topic. It is not a translation but a creative work compiled from French	articles
and one's own knowledge/experienceLonger monologues on topics /situations set for the examination are prepared. Text structure, cohesion and coherence.	
04XFMZK French for Intermediate Students Examination ZK	4
The content is the examination as given by the study programme. The whole French programme is ended with an examination covering the contents of FM1-FM3. The examination	nation
consists of a written and oral part and is organized according to Examination Instructions, a document available on the web.	
04XFP1 French for Advanced Students P1 Z	2
FP advanced course The objective of this three-semester course is to improve and further develop communication in the French language in both written and oral form. Studer	nts will
be able to communicate in social interaction and in academic, scientific and work environment. They will be able to use the language to transmit general and technical informati	ion and
o solve problems. FP1 The course builds on and further develops linguistic competence acquired at secondary school. Difficult grammar topics are repeated and expanded: sub	bjonctif,
passé composé-imparfait, pronouns. The following specific topics are covered: University studies in our country and in France, writing of transactional letters, CV, personal stat	tement,
equest, answer to an advert, environmental issues, success of French science and technology, chosen topics from French regional culture, Paris. Topics of specialization: mathe	matics,
internet, physics, chemistry. Reading of technical and popular science texts, further work with these texts and interpretation.	
04XFP2 French for Advanced Students P2 Z	2
With the link to P1 contents, the course further develops language skills. Focus is put on reading popular science texts and on oral communication on given topics. Features ty	pical of
technical and scientific communication are stressed (passive voice, nominalization, word formation).	
04XFP3 French for Advanded Students P3 Z	2
The course is focused on systemization and improvement of acquired linguistic competence, skills and knowledge, and their use for communication in engineering environment.	Special
skill - translation of shorter texts (both from and into the language). Writing of a paper and making oral presentation in-class. The paper generally covers a technical /applied so	cience
topic. It is a creative work compiled from 3 French sources. Preparation of several set topics for oral examination.	
04XFPZK French for Advanced Students Examination ZK	4
04XFPZK 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 accord	
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 accord	
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 accord Examination Instructions, a document available on the web. Assessment of the presentation is included into the examination grading.	ding to
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The course systematically revises other grammatical phenomena important for professional discourse (participles, relative clauses). 04XNM3 German for Intermediate Students M3 The course introduces other more complex grammatical structures and their application in communication based on technical texts, such as the relation between technology and society, the world at the beginning of the 21st century, linguistically more demanding texts on the environment, the language of mathematics, computers and car technology etc. Students practise reading for information and reading aloud, and appropriate language for various purposes in oral and written communication. The course systematically revises other grammatical phenomena important for professional discourse (participles, relative clauses). 04XNMZK German for Intermediate Students Examination The course content is the examination as given by the study plan. The whole German for Intermediate Students Course is completed by an examination consisting of two parts - written and oral, which cover the courses NM1 - NM3. The oral part follows after passing the written part successfully and after obtaining the 04NM3 assessment. More detailed information is to be obtained from the teacher. 04XNP1 German for Advanced Students P1 This course requires good grammar knowledge, extended general vocabulary, and good communication skills acquired at secondary school to be levelled off at the beginning of the course. The course is then focused on working with technical and scientific texts and practising reading techniques (skimming, scanning, reading for detail). It revises and develops more difficult grammar structures necessary for understanding a subtechnical text (passive voice, participles, participle structures) and it also focuses on practical everyday communication, i.e., telephoning. 04XNP2 German for Advanced Students P2 Ζ 2 The course develops the students' skills in working with professional scientific texts (understanding, summarising, note-taking, interpreting) while extending their general and subtechnical vocabulary range. It introduces mathematical expressions and texts of nuclear power engineering. Increasing emphasis is placed on understanding and practising formal communication, both written and oral (CV, letter of application, interview, scholarship), and more complex grammatical structures (i.e., subjunctive, indirect speech). 04XNP3 German for Advanced Students P3 The course consists of 3 main parts (general communicative situations, grammar and technical topics). Students will develop their vocabulary in a variety of less common situations (traffic problems and car accidents, accident report, filling in a form, complaints). Based on presentations and technical and subtechnical texts, the vocabulary range in fields such as nuclear power engineering, the environment, computer science, and car technology, will also be extended. Only authentic professional texts are used. By means of a presentation, students are trained to process information gained from their reading of complex and difficult texts and present it to the class in a simplified oral form. The course also includes translation practice to and from German. 04XNPZK German for Advanced Students Examination 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. Russian for Intermediate Students M1 04XRM1 The course is designed for students with previous knowledge of Russian from secondary schools. Students are supposed to know the Russian alphabet (both printed and handwritten), basic vocabulary for communication in everyday situations (introductions, socializing, greetings, shopping for food and objects of everyday need, asking the way and giving directions), they can use basic grammar structures (verbal and nominal forms, irregular verbs, pronouns). The initial knowledge corresponds to the achievement level of the RZ2 course. The contents and scope of the course correspond approximately to the RZ3 course, but for half of the time allotted in the timetable. 04XRM2 Russian for Intermediate Students M2 Ζ 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 Ζ 2 The course develops the knowledge and skills acquired in RM1 and RM2 and its contents and scope are roughly at the same level as those of RZ5, however, for half of the time allotted in the timetable. 04XRMZK Russian for Intermediate Students Examination ZK 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. 2 04XRP1 Russian for Advanced Students P1 The entrance requirement for the course is to achieve the B1 CEFR level. The objective of the course is revision of standard language structures, practicing more difficult grammar structures, understanding the fundamentals of technical language and training writing skills. 04XRP2 Russian for Advanced Students P2 Ζ 2 The course is based on RP1. It expands grammatical structures important for understanding technical texts (verbal adjectives, participles, passives, verb aspects, specific syntactic structures). Stress is put on independent oral and written communication. Russian for Advanced Students P3 The course is based on RP2 and is mainly focused on working with technical and scientific texts (reading comprehension, oral and written paraphrasing, translation). The RP1 - RP3 courses require good previous knowledge of general language at secondary level (listening, reading, correct communication in everyday situations). The courses develop and expand these skills. Further study is aimed at professional and technical skills (reading technical literature according to the students' specialization, oral and written interpretation). Students develop their subtechnical vocabulary and practice quick and correct communication in professional situations. They will be able to both speak write accurately and with confidence on technical topics. 04XRPZK Russian for Advanced Students Examination 7K 4 The course content is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowledge and skills acquired in RP1 - RP3. Students are eligible for the oral examination only after a prior pass in RP3 and a successful written examination. Students are given instructions by the teacher. 04XRZ1 Russian for Beginners Z1 The course represents the first stage of the five-semester programme, its final aim being reading and understanding professional texts written in Russian. Thus it begins with mastering the Russian alphabet (for both reading and writing skills) and fundamentals of grammar necessary for everyday communication (listening and speaking). Students will be able to read a short text with marked stress, understand its contents and summarize it. 04XRZ2 Russian for Beginners Z2 7 The second semester of the programme is designed to teach skills for basic communication in everyday situations and for reading easy and short subtechnical texts. Students will be able to communicate using short sentences and appropriate structures, and read aloud with confidence a short text without marked stress. They will also develop their vocabulary and master further grammatical structures. They will have mastered with confidence the Russian alphabet and will be able to use it in writing.

04XRZ3 Russian for Beginners Z3 The course is based on RZ2 and includes further everyday topics, develops understanding of short compact texts on new subtechnical topics (for training various forms of reading skills and listening) and introduces new grammar. Students will be trained to distinguish intonation patterns while listening to spoken language. They will be able to respond so as to be understood, and to express their opinion. Writing skills will be trained on guided writing tasks and note-taking. 04XRZ4 Russian for Beginners Z4 Z 2 The course is based on RZ3. It improves and expands the knowledge of general language in all four skills (reading and understanding longer texts with a certain percentage of unfamiliar words, oral communication in everyday situations, writing longer texts). Students are trained to use grammar structures effectively (e.g., irregular verbs, differences in verb patterns from Czech, modality, imperatives, conditionals). They practice and develop communication skills for everyday situations (food, travelling, free time), and practice oral and written communication on more specific topics (environment, addictions, the green movement). They become acquainted with various geographical data (e.g., Siberia), learn how to fill in forms, look up the information from the timetable, learn about Russian holidays and typical meals. 04XRZ5 Russian for Beginners Z5 The course expects the student to have completed RZ4. It concentrates predominantly on reading skills (working with professional texts, i.e. understanding, extracting and summarizing information from a specialized text) and speaking, and to a certain extent, writing about the professional information obtained by reading the texts. Communication skills are trained on everyday topics. Studying grammar is based on professional and technical texts and only includes items typically used in professional communication (verbal adjectives, participles, passive voice). Students develop their technical and economic vocabulary, and are also trained in some professional skills (writing a CV, polite request, etc.) 04XRZZK Russian for Beginners Examination 3 The course content is the examination as given by the study plan. The course is completed by taking a written and oral examination testing the knowledge and skills acquired in RZ1 - RZ5. Students are eligible for the oral examination only after a prior pass in RZ5 and a successful written examination. Students are given instructions by the teacher. Spanish for Intermediate Students M1 The course is designed for students whose competence is at level B1 of CEFR, i.e. those who studied Spanish in the secondary school. The 3-semester course develops standard vocabulary and pays attention to further grammar topics (e.g., perifrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the imperative, and subjunctive), to written and oral communication on a given everyday or easy subtechnical topic, for which the students are trained by reading texts or listening to them. Spanish for Intermediate Students M3 The course develops the students' knowledge from the previous course (SM1). Students are gradually acquainted with fundamentals of Spanish for specific purposes in order to be able to work with specialized texts on the Internet. 04XSM3 Spanish for Intermediate Students M3 2 The course books are supplemented with additional subtechnical materials, so the students will be gradually acquainted with the peculiarities of academic style. They will be competent enough to use the Internet in Spanish and search for information of their specialization or field of interest. Students will use the information to write short articles and summaries. The final part of the programme, general Spanish course based on course books, covers presentations and, finally, a written and oral examination Spanish for Intermediate Students Examination 04XSM7K 4 The course content is the examination as given by the study plan. XSMZK examination consists of two parts: written and oral; to be eligible for the written part, students will have obtained non-graded assessment for course XSM3. Oral examination follows the written part. 7 04XSP1 Spanish for Advanced Students P1 2 Course concentrates on more difficult grammar topics, revision of vocabulary, basics of Spanish for specific purposes as well as written communication. Course prerequisites: level B2 of CEFR. Spanish for Advanced Students P2 Z Course XSP2 is the second part of the advanced Spanish course, extending Spanish for specific purposes topics. It comprises more grammar and syntax and focuses on independent written communication. 04XSP3 Spanish for Advanced Students P3 7 2 Course XSP3 is the final part of the advanced Spanish course. It is based on texts chosen by the students according to their future specialization. It is focused on written communication based on what students will need in their career. 04XSPZK Spanish for Advanced Students Examination The course content is the examination as given by the study plan. Examination XSPZK consists of two parts, namely oral and written. The prerequisite for admission to oral part is having passed the written test. Examination content is based on syllabi of courses XSP1, XSP2, and XSP3 or on an individual study plan of the student. 04XSZ1 Spanish for Beginners Z1 2 Course XSZ1 is the first stage of the five-semester programme of Spanish studies; during the first stage the students will master phonetics and fundamental grammar structures and will be able to communicate at an elementary level on topics of everyday life. They will acquire and extend fundamental vocabulary of general Spanish and will develop it. Spanish for Beginners Students Z2 Course XSZ2 is based on course XSZ1, and expects students to develop and extend the knowledge and skills acquired so far. Grammar structures and lexis will be chosen so as to enable them to understand short adapted written texts and speech. Attention is also paid to cultural differences between Spanish-speaking countries and others such as the Czech Republic. Realia of Spanish-speaking countries are also included. 2 04XS73 Spanish for Beginners Z3 7 This course builds upon the foundations established in course XSZ2 and further develops students vocabulary and grammatical competence. It includes an introduction to the realia and cultural context of Spanish-speaking countries, with a primary focus on Spain. Particular attention is given to key grammatical structures, including the pretérito perfecto, pretérito indefinido, pretérito imperfecto, the gerund, and the imperative. The course also focuses on both written and spoken communication on general topics. Students are prepared for this through targeted reading and listening activities. Spanish for Beginners Z4 The course is based on course XSZ3. It develops the student's vocabulary and extends the knowledge of the culture and social customs of the Spanish speaking countries, mainly of Spain. It pays attention to further grammar topics (perifrasis verbales, futuro imperfecto, direct object and indirect object pronouns, negative form of the imperative, and subjunctive), to written and oral communication on a given general or subtechnical topic, for which the student is trained by reading texts or listening to them. Spanish for Beginners Z5 The course books are supplemented with additional subtechnical materials, so the students will be gradually acquainted with peculiarities of Spanish for specific purposes. In its final part, the general Spanish course based on the course book will end with a written and oral examination. ZK 04XSZZK Spanish for Beginners Examination 3 The course content is the examination as given by the study plan. Examination consists of two parts - written and oral. Student can register for oral examination only if he/she has passed the written examination test. 11BSEM 7 **Bachelor Seminar** 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 bachelors degree projects at the faculty. The second part is designed as a practical training for the defence of the bachelors 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 students

11SFIPL	Seminar on Solid State Physics	KZ	2
	ne Seminar and ?SSS? software features. 2.Module "bravais" - crystal structure and X-ray diffraction in 2D ? theory 3.Simulations of c	l l	
to following theme	es: crystal lattice versus crystal structure, primitive cell, elementary cell, lattice plane, reciprocal grid, Laue and Bragg condition, atom	ic scattering factor,	structural
factor, extinction, pr	actical structural analysis 4. Module "laue" - Diffraction on perfect and imperfect crystals 5. Simulations: influence of structural disorder on	diffraction pattern,	atomization
	cillations, quasi crystals 6."born" module - dynamics of crystalline grid in 1D? theory 7.Simulations: planar waves, traveling and stand	-	
	y and momentum transport, infinite chain, chain of finite lenght, boundary conditions, wave packets, group and phase velocity, dispersion		
	nharmonicity 8."debye" module - lattice dynamics and thermal capacity ? theory 9.Simulations: Brillouine zone, dispersion relation, del	=	
	drude" module - dynamics of classical electron gas in 2D ? theory 11. Simulations: diffuse electron movement, electron drift in an exte		- 1
Shockley experime	nt, electron mobility, electron motion in magnetic field, cyclotron frequency, Hall experiment, magnetorezistence 12.Assignment, elabo seminar work.	oration and present	ation of the
11ZFP	Basic to Solid State Physics	ZK	3
	amental properties of solids following the regular long distance ordering of atoms in a crystal lattice. Based on the introduced bonding		
	s of crystals and their properties are defined. The model of crystalline lattice dynamics in harmonic approximation is described and basic		
	periodic potential of the crystal lattice is introduced and its relation to the following model describing the energetic state of electrons in		, ,
energy bands ex	plained. The special consequences of band approach to the physical properties of solids are elucidated. The aim of the course is to s	systematically introd	duce and
	interpret a broad phenomenological basis of physical properties of crystalline solids		
11ZFPL	Basic to Solid State Physics	KZ	2
Description of fund	amental properties of solids following the regular long distance ordering of atoms in a crystal lattice. Based on the introduced bonding	interaction between	en atoms in
	s of crystals and their properties are defined. The model of crystalline lattice dynamics in harmonic approximation is described and basic		- 1
	periodic potential of the crystal lattice is introduced and its relation to the following model describing the energetic state of electrons in	•	
energy bands ex	plained. The special consequences of band approach to the physical properties of solids are elucidated. The aim of the course is to s	systematically introd	duce and
4.5.41.13.4	interpret a broad phenomenological basis of physical properties of crystalline solids		
12AUX	Administration of UNIX System	KZ	2
1000511	Basic and more advanced administration of Unix operating system		
12BPFI1	Bachelor Project 1	Z	5
i ne 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 proj	ect supervisor durir	ng common
4000000	regular meetings and discussions.	7	40
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 proj regular meetings and discussions.	ect supervisor dum	ig common
12MOF	Molecular Physics	ZK	2
	deas on physics of molecules and molecular matter, and on structure-to-physical properties relationship. Methods of molecular struct		
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. Me	· · · · · · · · · · · · · · · · · · ·	
=	icists (ordinary differential equations, random numbers) are included in addition to the basic numerical methods. Integrated computat		- 1
. , ,	used as a principle programming language as a demonstration tool. The seminars are held in computer laboratory.		
12NT	Nanotechnology	ZK	2
Lectures will introd	luce students mainly to modern technological methods of preparation of semiconductor, metal and dielectric nanostructures. Physica	and chemical fund	daments of
different technolo	gies (MBE, MOVPE, EBL, sol-gel and colloidal solution) will be explained. Substantive attention will be devoted to epitaxial technolog	ies which are subs	tantial for
nanostructure pre	paration. Particular emphasis will be focused on detail characterization of "in situ" and "ex situ" techniques, their applications for heter	rostructure and nan	ostructure
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
Practically oriente	d introduction to computer algebra systems (CAS): their main characteristics, ways and means of using them. Constituent part is real	ized in computer cl	assrooms:
	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, s	-	
	derivation, series summation, integration, ordinary differential equations, factorization, equations solving, quantifier elimination, subst ning, graphics, Maple - detailed introduction and solving of practical examples, applications, overview of other systems (Axiom, Macsyr	•	٠, ١
12PYTH	Scientific Programming in Python rse is to learn the fundamentals of the modern Python programming language with a focus on scientific computing. Emphasis is place	Z Z	2
	ourse is performed in an interactive form of practical exercises, whose topics can be tailored to the content of other subjects or studen		
-	ng research. In the introductory part of the course, students learn the basic features of Python?from basic types to object oriented or		
_	e course focuses on specific features of Python for scientific programming. Presented are the main numerical libraries NumPy, SciPy		- 1
	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
Overview of nanos	tructures and nanotechnologies; quantum technologies; quantum nanostructures; photonic structures; nanophotonics and nanoplasm	onics; optical wave	guides and
	fibers; integrated photonics; computer simulations; technological realization; student presentations		
12ULTB	Introduction to Laser Technique	KZ	3
Overview of electr	omagnetic radiation sources; laser principle; classification of lasers; characterization and rough application of various types of lasers;	laser safety precau	utions. The
	laser amplifier, Q-switching, mode-locking.		
12UNXAP	Introduction to UNIX	Z	2
=	perating systems. Personal computer, workstation and supercomputers. Processor, memory, bus, devices, hard disk, network interface		
	ting systems. Operating system UNIX. Basic principles, kernel, kernel services. Documentation. File system, file atributes, working wi		
	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 configuration of a	omputer. Network s	ervices:
1011054	hardware sharing, mail, scp, etc. Network applications	フフレ	
12UPF1	Introduction to Computational Physics 1	Z,ZK	2 Computer
	on and its role in physics, methodology of writing computer codes. Computer languages for physics. Numerical libraries and program isualization. Computational fluid dynamics, hydrodynamic simulations, methods for discretization of Euler equations. High-performance		
.colo loi doloi lullo V	software for parallel simulations. Databases of scientific information, scientist evaluation, citation analysis.	companing, parallel	Jonnpulliy,
	zzz. z z z z z z		

12UPF2	Introduction to Computational Physics 2	Z,ZK	2
Nonlinear models,	complex systems, chaotic systems, fractals and their applications in physics. Artificial intelligence methods: neural networks, machine	e learning, genetic	algorithms,
	expert systems and their applications in physics. Quantum computing. Virtual reality.		
12UVP	Introduction to Scientific Computing	Z	2
	d Introduction to scientific computing. Constituent part of the course is realized in computer classroom. Students get acquinted with s	_	
. radiidany dridina	and technicval computing, data analysis, data visualisation and algorithm development.	00 200.0 100.0 10	
10\/DME		Z	
12VPMF	Selected Topics in Modern Physics		3
	rse is to improve students knowledge in modern parts of physics (such as measuring of gravitational waves, neutrinos, discovery of h		1
• ,	with a partial help of computer algebra systems (e.g. Maple). Apart from the other courses related to modern physics taught in this st		
not deal with detaile	ed mathematical formalism of studied phenomena. Therefore, the secondary aim is the increase of students motivation for deeper und	derstanding of mod	dern physics
	and its laws in their following study	1	
12VTV	Scientific and Technical Computing	Z	2
The students get	familiar with methods of solving of computational problems in the scientific and technical practice, and with methods of their program	ming. The course	is oriented
	mainly to programming in the Fortran language.		
12ZAOP	Fundamentals of Optics	Z,ZK	2
	the very basics of optics - electromagnetic theory, linear optical physics and material effects, basics of nonlinear effects, and geome	'	1
	tain, on the bachelor level, broad and general information on optics, giving an essential orientation in the field, especially with respec	-	-
	ics are further elaborated during departmental masters program. The lecture stems from the electrodynamic notion of plane waves in		
-			-
**	her from material medium. It explains basics of linear and nonlinear response in material medium and dispersion properties. It next in		
· · · · · · · · · · · · · · · · · · ·	it explains processes induced by boundary conditions at interfaces. It also discusses the consequences of statistics on interference		
	ence and their applications in interferometers. Based on the Fresnel diffraction integral, diffraction processes are presented in a graphical		
	Based on this diffraction principle, basic functioning of holography is clarified. Finally, the lecture unravels the geometrical optics limit		geometrical
	roach imaging, substitutive schema of a paraxial imaging system, and optical aberrations. It shows fundamentals of imaging in optical		
12ZEL1	Basic Electronics 1	Z,ZK	3
The subject provid	les primary knowledge of circuit theory concerning principles of electronic circuits in both stationary and harmonic stable state. Circu	iit 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 effects	ects inside linear o	circuits.
12ZEL2	Basic Electronics 2	Z,ZK	3
I	s up with the Basic Electronics 1. Semiconductor elements basic properties are explained. Thecourse's final part deals with basic th	·	1
12ZELD	Fundamentals of Electrodynamics	Z,ZK	2
	derivation of Maxwell-Lorentz microscopic equations followed by transition to Maxwell macroscopic theory. Using special theory of rel	-	
	ld vectors between two inertial systems of coordinates with appropriate invariants. Wave and Helmholtz equations are derived. By expan	•	
	of solving these equations are studied in homogeneous media with gradually increasing complexity: isotropic without losses, with abs		
non-isotropio	c. Finally, solution in weakly non-homogeneous madia is presented using the method of eiconal. Individual chapters are illustrated by	appropriate exam	ples.
12ZFD	Physical Data Visualization	KZ	2
	·		
	Vector graphics basics, scientific plots, dala visualization basics, measurements results presentation		'
127FP		7 7K	'
12ZFP	Principles of Plasma Physics	Z,ZK	4 s in plasmas
Basic physics of hig	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line	ear theory of waves	s in plasmas
Basic physics of hig and propagation of	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parameters.	ear theory of waves etric instabilities ar	s in plasmas
Basic physics of hig and propagation of It o	Principles of Plasma Physics th temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parametemprises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are	ear theory of waves etric instabilities ar re introduced.	s in plasmas e explained.
Basic physics of high and propagation of lt of 12ZFS	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parametromprises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are Fundamentals of Photonic Structures	ear theory of waves etric instabilities ar the introduced. Z,ZK	s in plasmas re explained.
Basic physics of high and propagation of lt of 12ZFS. The lecture covers of the same and propagation of the lecture covers of the le	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parametromprises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are Fundamentals of Photonic Structures the basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes their presented in the pre	ear theory of waves etric instabilities ar re introduced. Z,ZK eparation and char-	in plasmas e explained.
Basic physics of hig and propagation of It of 12ZFS The lecture covers to Specifically, the	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parametromorphises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are Fundamentals of Photonic Structures the basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes their presented in the properties of the presented in the	ear theory of waves etric instabilities ar e introduced. Z,ZK eparation and char- of integrated phot	s in plasmas re explained. 2 acterization. onics for
Basic physics of hig and propagation of to 12ZFS The lecture covers to Specifically, the applications in open	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parametromorphises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are Fundamentals of Photonic Structures the basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes their presented electure discusses the basic physics and technology of optical waveguides; it introduces basic linear, nonlinear, and active structures of the structures and plasmonics, periodic structures of plasmonic structures and plasmonics, periodic structures.	par theory of waves betric instabilities ar e introduced. Z,ZK eparation and charmof integrated photetures and photonic	s in plasmas re explained. 2 acterization. ronics for c crystals,
Basic physics of hig and propagation of to 12ZFS The lecture covers to Specifically, the applications in open	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parametromorphises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are Fundamentals of Photonic Structures the basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes their presented in the properties of the presented in the	par theory of waves betric instabilities ar e introduced. Z,ZK eparation and charmof integrated photetures and photonic	s in plasmas re explained. 2 acterization. ronics for c crystals,
Basic physics of hig and propagation of to 12ZFS The lecture covers to Specifically, the applications in open	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parametromorphises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are Fundamentals of Photonic Structures the basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes their presented electure discusses the basic physics and technology of optical waveguides; it introduces basic linear, nonlinear, and active structures of the structures and plasmonics, periodic structures of plasmonic structures and plasmonics, periodic structures.	par theory of waves betric instabilities ar e introduced. Z,ZK eparation and charmof integrated photetures and photonic	s in plasmas re explained. 2 acterization. ronics for c crystals,
Basic physics of hig and propagation of It of 12ZFS The lecture covers to Specifically, the applications in open	Principles of Plasma Physics the temperature plasmas is explained using particle, kinetic and fluid approaches. It includes drift motions and adiabatic invariants, line electromagnetic waves in inhomogeneous plasmas. Basic non-linear effects, such as ponderomotive force, self-focusing and parameter comprises brief introduction into magnetohydrodynamics and nuclear fusion. Basics of atomic physics od multiply-ionized plasmas are Fundamentals of Photonic Structures the basics of photonic structures, it classifies photonic structures compares them with the electronic structures, summarizes their presentations and sensors. Next, the attention is given to introduction of plasmonic structures and plasmonics, periodic structures teasurfaces, and finally to photonic structures for quantum technologies. Finally, the lecture is closed with student presentations on sentences.	par theory of waves betric instabilities ar e introduced. Z,ZK eparation and charmof integrated photetures and photonic	s in plasmas e explained. 2 acterization. conics for c crystals,
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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 prograi	nming and with the	Python	
	programming language.			
B0B36JUL	Julia for optimization and learning	KZ	4	
Julia programming	language is increasingly known by the community for its suitability in the field of numerical calculations. The course consists of two p	arts. The first part p	resents the	
basics of Julia. The	second part introduces mathematical optimization and its application in machine learning, statistics and optimal control of differentia	l equations. While	the first part	
shows the individu	ual concepts of Julia, the second part combines them into longer logical sections of code. We explain each application theoretically. S	students are encou	raged both	
to write simple fund	ctions by themselves and compare them with already existing packages. The course ends with a final project. Students can either cho	oose a topic conne	cted to their	
theses or join a Kag	ggle competition with real data. This course is also part of the inter-university programme prg.ai Minor. It pools the best of Al educatior	• .	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	
TV-3	Physical education	Z	1	
TV-4	Physical education	Z	1	

For updated information see http://bilakniha.cvut.cz/en/FF.html Generated: day 2025-07-27, time 14:20.