University: P. J. Šafárik University in Košice							
Faculty: Facult	y of Science						
Course ID: KF: AFS/05	aDF/ Course na	ame: Ancient Ph	ilosophy and Pre	sent Times			
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of cree	dits: 2						
Recommended	semester/trimes	ster of the cours	e: 2.				
Course level: II	-						
Prerequisities:							
Conditions for	course completi	ion:					
Learning outco	omes:						
Brief outline of	the course:						
Recommended	literature:						
Course languag	ge:						
Course assessm Total number o	Course assessment Total number of assessed students: 31						
А	В	С	D	Е	FX		
80.65	6.45	6.45	0.0	6.45	0.0		
Provides: Doc. PhDr. Peter Nezník, CSc.							
Date of last modification: 31.08.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J. Šafárik University in Košice							
Faculty: Faculty of Science							
Course ID: ÚF ARE1a/99	V/ Course	name: Automatiza	tion of Physical	Experiments			
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of crea	lits: 3						
Recommended	semester/trin	ester of the cours	e: 1.				
Course level: II	•						
Prerequisities:							
Conditions for 2 tests during se Exam, accordin	course compl emester g to the topics	etion: of the lectures.					
Learning outco Design of autor of properties of	mes: nated setups for measuring and	r performing select l controlling subsys	ted types of phy stem.	sical measuremer	nts. Discussion		
Brief outline of Structure of sys equiped with r realization of so regulators, soft IEEE488, RS2 Design of digita	Brief outline of the course: Structure of systems of automated measurement and control. Characterization of instrumentation equiped with microcomputer. Sensors of physical quantities, principle of operation, technical realization of selected types of sensors. Elements for processing signal from sensors. Electronic regulators, software simulation of analog regulators. Standart communication protocols CAMAC, IEEE488, RS232. Universal microprocessors and microcomputers. Digital signal processing.						
Recommended J. Uffenbeck, M P. Horowitz, W	literature: licrocomputers Hill, The Art	and microprocesso of Electronics, Can	ors, Prentice Ha nbridge Univers	ll, 1985. ity Press 1989.			
Course languag slovak, english	ge:						
Course assessm Total number of	ient f assessed stud	ents: 51					
А	В	C	D	E	FX		
43.14	43.14 29.41 11.76 13.73 1.96 0.0						
Provides: doc. RNDr. Erik Čižmár, PhD., prof. Ing. Martin Orendáč, CSc.							
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J. Šafárik University in Košice							
Faculty: Faculty of Science							
Course ID: ÚF ARE1b/99	Course ID: ÚFV/ Course name: Automatization of Physical Experiments ARE1b/99						
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 3 Per study period: 42 Course method: present							
Number of crea	lits: 3						
Recommended	semester/trime	ster of the cours	se: 2.				
Course level: II	•						
Prerequisities:	ÚFV/ARE1a/99						
Conditions for Evaluation of re Final evaluation	course complet esults reached du n of the obtained	ion: rring solving give results.	en tasks.				
about properties skills in practics thermodynamic become familia solids.	s of non-ideal dig al programming properties of so r with handling s	graming automat gital to analog an of model experir lids as well as in selected automate	ad analog to digit id analog to digit nental setups des design of digital edl setups design	setups. Extension tal converters. Ob signed for investig l filters. A student red for experimen	taining gation of t will also tal studying		
Temperature co digital converte Digital filtering experimental se	ntroller. Nonline or with feedback of signal. Cor otups in the labor	earity of digital - . Study of heat a ntrolling step mo atories in Depart	analog and ana flow in material ptor. Adressing ment of Conden	log -digital conve s with low therm selected problem sed Matter Physic	erters. Analog - al conductivity. s in automated cs.		
Recommended Supporting mat	literature: erial is available						
Course languag slovak, english	ge:						
Course assessm Total number of	lent f assessed studer	nts: 27					
А	В	С	D	E	FX		
59.26	14.81	25.93	0.0	0.0	0.0		
Provides: prof.	Ing. Martin Orei	ndáč, CSc.					
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J. Šafárik University in Košice								
Faculty: Fa	culty of S	cience						
Course ID: DDS/15	e ID: ÚFV/ Course name: Domain and Domain Walls 5							
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present								
Number of	credits: 3							
Recommen	ded seme	ster/trimester	of the cours	e: 2.				
Course leve	el: II., III.							
Prerequisit	ies:							
Conditions Exam	for cours	e completion:						
Learning o The objecti formation,	utcomes: ve is to ac their struc	quaint the stude ture, static and o	ents witrh the dynamic pro	e basis of the perties in ma	e domain and agnetic mater	domain wal	1	
Brief outlin Domain str Anisotropie motion indu	ne of the c ructure. E es. Domain uced by el-	ourse: xperimental stu n wall types. D ectrical current.	udy of dom Iomain wall	ain structure potential. D	e. Calculatio omain wall o	n of domain lynamics. D	n structure. omain wall	
 Recommended literature: 1. B.D. Cullity, C.D. Graham, "Introduction to magnetic materials", John Wiley & Sons, New Jersy (2009) 2. S. Chikazumi, Physics of Ferromagnetism, Oxford University Press, USA (2009) 3. S. Tumanski, Handbook of Magnetic Measurements, CRC Press (2011) 4. N. A. Spaldin, Magnetic Materials; Fundamentals and Device Applications, Cambridge University Press (2003) 								
Course lan slovak, eng	guage: lish							
Course asse Total numb	essment er of asses	ssed students: 4						
Α	В	C	D	Е	FX	Ν	Р	
50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	
Provides: p	Provides: prof. RNDr. Rastislav Varga, DrSc.							
Date of last	modifica	tion: 26.09.201	7					
Approved:	Guarantee	eprof. Ing. Mart	in Orendáč,	CSc.				

University: P. J. Šafárik University in Košice									
Faculty: Faculty of Science									
Course ID: ÚFV/ DEJ1/99	Course name: History of Physics								
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present									
Number of credits: 2	stoultuin actou of the course 2. 1								
Recommended seme	ster/trimester of the course: 2., 4.								
Course level: 1., 11.									
Conditions for cours written test and thesis exam	e completion:								
Learning outcomes: Basic facts in the hist	ory of physics.								
Brief outline of the c Evolution of knowled world. Evolution and evolution of the theor and their application, natural sciences and p	ourse: Ige before Galileo. Evolution of physics within the mechanical picture of the I limits of classical physics, phase of breakthrough in physics. Origin and y of relativity. Quantum physics and prospects of further evolution of physics . Contemporary state of physical research and its application in technology, philosophy. Position of physics in our society.								
 natural sciences and philosophy. Position of physics in our society. Recommended literature: R.Zajac, J.Chrapan: Dejiny fyziky, skriptá, MFF UK, Bratislava, 1982. V.Malíšek: Co víte o dějinách fyziky, Horizont, Praha, 1986. I.Kraus, Fyzika v kulturních dějinách Evropy, Starověk a středověk, Nakladatelství ČVUT, Praha, 2006. A.I.Abramov: Istoria jadernoj fiziky, KomKniga, Moskva, 2006. L.I.Ponomarev: Pod znakom kvanta, Fizmatlit, Moskva, 2006. I.Kraus, Fyzika v kulturních dějinách Evropy, Od Leonarda ke Goethovi, Nakladatelství ČVUT, Praha, 2007. I.Kraus, Fyzika od Thaléta k Newtonovi, Academia, Praha, 2007. I.Štoll, Dějiny fyziky, Prometheus, Praha, 2009. www-pages. 10.Brandt S., The harvest of a century, Discoveries of modern physics in 100 episodes, Oxford, 2000. 									
Course language:									
Course assessment Total number of asses	ssed students: 24								

А	В	С	D	Е	FX		
83.33 8.33 8.33 0.0 0.0 0.0							
Provides: prof. RNDr. Stanislav Vokál, DrSc.							
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J.	University: P. J. Šafárik University in Košice					
Faculty: Faculty	y of Science					
Course ID: KFa DF2p/03	aDF/ Course na	ame: History of I	Philosophy 2 (Ge	neral Introductio	n)	
Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 2 / 1 Per study period: 28 / 14 Course method: present						
Number of crea	dits: 4					
Recommended	semester/trimes	ster of the cours	e:			
Course level: I.	, II.					
Prerequisities:						
Conditions for	course completi	ion:				
Learning outco	omes:					
Brief outline of	the course:					
Recommended	literature:					
Course languag	ge:					
Course assessm Total number of	ent f assessed studen	ıts: 738				
А	В	С	D	Е	FX	
60.84	13.82	12.6	8.67	3.39	0.68	
Provides: doc. PhDr. Pavol Tholt, PhD., mim. prof., Doc. PhDr. Peter Nezník, CSc., PhDr. Katarína Mayerová, PhD., doc. Mgr. Róbert Stojka, PhD.						
Date of last modification: 31.08.2017						
Approved: Gua	Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.					

University: P. J	. Šafárik Univer	sity in Košice					
Faculty: Facult	Faculty: Faculty of Science						
Course ID: ÚF DPO/14	V/ Course n	ame: Diploma T	hesis and its Defe	ence			
Course type, sc Course type: Recommended Per week: Per Course metho	ope and the me d course-load (I r study period: d: present	thod: nours):					
Number of cree	dits: 20						
Recommended	semester/trime	ster of the cours	se:				
Course level: II	-						
Prerequisities:							
Conditions for	course complet	ion:					
Learning outco	omes:						
Brief outline of	the course:						
Recommended	literature:						
Course languag	ge:						
Course assessm Total number o	nent f assessed studer	nts: 43					
А	В	С	D	Е	FX		
67.44	20.93	9.3	2.33	0.0	0.0		
Provides:							
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J. Šafárik University in Košice							
Faculty: Faculty	y of Science						
Course ID: ÚF EM1/03	V/ Course na	ame: Experimenta	al Methods in S	Solid State Physics	s II		
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of crea	lits: 3						
Recommended	semester/trimes	ster of the course	e: 3.				
Course level: II							
Prerequisities:							
Conditions for Test Oral Exam	course completi	on:					
Learning outco The subjects pro surface structure	mes: ovides a basic ov es as well as the	rerview of the soli quasiparticle spec	id state method etra.	s and techniques s	studying the		
Brief outline of Experimental m vortices, magne studies of electr	the course: nethods oriented tic and electrical on and other qua	l on structural st surface structure siparticles in soli	tudies of solid s. Spectroscopi ds.	state surfaces, sites with high energy	superconducting gy resolution for		
Recommended Hajko V a kol.: Kittel Ch.: Intro M. Tinkham: In	Recommended literature: Hajko V a kol.: Physics in Experiment, Veda, Bratislava 1998. Kittel Ch.: Introduction to Solid State Physics, 7th edition, John Wiley and sons, NY, 1996 M. Tinkham: Introduction to Superconductivity, McGraw-Hill, Nwe York, 1996						
Course languag Slovak or Engli	ge: sh						
Course assessm Total number of	ent f assessed studen	ts: 49					
А	В	С	D	Е	FX		
87.76	6.12	6.12	0.0	0.0	0.0		
Provides: Mgr.	Provides: Mgr. Tomáš Samuely, PhD.						
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J. Šafárik University in Košice								
Faculty: Faculty of Science								
Course ID: ÚFV EMT1/03	V/ Course name: Experimental Methods in Solid State Physics I							
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present								
Number of cred	its: 3							
Recommended s	semester/trimes	ster of the course	e: 1.	_				
Course level: II.								
Prerequisities:								
Conditions for a 2 tests during se Exam.	course completi mester,	on:						
Learning outcome Clarification of a Discussion of ph experimental set	mes: selected experin nysical phenome rups.	nental techniques ana associated wit	applied in the ex h the techniques	xperimental study and design of m	y of solids. odel			
Brief outline of Low level sig susceptibility, p permitivity stud measurements. I semiconductors.	the course: nal measureme ermitivity. Cap ly in liquids a ntroduction to v Thermoelectric	ents. Study of acitor partially and solids. Spec racuum technolog phenomena.	dielectric prop filled with diel ific heat, therr y. Studying Hal	erties. Dielectri lectric material. nal and electrics l effect and magn	c polarization, Capacitors for al conductivity etoresistance in			
Recommended Supporting mate	literature: erial is available							
Course languag slovak, english	e:							
Course assessme Total number of	ent assessed studen	ts: 45						
A	В	С	D	E	FX			
37.78	31.11	17.78	8.89	4.44	0.0			
Provides: prof. I	Provides: prof. Ing. Martin Orendáč, CSc.							
Date of last modification: 26.09.2017								
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.								

University: P. J.	University: P. J. Šafárik University in Košice							
Faculty: Faculty	y of Science							
Course ID: ÚF FMT/07	V/ Course na	Course name: Physics of Materials						
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 3 Per study period: 42 Course method: present								
Number of crea	lits: 4							
Recommended	semester/trimes	ster of the cours	e: 2.					
Course level: II	•							
Prerequisities:								
Conditions for 70% written tes 30% exam	course completi t	on:						
Learning outco The course give classification of deformation.	mes: es basic informat f surfaces, model	ion about Physics s of grain bound	s of Metals. Mair ary, segregation k	n topics are: diffu kinetics, dislocati	ision in metals, ons, plastic			
 Brief outline of the course: Imperfections in crystal lattice. Diffusion in metals: 1st and 2nd Fick's laws, diffusion coefficient, solution of Ficks' laws for different marginal conditions, Kirkendall effect, diffusion-controlled growth of precipitates, up-hill diffusion, diffusion in dilute and alloy systems. Experimental methods of diffusion coefficient determination. Classification of surfaces, models of grain boundary. Grain boundary segregation in solids: equilibrium segregation (McLean's and Guttmann's models), site competition effect, non-equilibrium segregation, segregation kinetics. Dislocations: classification, properties, movement and dislocation reactions. Dilocation structure in bcc, fcc and hcp lattice. Elastic deformation. Elastic stretching. Plastic deformation. Mechanism of atrain hardening. Machanisal properties and helpaviour. Gram. Strass. Butture and Strass Correspondence. 								
 Recommended literature: 1.Heumann: Diffusion in Metallen, Springer-Verlag, Berlin 1992 (in German). 2. W. Cahn and P. Haasen: Physical Metallurgy, Elsevier Science Publishers, Amsterdam 1996.Shewmon: Diffusion in solids, TMS, Warrendale 1989. 3. D.R. Askeland, P. Phulé, The Science and Engineering of Materials, Thomson, 2003. 								
Course language: english								
Course assessm Total number of	Course assessment Total number of assessed students: 14							
А	В	С	D	Е	FX			
64.29	14.29	21.43	0.0	0.0	0.0			

Provides: prof. RNDr. Pavol Sovák, CSc.

Date of last modification: 26.09.2017

Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.

University: P. J. Šafárik University in Košice							
Faculty: Faculty of Science							
Course ID: ÚF FNT1/03	V/ Course na	me: Low Tempe	erature Physics				
Course type, sc Course type: I Recommended Per week: 4 Pe Course metho	ope and the met Lecture I course-load (h er study period: d: present	thod: ours): 56					
Number of crea	lits: 6						
Recommended	semester/trimes	ster of the cours	e: 3.				
Course level: II	•						
Prerequisities:							
Conditions for Two tests durin exam. The oral	course completi g the semester. F exam may be wa	on: inal examination ived of if the test	consists of the states results are bet	results of two test tter then D.	s and oral		
Learning outco The cours gives information on	mes: knowledge of m basic physical pr	nethods and techr operties of conde	iques used in lo ensed matter at l	ow-temperature phow temperatures.	nysics and		
Brief outline of Phase diagram Two-fluid mod helium-4. Quar solutions. Quar of superconduc Macroscopic qu Reaching low physics.	Brief outline of the course: Phase diagram of 4He. Thermal and transport propertie sof liquid helium-4. Superfluidity. Two-fluid model for superfluid He II. Hydrodynamics and thermodynamics for superfluid helium-4. Quantize vortices. Phase diagram of 3He. Order parameter. Properties of 3He-4He solutions. Quantum crystals. Superconductivity. Tunnel superconducting junctions. Application of superconductivity. Transport properties (electrical and thermal) of solids at low temperatures. Macroscopic quantum effects and mesoscopic systems. Specific heat of solids at low temperatures. Reaching low and very low temperatures. Thermometry. New problems of low-temperature physics						
Recommended literature: A. Kent: Experimental low-temperature physics. Mac Millan Press Ltd., 1993. D. S. Betts: An introduction to Milikelvin Technology. Cambridge University Press, 1989. P. V. E. McClintok et al.: Low-Temperature Physics. Blackie, Galsgow and London 1992. F. Pöbell: Matter an Methods at Low Temperatures. Springer - Verlag. Berlin, 1992							
Course languag	ge:						
Course assessm Total number of	ent f assessed studen	ts: 48					
А	В	С	D	Е	FX		
95.83	2.08	2.08	0.0	0.0	0.0		
Provides: doc. 1	Provides: doc. RNDr. Erik Čižmár, PhD., Dr.h.c. prof. RNDr. Alexander Feher, DrSc.						
Date of last modification: 26.09.2017							
Approved: Gua	Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.						

University: P. J	Šafárik Univers	sity in Košice					
Faculty: Facult	y of Science						
Course ID: ÚF FPK1/07	V/ Course na	ame: Phase Tran	sitions and Critic	al Phenomena			
Course type, sc Course type: I Recommended Per week: 3 Pe Course metho	ope and the me Lecture I course-load (h er study period: d: present	thod: ours): 42					
Number of crea	lits: 4						
Recommended	semester/trime	ster of the cours	e: 2.				
Course level: II	•						
Prerequisities:							
Conditions for Examination	course complet	ion:					
Learning outco To acquaint stud	mes: dents with based	problems of the	phase transitions	and critical pher	nomena.		
Brief outline of Thermodynami universality. M dimensions. Me	the course: cs of phase tran icroscopic mode can field theory of	sitions. Classific ls of the magnet of the Ising mode	cation of phase t ic phase transitic l. Landau theory	transitions. Critic ons. Ising model of phase transitio	cal phenomena, in one and two ons.		
Recommended 1. Stanley H.G. Oxford, Oxford 2. Reichl L.E.: 3. Plischke M., 4. Kadanoff L.F Singapore, 2000	literature: : Introduction to , 1971. A Modern Cours Bergersen B.: Ed C: Statistical Phy).	Phase Transition te in Statistical P quilibrium Statisti sics, Statistics, D	ns and Critical Ph hysics, University tical Physics, Wo Dynamics and Ren	enomena, Claren y of Texas Press, rld Scientific, Sin normalization, W	don Press Austin, 1980. 1gapore, 1994. 'orld Scientific,		
Course languag 1. Slovak, 2. English	ge:						
Course assessm Total number of	ent f assessed studer	its: 108					
А	В	С	D	Е	FX		
60.19	60.19 11.11 11.11 12.04 5.56 0.0						
Provides: prof.	Provides: prof. RNDr. Andrej Bobák, DrSc.						
Date of last mo	dification: 26.09	9.2017					
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.				

University: P. J.	Šafárik Univers	ity in Košice					
Faculty: Faculty of Science							
Course ID: ÚFV FPO/14	Course na	ame: Surface scie	ence				
Course type, sco Course type: L Recommended Per week: 2 Pe Course method	pe and the me ecture course-load (h r study period: : present	thod: ours): 28					
Number of cred	its: 3						
Recommended s	semester/trimes	ster of the course	e: 1.				
Course level: II.							
Prerequisities:							
Conditions for c report from select	ourse completing the scientific provident of the scientific provident of the scientific provident of the science of the scienc	on: roblems, exam					
Learning outcor The goal of this processes and ph	nes: course is to intr eenomena on su	oduce student to t rfaces and metho	heory and phys ds used for thei	sical properties of r study.	surfaces,		
In the introduction structure of solid methods used for diffusion on surf- layers. I will sho Student will gain laser and electro	on i will make g ds with applica or surface char faces, with ther ow examples of n basic knowled ns and about ma	general overview tion to surfaces. acterization. Stud modynamics and physical and che dge about theory anipulation on sur	of terminology I will make de lent will learn kinetics of pro mical processes of interfaces an faces on nanos	in physics of surf etailed overview of about theory of cesses on surfaces s on surfaces in re nd about processe cale.	aces, electronic of experimental adsorption and s and growth of eal applications. s stimulated by		
Recommended I 1. K. W. Kolasin Sons, Ltd. 2008. Sons, 1995. 3. A	iterature: ski, Surface Sci 2. Ch. Kittel, It . Zangwill Phys	ence Foundations ntroduction to Sol	s of Catalysis a id State Physic Cambridge univ	nd Nanoscience, Josephanes, Josephanes, Josephanes, Josephanes, John edition, John ersity press, 1988	ohn Wiley and n Wiley and		
Course language slovak, english	2:						
Course assessme Total number of	Course assessment Total number of assessed students: 14						
A	A B C D E FX						
57.14	57.14 42.86 0.0 0.0 0.0 0.0						
Provides: Mgr. V	/ladimír Komar	nický, Ph.D.		<u> </u>	<u>.</u>		
Date of last mod	ification: 26.09	9.2017					
Approved: Guar	anteeprof. Ing.	Martin Orendáč,	CSc.				
	<u>1</u>	,					

University: P. J	. Šafárik Univer	sity in Košice					
Faculty: Facult	y of Science						
Course ID: ÚF FTV/14	V/ Course n	ame: Physics and	l technics of vac	uum			
Course type, sc Course type: 1 Recommended Per week: 2 Pe Course metho	ope and the me Lecture d course-load (l er study period d: present	ethod: hours): : 28					
Number of cree	lits: 3						
Recommended	semester/trime	ester of the cours	e: 3.				
Course level: II	•						
Prerequisities:							
Conditions for Final test exam	course complet	ion:					
Learning outco Student will ob vacuum creatio	mes: tain basic knowl n and measurem	edge about vacuu	ım physics princ	iples and technica	al Solutions for		
Brief outline of Overview of ba solids. Principle equipment cons material prepar	the course: sic topics in vac es of the measure struction and the ation and cryoge	euum physics - vo ement and creation leak-tightness te enics.	lume transport p n of low pressure sting. The use of	properties of gas, g conditions. Basic f vacuum technolo	gas flow, gas on es of the vacuum ogy in advanced		
Recommended J.F. O'Hanlon,	literature: A User's Guide	to Vacuum Techn	ology, Wiley-Int	terscience; 2003;			
Course languag	ge:						
Course assessm Total number of	ent f assessed stude	nts: 4					
А	В	C	D	Е	FX		
100.0	100.0 0.0 0.0 0.0 0.0 0.0						
Provides: doc.]	RNDr. Erik Čižr	nár, PhD.					
Date of last mo	dification: 26.0	9.2017					
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.				

University: P. J.	Šafárik Univers	sity in Košice			
Faculty: Faculty	of Science				
Course ID: ÚFV GPP/18	// Course n	ame: Graphic pro	ogramming		
Course type, sco Course type: L Recommended Per week: 1 / 1 Course method	ope and the me ecture / Practice course-load (h Per study period l: present	thod: e iours): iod: 14 / 14			
Number of cred	its: 2				
Recommended	semester/trime	ster of the cours	e: 1., 3.		
Course level: II.					
Prerequisities:					
Conditions for a	course complet	ion:			
Learning outco	mes:				
Brief outline of	the course:				
Recommended	literature:				
Course languag	e:				
Course assessm Total number of	ent assessed studer	nts: 1			
A	В	C	D	Е	FX
100.0 0.0 0.0 0.0 0.0 0.0					
Provides: doc. RNDr. Erik Čižmár, PhD.					
Date of last mod	lification: 09.0	3.2018			
Approved: Guar	ranteeprof. Ing.	Martin Orendáč,	CSc.		

University: P. J. Š	afárik Univers	sity in Košice				
Faculty: Faculty of	of Science					
Course ID: KFaD IH2/03	F/ Course na	ame: Idea Humai	nitas 2 (General	Introduction)		
Course type, scop Course type: Pra Recommended of Per week: 2 Per Course method:	e and the me actice ourse-load (h study period: present	thod: ours): 28				
Number of credit	s: 2					
Recommended se	mester/trimes	ster of the cours	e: 3.			
Course level: II.						
Prerequisities:						
Conditions for co	urse completi	ion:				
Learning outcom	es:					
Brief outline of th	e course:					
Recommended lit	erature:					
Course language:						
Course assessmen Total number of a	Course assessment Total number of assessed students: 8					
A	В	С	D	E	FX	
87.5 12.5 0.0 0.0 0.0 0.0						
Provides: Doc. Ph	Dr. Peter Nez	ník, CSc.			•	
Date of last modification: 31.08.2017						
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.						

Faculty: Faculty of Science Course ID: ÚFV/ KAK/14 Course name: Liquid crystals Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present Number of credits: 2 Recommended semester/trimester of the course: 1., 3. Course level: II. Prerequisities: Conditions for course completion: Discussion accompanied with the preparation and presentation of a short project Learning outcomes: Student will obtain basic information about structural, mechanical and optical properties of liquid crystals as well as about their applications in technical praxis. Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals. Liquid crystals. Recommended literature: 1. P.G.de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. 2. N. TomaSovičová, P.Kopčanský, N.Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course language: english Course sessessment Total number of assessed students: 2 A B C	University: P. J.	Šafárik Univer	sity in Košice				
Course ID: ÚFV/ KAK/14 Course name: Liquid crystals Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present Image: Course type: Lecture Recommended semester/trimester of the course: 1., 3. Number of credits: 2 Image: Course type: Lecture Recommended semester/trimester of the course: 1., 3. Course level: II. Image: Course type: Course completion: Discussion accompanied with the preparation and presentation of a short project Learning outcomes: Student will obtain basic information about structural, mechanical and optical projects of liquid crystals as well as about their applications in technical praxis. Brief outline of the course: - Freedericksz transition. Applications of liquid crystals. Liquid crystals line phases an chemical structure. Optical anisotropy. Interaction of liquid crystals with electric and magnetic fiel - Freedericksz transitions. Applications: Composite systems based on liquid crystals. Recommended literature: 1. P.G. de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. N.Tomašovičová, P.Kopčanský, N.Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course language: english Implications: See Students: 2 A B C D E FX 50.0 0.0 0.0 0.0 0.0 0.0 0.0 <	Faculty: Faculty	of Science					
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present Number of credits: 2 Recommended semester/trimester of the course: 1., 3. Course level: II. Prerequisities: Conditions for course completion: Discussion accompanied with the preparation and presentation of a short project Learning outcomes: Student will obtain basic information about structural, mechanical and optical properties of liquid crystals as well as about their applications in technical praxis. Brief outline of the course: Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals with electric and magnetic fiele – Freedericksz transitions. Applications. Composite systems based on liquid crystals. Recommended literature: 1. P.G.de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. N.Tomašovičová, P.Kopčanský, N.Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course language: english Course assessed students: 2 A B C D E FX 50.0 0.0 0.0 0.0 0.0 0.0	Course ID: ÚF KAK/14	V/ Course n	ame: Liquid crys	tals			
Number of credits: 2 Recommended semester/trimester of the course: 1., 3. Course level: II. Prerequisities: Conditions for course completion: Discussion accompanied with the preparation and presentation of a short project Learning outcomes: Student will obtain basic information about structural, mechanical and optical properties of liquid crystals as well as about their applications in technical praxis. Brief outline of the course: Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals. Liquid crystals. Preedericksz transitions. Applications. Composite systems based on liquid crystals. Preedericksz transitions. Applications. Composite systems based on liquid crystals. Preedericksz transitions. Applications. Composite systems based on liquid crystals. Recommended literature: 1. P.G. de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. N.Tomašovičová, P.Kopčanský, N.Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course language: english A B	Course type, sc Course type: I Recommended Per week: 2 Pe Course method	ope and the mo Lecture I course-load (er study period d: present	ethod: hours): l: 28				
Recommended semester/trimester of the course: 1., 3. Course level: II. Prerequisities: Conditions for course completion: Discussion accompanied with the preparation and presentation of a short project Learning outcomes: Student will obtain basic information about structural, mechanical and optical properties of liquid crystals as well as about their applications in technical praxis. Brief outline of the course: Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals with electric and magnetic fiel – Freedericksz transitions. Applications. Composite systems based on liquid crystals. Recommended literature: 1. P.G.de Genenes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. N. Tomašovičová, P. Kopčanský, N. Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course assessent Total number of assessed students: 2 A B C D E FX Gourse assessed students: 2 A B C D E FX	Number of cred	lits: 2					
Course level: II. Prerequisities: Conditions for course completion: Discussion accompanied with the preparation and presentation of a short project Learning outcomes: Student will obtain basic information about structural, mechanical and optical properties of liquid crystals as well as about their applications in technical praxis. Brief outline of the course: Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals with electric and magnetic fiel – Freedericksz transitions. Applications. Composite systems based on liquid crystals. I. P.G.de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. NTomašovičová, P.Kopčanský, N.Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course language: english Course assessed students: 2 A A B Course language: Endline of assessed students: 2 A B Course language:	Recommended	semester/trim	ester of the cours	e: 1., 3.			
Prerequisities: Conditions for course completion: Discussion accompanied with the preparation and presentation of a short project Learning outcomes: Student will obtain basic information about structural, mechanical and optical properties of liquid crystals as well as about their applications in technical praxis. Brief outline of the course: Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals with electric and magnetic fiel – Freedericksz transitions. Applications. Composite systems based on liquid crystals. Recommended literature: 1. P.G.de Genmes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. N. Tomašovičová, P. Kopčanský, N. Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course language: Provides: assessed students: 2 A B C D E FX 50.0 0.0 0.0 0.0 0.0 0.0 0.0 Provides: doc. RNDr. Alžbeta Urendáčová, DrSc., RNDr. Natália Tomašovičová, CSc. Date of last motification: 26.09.2017	Course level: II						
Conditions for course completion: Discussion accompanied with the preparation and presentation of a short projectLearning outcomes: Student will obtain basic information about structural, mechanical and optical properties of liquid crystals as well as about their applications in technical praxis.Brief outline of the course: Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals with electric and magnetic fiel – Freedericksz transitions. Applications. Composite systems based on liquid crystals.Recommended literature: 1. P.G.de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. N.Tomašovičová, P.Kopčanský, N.Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012.Course language: englishCourse assessed students: 2ABCABCABCABCABCABCABCABCABCourse:S0.00.00.00.050.00.00.0Statication: 26.09.2017	Prerequisities:						
Learning outcomes: Student will obtain basic information about structural, mechanical and optical properties of liquid crystals as well as about their applications in technical praxis. Brief outline of the course: Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals with electric and magnetic fiel – Freedericksz transitions. Applications. Composite systems based on liquid crystals. Recommended literature: 1. P.G.de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. N. Tomašovičová, P.Kopčanský, N.Eber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course language: english Course assessment Total number of assessed students: 2 A B C D E FX 50.0 0.0 0.0 0.0 0.0 0.0 Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Natália Tomašovičová, CSc. Date of last modification: 26.09.2017	Conditions for Discussion acco	course complet ompanied with t	t ion: he preparation and	d presentation of	f a short project		
Brief outline of the course: Basic properties of liquid crystals. Classification of liquid crystals. Liquid crystalline phases an chemical structure. Optical anisotropy. Interaction of liquid crystals with electric and magnetic fiel – Freedericksz transitions. Applications. Composite systems based on liquid crystals. Recommended literature: 1. P.G.de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 1974 2. N.Tomašovičová, P.Kopčanský, N.Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012. Course language: english Course assessment Total number of assessed students: 2 A B C D E FX 50.0 0.0 0.0 0.0 0.0 0.0 Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Natália Tomašovičová, CSc. Date of last modification: 26.09.2017	Learning outco Student will obt crystals as well	mes: ain basic inforr as about their a	nation about struc pplications in tech	tural, mechanica nnical praxis.	al and optical prop	perties of liquid	
Recommended literature:1. P.G.de Gennes, The Physics of Liquid Crystals, Clarendon Press, Oxford 19742. N.Tomašovičová, P.Kopčanský, N.Éber: Magnetically Active Anisotropic Fluids Based on Liquid Crystals, Anisotropy Research: New Developments, ed. Hirpa Lemu, Nova Science Pub Incorporated, 2012.Course language: englishCourse assessment Total number of assessed students: 2ABCDEFX50.00.00.00.00.00.0Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Natália Tomašovičová, CSc.Date of last modification: 26.09.2017	Brief outline of Basic properties chemical structu – Freedericksz t	the course: s of liquid cryst re. Optical anis ransitions. App	als. Classification otropy. Interactior lications. Compos	of liquid crystan of liquid crystan site systems base	als. Liquid crystal ls with electric and ed on liquid crysta	line phases and l magnetic field ls.	
enginsn Course assessment Total number of assessed students: 2 A B C D E FX 50.0 0.0 0.0 0.0 0.0 0.0 Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Natália Tomašovičová, CSc. Date of last modification: 26.09.2017	Recommended 1. P.G.de Genne 2. N.Tomašovič Liquid Crystals, Incorporated, 20 Course languag	literature: es, The Physics ová, P.Kopčans , Anisotropy Re)12. g e:	of Liquid Crystals ký, N.Éber: Magn search: New Deve	s, Clarendon Pre netically Active . elopments, ed. H	ess, Oxford 1974 Anisotropic Fluids Hirpa Lemu, Nova	s Based on Science Pub	
Course assessmentTotal number of assessed students: 2ABCDEFX50.00.00.00.00.00.0Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Natália Tomašovičová, CSc.Date of last modification: 26.09-2017	english						
ABCDEFX50.00.00.00.00.00.0Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Natália Tomašovičová, CSc.Date of last modification: 26.09.2017	Total number of	ent assessed stude	nts: 2				
50.00.00.00.050.00.0Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Natália Tomašovičová, CSc.Date of last modification: 26.09.2017	А	В	C	D	E	FX	
Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Natália Tomašovičová, CSc. Date of last modification: 26.09.2017	50.0 0.0 0.0 0.0 50.0 0.0						
Date of last modification: 26.09.2017	Provides: doc. H	RNDr. Alžbeta	Drendáčová, DrSc	., RNDr. Natália	a Tomašovičová, C	CSc.	
	Date of last mo	dification: 26.0	9.2017				
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.	Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.			

University: P_I_Š:	nfárik Univers	sity in Košice			
Faculty: Faculty of	t Science				
Course ID: KFaDI KDF/05	E/ Course na Centuries	ame: Chapters fro (General Introduc	om History of Pl ction)	nilosophy of 19th	and 20th
Course type, scop Course type: Prace Recommended co Per week: 2 Per s Course method:	e and the me otice ourse-load (h otudy period: present	thod: ours): 28			
Number of credits	:2				
Recommended ser	nester/trime	ster of the cours	e: 2.		
Course level: II.					
Prerequisities:					
Conditions for cou	ırse completi	ion:			
Learning outcome	S:				
Brief outline of th	e course:				
Recommended lite	erature:				
Course language:					
Course assessmen Total number of as	t sessed studen	its: 10			
A	В	C	D	Е	FX
50.0 20.0 10.0 0.0 10.0 10.0					
Provides: doc. PhI	Dr. Pavol Tho	lt, PhD., mim. pro	of.		
Date of last modif	ication: 31.08	3.2017			
Approved: Guaran	teeprof. Ing.	Martin Orendáč,	CSc.		

University: P. J. Šafá	rik Univers	ity in Košice		
Faculty: Faculty of S	cience			
Course ID: KPPaPZ/KK/07	Course na	me: Communication and Coopera	tion	
Course type, scope a Course type: Practic Recommended cour Per week: 2 Per stu Course method: pre	nd the met ce rse-load (h dy period: csent	thod: ours): 28		
Number of credits: 2				
Recommended seme	ster/trimes	ster of the course: 3.		
Course level: II.				
Prerequisities:				
Conditions for cours	e completi	on:		
Learning outcomes:				
Brief outline of the c	ourse:			
Recommended litera	ture:			
Course language:				
Course assessment Total number of asses	ssed studen	ts: 281		
abs		n	Z	
98.22 1.78 0.0				
Provides: Mgr. Ondre	ej Kalina, P	hD., Mgr. Lucia Hricová, PhD.		
Date of last modifica	tion: 21.08	3.2017		
Approved: Guarantee	eprof. Ing. 1	Martin Orendáč, CSc.		

University: P. J. Šafá	rik University in Košice							
Faculty: Faculty of S	Faculty: Faculty of Science							
Course ID: ÚTVŠ/ KP/12	Course name: Survival Co	ourse						
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: Per study period: 36s Course method: present								
Number of credits: 2								
Recommended seme	ster/trimester of the cours	e:						
Course level: I., II.								
Prerequisities:								
Conditions for cours Conditions for course Attendance Final assessment: cor	Conditions for course completion: Conditions for course completion: Attendance Final assessment: continuous fulfilment of all tasks within the course							
Students will be fami conditions as they wi and demanding situat course develops team require overcoming of	liarized with principles of s ll obtain theoretical knowle tions connected with surviva work and students will lear of obstacles.	afe stay and movement in extreme natural dge and practical skills to solve the extraordinary al and minimization of damage to health. The rn how to manage and face the situations that						
Brief outline of the course: Brief outline of the course: Lectures: 1. Principles of behaviour and safety for movement and stay in unknown mountains 2. Preparation and leadership of tour 3. Objective and subjective danger in mountains 4. Principles of hygiene and prevention of damage to health in extreme conditions Exercises: 1. Movement in terrain, orientation and navigation in terrain (compasses, GPS) 2. Preparation of improvised overnight stay 3. Water treatment and food preparation. Recommended literature: Course language:								
Course assessment Total number of assessed students: 365								
	abs	n						
	44.38 55.62							

Provides: MUDr. Peter Dombrovský, Mgr. Marek Valanský

Date of last modification: 18.08.2017

Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.

Faculty: Faculty of Science Course ID: ÚFV/ KTM/14 Course name: Quantum Theory of Magnetism Course type, scope and the method: Course type. Lecture Recommended course-load (hours): Per week: 3 Per study period: 42 Course method: present Number of credits: 5 Recommended semester/trimester of the course: 3. Course level: IL, III. Prerequisities: Conditions for course completion: Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 45 (Springer, Berlin Heidelberg, 2010). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 45 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course assessment Total number of assessed students: 15 A B C D E FX N P 6.67	University: P. J.	Šafárik	University in	n Košice					
Course ID: ÚFV/ KTM/14 Course type; scope and the method: Course type; scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 3 Per study period: 42 Course method: present Number of credits: 5 Recommended semester/trimester of the course: 3. Course level: II., III. Prerequisities: Conditions for course completion: Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum TY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course assessment Total number of assessed students: 15 <th colspan="2</td> <td>Faculty: Faculty</td> <td>of Scie</td> <td>ence</td> <td></td> <td></td> <td></td> <td></td> <th></th>	Faculty: Faculty	of Scie	ence						
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 3 Per study period: 42 Course method: present Number of credits: 5 Recommended semester/trimester of the course: 3. Course level: IL, III. Prerequisities: Conditions for course completion: Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum CY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 816 (Springer, Berlin Heidelberg, 2010). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course anguage: EN - english Course anguage: EN - english Course anguage: EN -	Course ID: ÚFV KTM/14	// C	ourse name:	Quantum T	heory of Ma	gnetism			
Number of credits: 5 Recommended semester/trimester of the course: 3. Course level: II., III. Prerequisities: Conditions for course completion: Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum XY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 616 (Springer, Berlin Heidelberg, 2010). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course assessment Total number of assessed students: 15 A B C D E FX N P 6.667 33.33 26.67 6.67 13.33 0.0	Course type, sco Course type: L Recommended Per week: 3 Pe Course method	Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 3 Per study period: 42 Course method: present							
Recommended semester/trimester of the course: 3. Course level: II., III. Prerequisities: Conditions for course completion: Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum XY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 816 (Springer, Berlin Heidelberg, 2010). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course assessement Total number of assessed students: 15 A B C D E FX N P 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 <td cols<="" td=""><td>Number of cred</td><td>lits: 5</td><td></td><td></td><td></td><td></td><td></td><th></th></td>	<td>Number of cred</td> <td>lits: 5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <th></th>	Number of cred	l its: 5						
Course level: II., III. Prerequisities: Conditions for course completion: Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum XY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 816 (Springer, Berlin Heidelberg, 2010). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course assessment Total number of assessed students: 15 A B C D E FX N P 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD. Date of last	Recommended	semeste	er/trimester	of the cours	e: 3.				
Prerequisities: Conditions for course completion: Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum XY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 816 (Springer, Berlin Heidelberg, 2010). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course assessment Total number of assessed students: 15 A B C D E FX N P 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD. Date of last modification: 26.09.2017	Course level: II.	, III.							
Conditions for course completion: Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum XY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 816 (Springer, Berlin Heidelberg, 2010). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course language: EN - english Course assessment Total number of assessed students: 15 A B C D E FX N P 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD. Date of last modification: 26.09.20	Prerequisities:								
Learning outcomes: Brief outline of the course: The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum XY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation. Recommended literature: 1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 816 (Springer, Berlin Heidelberg, 2010). 2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004). 3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course language: EN - english Course assessment Total number of assessed students: 15 A B C D E FX N P 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD. Date of last modification: 26.09.2017	Conditions for o	course o	completion:						
Brief outline of the course:The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum XY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein- Primakoff transformation.Recommended literature:1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 816 (Springer, Berlin Heidelberg, 2010).2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004).3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000).Course language: EN - englishCourse assessment Total number of assessed students: 15ABCDEFXNP6.6733.3326.676.6713.330.0Quertice: RNDr. Jozef Strečka, PhD.Date of last modification: 26.09.2017	Learning outco	mes:							
3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000). Course language: EN - english Course assessment Total number of assessed students: 15 A B C D E FX N P 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD. Date of last modification: 26.09.2017	one-dimensiona method. Valence models. The one fermionization Primakoff transf Recommended 1. J. B. Parkinsce Physics 816 (Sp 2. U. Schollwood Physics 645 (Sp	l quant e-bond- e-dimen and qua formatic literatu on, D. J. ringer, I k, J. Ric ringer, J	um Heisenber crystal ground isional quantu intum critical on. re: J. Farnell, An Berlin Heidel chter, D. J. J. Berlin Heidel	nd states of m XY mod points. Th n Introduction berg, 2010). Farnell, R. H berg, 2004).	spin waves f the Majum lel in a transve spin-wave	and the gr ndar-Ghosh verse magne theory, bosh m Spin Syste	ems, Lecture	Pethe-ansatz Sutherland dan-Wigner d Holstein-	
Course language: EN - englishCourse assessment Total number of assessed students: 15ABCDEFXNP 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD.Date of last modification: $26.09.2017$	3. N. Majlis, Th	e Quant	um Theory o	f Magnetism	n (World Scie	entific, Singa	pore, 2000).		
Course assessment Total number of assessed students: 15ABCDEFXNP 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD.Date of last modification: $26.09.2017$	Course language: EN - english								
A B C D E FX N P 6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD. Date of last modification: 26.09.2017 E FX N P	Course assessment Total number of assessed students: 15								
6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33 Provides: doc. RNDr. Jozef Strečka, PhD. Date of last modification: 26.09.2017	A	A B C D E FX N P							
Provides: doc. RNDr. Jozef Strečka, PhD. Date of last modification: 26.09.2017	6.67 33.33 26.67 6.67 13.33 0.0 0.0 13.33								
Date of last modification: 26.09.2017	Provides: doc. RNDr. Jozef Strečka, PhD.								
	Date of last mo	lificatio	on: 26.09.201	7					
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.	Approved: Guar	ranteepr	of. Ing. Mart	in Orendáč,	CSc.				

University: P. J.	. Šafárik Univers	sity in Košice			
Faculty: Faculty	y of Science				
Course ID: ÚF LEK1/02	V/ Course na	ame: Physical Pr	inciples of Medi	cal Diagnostics a	nd Therapy
Course type, sc Course type: I Recommended Per week: 2 Pe Course metho	ope and the me Lecture d course-load (h er study period: d: present	thod: ours): 28			
Number of crea	lits: 2				
Recommended	semester/trimes	ster of the cours	e: 1., 3.		
Course level: II	•				
Prerequisities:					
Conditions for	course completi	ion:			
Learning outco	mes:				
Brief outline of	the course:				
Recommended	literature:				
Course languag	ge:				
Course assessm Total number of	ent f assessed studen	its: 35			
А	В	С	D	Е	FX
85.71 11.43 2.86 0.0 0.0 0.0					
Provides: doc. 1	RNDr. Karol Fla	chbart, DrSc.			
Date of last mo	dification: 26.09	9.2017			
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.		

University: P. J. Šafá	rik University in Košice						
Faculty: Faculty of S	science						
Course ID: ÚTVŠ/ LKSp/13	Course name: Summer Co	Course name: Summer Course-Rafting of TISA River					
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: Per study period: 36s Course method: present							
Number of credits: 2	2						
Recommended seme	ester/trimester of the cours	e:					
Course level: I., II.							
Prerequisities:							
Conditions for cours Conditions for course Attendance Final assessment: Ra	Conditions for course completion: Conditions for course completion: Attendance Final assessment: Raft control on the waterway (attended/not attended)						
Learning outcomes: Learning outcomes: Students have knowl	edge of rafts (canoe) and the	eir control on waterway.					
Students have knowledge of rafts (canoe) and their control on waterway. Brief outline of the course: 1. Assessment of difficulty of waterways 2. Safety rules for rafting 3. Setting up a crew 4. Practical skills training using an empty canoe 5. Canoe lifting and carrying 6. Putting the canoe in the water without a shore contact 7. Getting in the canoe 8. Exiting the canoe 9. Taking the canoe out of the water 10. Steering a) The pry stroke (on fast waterways) b) The draw stroke 11. Capsizing 12. Commands							
Recommended literature:							
Course language:							
Course assessment Total number of assessed students: 142							
	abs	n					
	41.55 58.45						

Provides: Mgr. Peter Bakalár, PhD.

Date of last modification: 18.08.2017

Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.

University: P. J.	Šafárik Univers	ity in Košice			
Faculty: Faculty	Faculty: Faculty of Science				
Course ID: ÚFV MAG/08/08	Course name: Magnetochemistry				
Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 2 / 1 Per study period: 28 / 14 Course method: present					
Number of credi	ts: 5				
Recommended s	emester/trimes	ster of the cours	e: 1.		
Course level: II.					
Prerequisities:					
Conditions for c Exam	ourse completi	on:			
Introduction to the the correlations be standard methods magnetization) as about the structure	ne basic interact between the stru s used in the and nd EPR, since t re of material es	ions in the electr cture and magne alysis of thermod he study of magn specially at low to	on subsystem of tic properties. S lynamic data (sp letic properties y emperatures.	f insulators, demo tudents will learn pecific heat, susce yield an important	nstration of the basic ptibility, t information
Brief outline of t Electronic states diamagnetic atom paramagnetic res Hamiltonian. Ter and dipole intera order. Low-dime Heisenberg, Ising	he course: in hydrogen at ns. Atom in mag sonance (EPR). rmodynamics a action.Heisenbe nsional magnet g and XY mode	tom, electronic c netic field: specif Atom in the cry nd EPR of para erg Hamiltonian. s. Spatial anisotro l.	configuration, te fic heat, suscepti stal field. Freez magnetic atom Magnetic dime opy of exchange	erm, multiplet. Pa ibility, magnetizat zing of angular m s in the crystal f er. Long-range an e coupling. Excha	ramagnetic and ion and electron iomentum. Spin field. Exchange ind short- range inge anisotropy.
Recommended li 1.R.L. Carlin, A. inc. Springer Ver 2. A.B.P.Lever, I	iterature: J. Duyneveldt: lag, 1977. norganic electro	Magnetic propert	ties of transition	metal compound terdam, 1987.	s. New York,
Course language english	:				
Course assessme Total number of	ent assessed studen	ts: 19			
A	В	С	D	E	FX
47.37	21.05	21.05	5.26	5.26	0.0
Provides: doc. R	NDr. Alžbeta O	rendáčová, DrSc	., RNDr. Róbert	t Tarasenko, PhD.	
Date of last mod	ification: 26.09	0.2017			

Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.

University:	University: P. I. Šafárik University in Košice						
Faculty: Fa	culty of Sc	ience					
Course ID: MKL/03	ÚFV/ Course name: Magnetic Properties of Solids						
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 4 Per study period: 56 Course method: present							
Number of	credits: 6						
Recommen	ded semes	ter/trimester	of the cours	e: 2.			
Course leve	el: II., III.						
Prerequisit	ies:						
Conditions Test. Oral examin	Conditions for course completion: Test. Oral examination.						
Learning of To obtain a magnetic m	Learning outcomes: To obtain a general view on basic magnetic phenomena, intrinsic magnetic properties of various magnetic materials, magnetization processes and domain structure.						
Brief outlin Magnetic m model of t Paramagnet structure of Domain str Susceptibili	e of the co naterials an he atom. M tism. Ferro materials. ucture. Ma ity. Thin fil	urse: d magnetization Magnetic field magnetism. A Neutron diffing netostriction. ms.	on. Magnetic I sources. M Antiferromag raction. Mag Technical m	quantities. Cleasurements netism. Ferr netic anisotr nagnetization	Carriers of m. s of magneti imagnetism. opy. Hall eff . Dynamic m	agnetic mon c field. Dia Mgnetic be fect, magnet nagnetization	nent. Vector magnetism. havior and oresistance. n processes.
Recommended literature: S. Chikazumi: Physics of Magnetism, Oxford University Press 2009 D. Jiles: Introduction to magnetism and magnetic materials, Chapman&Hall, London, New York, Tokyo, Melbourne, Madras, 1991							
Course language: english							
Course assessment Total number of assessed students: 96							
А	В	C	D	Е	FX	Ν	Р
39.58	17.71	10.42	3.13	2.08	0.0	0.0	27.08
Provides: p	rof. RNDr.	Peter Kollár, I	DrSc.				
Date of last modification: 26.09.2017							
Approved:	Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.						

University: P. J. Šafá	University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science						
Course ID: ÚFV/ MNK/17	ourse ID: ÚFV/ Course name: Mechanika kontinua NK/17					
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 0 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 0 esent					
Number of credits: 3						
Recommended seme	ster/trimester of the course: 2.					
Course level: II., III.						
Prerequisities:						
Conditions for cours	e completion:					
Learning outcomes: This course follows the in order to focus on most this course is to pro- properties of material Brief outline of the c Approximation of con- fills the space it occor completely ignoring that of interatomic dist the conservation of mapplied to such model within the frame of a to the mathematical solids and classical the homogeneous media of waves in unlimited wave propagation for of free and forced osc of mechanics of liqui	he basics of continuum mechanics presented within Theoretical mechanics nore advanced problems of continuum mechanics. The main objective ovide an introduction to the continuum mechanics, where mechanical is are modeled as continuous mass rather than as discrete particles. ourse: ntinuum nature of matter assumes that the substance of the object completely cupies. Such consideration ignores the fact that matter is made of atoms, its microphysical structure. However, on lengths scales much greater than stances, such models are highly accurate. Fundamental physical laws such as hass, the conservation of momentum, and the conservation of energy may be ls to derive differential equations describing the behavior of solids and liquids continuous mechanics. At the beginning of the course, a brief introduction apparatus of the continuum mechanics is provided. Next, deformation of neory of elasticity are studied. Hook law and dynamical equation of isotropic will be evaluated. Within the frame of continuum mechanics, a propagation i media will be studied (transverse and longitudinal modes) and equations of geometrically confined solids (wave reflection, Rayleigh waves). Equations illations of strings, membranes rods will be evaluated. Finally, basic equations ds will be evaluated.					
Recommended litera 1. M. Brdlička, L. Sa 978-80-200-2039-0. 2. M. Okrouhlík, C. H	t ure: mek, B. Sopko, Mechanika kontinua, Praha : Academia, 2011. 878 s. ISBN Höschl, J. Plešek, S. Pták, J. Nadrchal, Mechanika poddajných					

těles, numerická matematika a superpočítače, Ústav termomechaniky AV ČR, 1997.

3. G.A.Holzapfel: Nonlinear Solid Mechanics, Wiley, 2000.

Course language:

Course assessment

Total number of assessed students: 0

abs	n		
0.0	0.0		
Provides: RNDr. Kornel Richter, PhD.			
Date of last modification: 01.03.2018			
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.			

University: P. J.	. Šafárik Univer	sity in Košice			
Faculty: Faculty	y of Science				
Course ID: ÚF MOP/14	V/ Course name: Magnetooptics				
Course type, sc Course type: I Recommended Per week: 2 Pe Course metho	ope and the me Lecture I course-load (I er study period d: present	ethod: hours): : 28			
Number of crea	lits: 3				
Recommended	semester/trime	ester of the cours	e: 3.		
Course level: II					
Prerequisities:					
Conditions for exam	course complet	ion:			
Learning outco The goal is to te overview of ma	mes: each students the gnetooptical ma	e basics on magne	tooptical param	neters, measureme	ents and
Brief outline of Introduction, p magnetooptical applied magneto	the course: polarized light activity, magne poptics	magneto-optica	l phenomena, als, dielectrics,	microscopic m ferrites, metals a	nechanisms the and their alloys,
Recommended Zvezdin AK, K Francis ,1997 Sugano S., Koji	literature: otov VA, Moder ma N., Magnete	rn magnetooptics	and magnetoop 1999	tical materials, Ta	ylor &
Course languages slovak or englis	ge: h				
Course assessment Total number of assessed students: 2					
Α	В	С	D	Е	FX
100.0	0.0	0.0	0.0	0.0	0.0
Provides: RND	r. Kornel Richte	r, PhD.			
Date of last mo	dification: 26.0	9.2017			
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.		

University:	University: P. J. Šafárik University in Košice						
Faculty: Fa	Faculty: Faculty of Science						
Course ID: MPN/14	ÚFV/ C	JFV/ Course name: Methods of preparation and characterization of nanostructures					
Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 2 / 1 Per study period: 28 / 14 Course method: present							
Number of	credits: 3						
Recommen	ded semeste	er/trimester	of the cours	e: 2.			
Course leve	el: II.						
Prerequisit	ies:						
Conditions powerpoint	for course of review of se	completion: elected topic					
Learning o The goal of and nanode	Learning outcomes: The goal of this course is to make an overview of methods used for fabrication of nanostructures and nanodevices.						
microanaly forces actin methods wi methods. A Part of this	tical devices g upon nanc ill be also giv lso applicati course is als	and nanoobj objects, there ven. I will tal on of nanostr o laboratory	ects using to nodynamics k about conv uctures in fu practice.	p-down met on nanoscal ventional and indamental a	hods. I will n le. Overview l unconvention nd applied so	nake an over of thin film onal nanopat cience will b	rview of preparation tterning e described.
Recomment 1. B. Bhush 2007. 2. J. A. Rog 1990. 3. G. Horny 4. G. A. Oz Nanomater	ded literatu nan Ed., Han gers, H. H. L yak, J. Dutta, tin, A. C. Ars ials, RSC Pu	re: dbook of nan ee, Unconver , H. F. Tibbal senault, L. Ca blishing, 200	otechnology ntional nano s, A. K. Rao ademartiri, N 5.	r, Springer A patterning te , Introductio Ianochemistr	cademic Pub chniques and n to nanocier ry A Chemica	lishers, 2nd l application nce CRC Pre al Approach	edition, s, Wiley, ess, 2008. to
Course lan Slovak, En	guage: glish						
Course asso Total numb	essment er of assesse	d students [.] 3	4				
A	B	C C	D	Е	FX	N	Р
55.88	11.76	2.94	0.0	0.0	0.0	0.0	29.41
Provides: N	l Igr. Vladimí	r Komanický	, Ph.D.				I.
Date of last	modificatio	on: 26.09.201	.7				
L							

Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.

University: F. J. Salarik University in Rusice	University:	P. J.	Šafárik	University	in	Košice
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Faculty: Faculty of Science

Course ID: ÚFV/	Course name: Methods of Structural Analysis
MSA1/03	

Course type, scope and the method:

Course type: Lecture / Practice

Recommended course-load (hours): Per week: 3 / 2 **Per study period:** 42 / 28

Course method: present

Number of credits: 7

Recommended semester/trimester of the course: 2.

Course level: I., II., III.

Prerequisities:

Conditions for course completion:

Final written exams form both topics:EM and X-ray diffractometry - 25%

Experimental projects from both topics: ligt and electron microscopy and X-ray diffractometry - 75%

Learning outcomes:

The course is oriented on modern methods of structural analysis of metals. Main topics are: optic microscopy, electron microscopy (TEM, SEM), electron microprobe analysis and X-ray diffractometry.

Brief outline of the course:

Optic microscopy. Electron microscopy: Electron beam instruments, Electron optics, Electron lences and deflection systems, Transmission electron microscopy - principle and construction. Electron – specimen interactions. Electron diffraction. Kikuchy lines. Scanning electron microscopy – principle and cnstrucion. Scanning transmission electron microscopy. High Voltage electron microscopy. Electron microscopy. Electron microscopy. Convergent beam diffraction.

X-ray diffractometry: Scattering of x-rays, Neutrons and neutron scattering, CW - diffractometer, Ewald's sphere, Diffraction on powder samples, The main characteristics of powder diffraction pattern, Structure factor, Ocupation factor, Atomic displacement factor, Peak intensity, shape and symmetry, Sherrer equation. Peak profile, Rietweld method. Qualitative phase analysis, parameters of elementary cell, Profile analysis of diffraction peak and interpretation of profile analysis.

Recommended literature:

1.S. Amelincks, D.van Dyck, J. van Landyut, Electron Microscopy – Principles and Fundamentals of Electon Microscopy, VCH, 1997.

2.M.H. Loretto, Electrom beam analysis of materials. Springer, 2002.

3. Fundamentals of Powder Diffraction and Structural Characterization of Materials, Vitalij K.

Pecharsky & Peter Y. Zavalij, Kluwer Academic Publishers, 2003.

4.Structure Determination from Powder Diffraction Data, Edited by W.I.F. David, K. Shankland, L.B. McCusker, C. Bärlocher, Oxford University Press, 2006

Course language:

English
Course assessment Total number of assessed students: 65									
A B C D E FX N P									
36.92	26.15	10.77	1.54	0.0	0.0	0.0	24.62		
Provides: prof. RNDr. Pavol Sovák, CSc., Ing. Karel Saksl, DrSc., Ing. Vladimír Girman, PhD.									
Date of last modification: 26.09.2017									
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.									

University: P. J. Šafárik	University in Košice								
Faculty: Faculty of Scien	Faculty: Faculty of Science								
Course ID: ÚFV/ Co MSSFKL/15	ourse name: Condensed Matter Physics								
Course type, scope and Course type: Recommended course- Per week: Per study p Course method: presen	the method: load (hours): eriod: at								
Number of credits: 4									
Recommended semester	r/trimester of the course:								
Course level: II.									
Prerequisities: ÚFV/MK	CL/03 and ÚFV/FNT1/03 and ÚFV/TKL1/99								
Conditions for course co Obtaining required numb	ompletion: oer of the credits given by the study plane.								
Learning outcomes: Evaluation of the compe	tences of the students according to the profile.								
The state exam consists of is obliged to pass the exa I. Block – compulsory Theory of condensed ma 1. Basic approximations The Hartreeho-Fock met 2. The definition of ideal 3. Electrons in a periodic 4. The finite crystal and 5. The approximation of 6. The tight binding meth of nearly-fee electrons. 7. The harmonic approxi- per unit cell. 8. Vibrations of the linea 9. Quantum theory of ha 10. The second quantizat 11. The electron-phonon II. Optional block Magnetic properties of so 1. Magnetic moment of a 2. Diamagnetism. 3. Paramagnetism. 5. Antiferromagnetism. 6. Ferrimagnetism.	of defending diploma thesis and exam which has two blocks. The student am from the compulsory block and one of two optional blocks. ter in solid state physics. The Born-Oppenheimer adiabatic approximation. hod. crystal. The direct and reciprocal lattice. The Wigner-Seitz elementary cell. c potential field. The effective mass. Born-Kárnan boundary conditions. Brilluoin zones. nearly-fee electrons. The band structure of energy spectrum. od. Differences of the band structure in comparison with the approximation mation and lattice vibrations . Vibrations of the linear chain with one atom ar chain with two atoms per unit cell. rmonic vibrations. Phonons. tion. interaction.								

- 7. Energy of ferromagnets.
- 8. Domain structure.
- 9. Magnetization processes.
- Experimental methods
- 10. Measurement of intensity a induction of magnetic field.
- 11. Measurement of magnetostriction and anisotropy.
- 12. Physical principle of electron microscopy, construction of electron microscop.
- 13. X ray and electron diffraction and their applications in solid state physics.
- 14. Analytical methods for determination of surface chemical composition (EDX, WDX).

III. Optional block

- Low temperature physics
- 1. Superfluidity of 4He.
- 2. Superfluidity of 3He.
- 3. Properties of liquid solutions 3He 4He.
- 4. Quantum crystals.
- 5. Introduction to superconductivity Josephson effect and its applications.
- 6. BCS a GLAG theories of superconductivity.
- 7. Unconventional superconductivity.
- 8. Transport of charge and heat at low temperatures.
- 9. Methods of reaching very low temperatures.
- 10. Methods of measurements of low temperatures.

Experimental methods

- 11. Specific heat at low temperatures measurement techniques and data acquisition.
- 12. Low level signal measurements.
- 13. Electron paramagnetic resonance.

Recommended literature:

Course language:

english

Course assessment

Total number of assessed students: 13

53.85	30.77	0.0	15.38	0.0	0.0
А	В	С	D	Е	FX

Provides:

Date of last modification: 26.09.2017

~ ×	<u> </u>						
University: P. J. Šafá	rik University in Košice						
Faculty: Faculty of S	cience						
Course ID: ÚFV/ NANO/09Course name: Nanomaterials and Nanotechnologies							
Course type, scope a Course type: Lectur Recommended cou Per week: 2 / 1 Per Course method: pre	and the method: re / Practice rse-load (hours): study period: 28 / 14 esent						
Number of credits: 4	4						
Recommended seme	ester/trimester of the course: 2.						
Course level: II., III.							
Prerequisities:							
Conditions for cours Test or preparation o	se completion: f the ppt presentation on a selected topic in the field of nanomaterials.						
Learning outcomes: To acquaint students about physical and cl view of the wide app	with the basic concepts of nanotechnology and to bring them knowledge hemical properties of nanomaterials. Provide students with a comprehensive lications using nanomaterials.						
Brief outline of the c	course:						
Recommended litera 1. Nanoscience and r 2. C. Burda, X. Chen 3. J. A. Mydosh, Spin	ature: nanotechnologies, The Royal Society, London 2004. n, et al., Chemical Review 105, (2005) 1025-1102. n glasses, Taylor and Francis 1993.						
Course language:							
Notes: During the course wi during the research p APVV-0132-11 (Uno APVV-0073-14 (mag VEGA 1/0861/12 (T	Il be presented also the latest scientific results about nanomaterials obtained roject conventional quantum states in nanoscopic magnetic systems) gnetocaloric effect in quantum and nanoscopic systems) he effect of the interaction of particles in the ferromagnetic iron-based						

magnetic properties of the composite material), VEGA-1/0377/16

workplaced in KFKL, UFV, PF UPJŠ.

During exercise will be used the most modern research infrastructure solutions purchased for scientific projects.

Course assessment

Total number of assessed students: 30

А	В	С	D	Е	FX	N	Р
43.33	0.0	0.0	0.0	0.0	0.0	0.0	56.67
Descrition des DNDs Adrians 7-1-X/1-a-(DLD							

Provides: doc. RNDr. Adriana Zeleňáková, PhD.

Date of last modification: 26.09.2017

University: P. J. Šafá	rik University in Košice							
Faculty: Faculty of Science								
Course ID: ÚFV/ NAS/14	Course name: Nanoscopic systems							
Course type, scope a Course type: Lectu Recommended cou Per week: 2 Per stu Course method: pr	and the method: re rse-load (hours): ady period: 28 esent							
Number of credits:	3							
Recommended seme	ester/trimester of the course: 2.							
Course level: II.								
Prerequisities:								
Conditions for cour Test or preparation o	se completion: f the ppt presentation on a selected topic in the field of nanoscale systems.							
Learning outcomes: Knowledge and under and physical principly structure of nanosyst size of the systems a implications of nano	erstanding of nanotechnology with special emphasis on the physicochemical les in nanotechnology. Students gain knowledge in areas such as electronic rems, magnetic properties, dependence of thermodynamic properties on the s well as an overview of the application potential of nanosystems and ethical technology.							
Brief outline of the o The Origin of Na Dimensionality and Number. Nanoscopi Magnetization Reve behavior of nanosyst	course: nomagnetic Behavior. Sample Dimensions and Characteristic Lengths. Density of Electronic States. Dimensionality and Reduced Coordination c Samples and Proportion of Surface Atoms. Nanoscopic Samples and rsal. Dimensionality and Critical Behavior. Superparamagnetism. Magnetic ems at different temperature. The practical application of nanoscopic systems.							
Recommended liter 1. Emil Roduner, Na ISBN: 0 85404 857.	ature: noscopic Materials: Size-Dependent Phenomena, RSC Publishing 2006,							
Course language: slovak, english								
Notes: During the course we during the research p APVV-0132-11 (Un APVV-0073-14 (ma VEGA 1/0861/12 (T magnetic properties workplaced in KFKI	ill be presented also the latest scientific results about nanomaterials obtained project conventional quantum states in nanoscopic magnetic systems) gnetocaloric effect in quantum and nanoscopic systems) he effect of the interaction of particles in the ferromagnetic iron-based of the composite material), VEGA-1/0377/16 L, UFV, PF UPJŠ.							
Course assessment Total number of asse	essed students: 0							

А	В	С	D	Е	FX		
0.0	0.0	0.0	0.0	0.0	0.0		
Provides: doc. RNDr. Adriana Zeleňáková, PhD.							
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J. Šafárik University in Košice								
Faculty: Faculty of Science								
Course ID: ÚFV/ NERO/14	rse ID: ÚFV/ Course name: Neutron scattering in solids							
Course type, sco Course type: Le Recommended Per week: 2 / 1 1 Course methods	pe and the m octure / Practic course-load (Per study per present	ethod: ce hours): riod: 28 / 14						
Number of credi	ts: 4							
Recommended so	emester/trim	ester of the cours	e: 3.					
Course level: II.								
Prerequisities:								
Conditions for co Final exam	ourse comple	tion:						
Lectures are devo neutron scattering Analysis and inte	oted to the des g and its appli rpretation of e	cription of experin cation in condense experimental data	nental methods l ed matter physics will be shown fo	based on elastic a s and materials re or specific cases.	ind inelastic search.			
Brief outline of the Properties of new incoherent scatted law, reciprocal la angle scattering. spectrometer. Appexcitation spectra	he course: utron, classifi ering. Dynam attice. Elastic Neutron sour plication of in Polarized ne	cation of neutron ic structure facto and inelastic sca ces, three-axes an nelastic neutron so putrons.	scattering. Fer or. Diffraction, attering, critical d two-axes spec cattering for the	mi's golden rule static structure and diffusive s ctrometer, choppe study of phonor	c. Coherent and factor, Bragg's cattering, small er time-of-flight as and magnetic			
Recommended li Smetana, Šíma, M Booklet, OCP Sc Alamos, 1990; ht	terature: Jeutronová di ience, Grenob tp://www.ill.f	frakce, MFF UK, 1 le, 2003; Pynn, A r; http://www.isis.	Praha, 1982;Diar Neutron Scatter rl.ac.uk; http://w	noux, Lander, Ne ing Primer, LAN ww.esrf.fr	utron Data CSE, Los			
Course language english	:							
Course assessment Total number of assessed students: 4								
A	В	C	D	Е	FX			
100.0 0.0 0.0 0.0 0.0								
Provides: RNDr.	Róbert Tarase	enko, PhD.		<u>.</u>	<u>.</u>			
Date of last modi	fication: 26.0	9.2017						
Approved: Guara	nteeprof. Ing.	Martin Orendáč,	CSc.					

University: P. J. Šafárik University in Košice								
Faculty: Faculty of Science								
Course ID: NKM1/99	ÚFV/	Course name:	: Non-Conve	ntionals Met	tallic Materia	ls		
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present								
Number of	credits: 3							
Recommen	ded seme	ster/trimester	of the course	e: 1.				
Course leve	el: II., III.							
Prerequisit	ies:							
Conditions The exam c	for cours consists of	e completion: writing three q	uestions and	an oral answ	vers.			
Learning o The course and relatior	utcomes: gives info ns betweer	ormation about	basics of mat s and mechar	erials scienc nical and phy	e, standard a sical propert	nd advanced ties of metal	d materials, lic alloys.	
Real metal mechanism Fe - based materials fe dedicated to effect and entropy allo	ic structures, Precipit alloys, ad- or corrosi o automot its alloys. bys. Biode	res, Binary dia tation and segr vanced high-stu on environmer ive, aircraft, ar Materials for gradable metal	grams, Latti egation proc renght alloys nt. Ti, Al, C mament and cryogenic a s. Metallic gl	ce imperfec esses, Defor . Metallic bi o, Ni - bas nuclear indu pplications. asses.	tions, hypers nation mech omaterials. C ed progressi ustry. Superp Intermetallic	structures, S anisms, Cry Corrosive pr ve materials lasticity, sha cs. Quasicry	Streghtening vstallization. vocesses and s. Materials ape memory vstals. High	
 Recommended literature: 1.D.R.Askeland and P.P. Phulé, The Science and Engineering of Materials, Thomson 2003. 2.Structure and Properties of Engineering Alloys, McGraw-Hill Editons, 1993. Š. Nižník: Základy Fyziky tuhých látok, Učebné texty, Košice, 2002 M. Fuida: Základné rovnovážne diagramy Učebné texty košice, 2010 								
Course language: Slovak language								
Notes: None.								
Course assessment								
A	B	C C	D	Е	FX	N	Р	
26.09	17.39	0.0	4.35	4.35	0.0	0.0	47.83	
Provides: In	ng. Vladin	nír Girman, Phl	L D.		I		<u> </u>	
Date of last	modifica	tion: 26 09 201	17					

University: P. J. Šaf	árik Univers	sity in Košice			
Faculty: Faculty of	Science				
Course ID: ÚFV/ NOT1a/03	Course na	ame: Nontraditic	nal Optimization	Techniques I	
Course type, scope Course type: Lectu Recommended cou Per week: 2 / 2 Per Course method: pr	and the me are / Practice arse-load (h • study peri resent	thod: e ours): od: 28 / 28			
Number of credits:	5				
Recommended sem	ester/trime	ster of the cours	e: 1.		
Course level: I., II.					
Prerequisities:					
Conditions for cour Monitoring progress examination (50%), examination	se completing in solving a quality of the	ion: applied projects. he project (50%)			
Learning outcomes To familiarize stude and prediction techn heuristic techniques	nts with bio iques. To ex in solving a	logically and phy spand students' cr applied problems	visically inspired of reativity and prog	optimization, sim gramming skills l	ulation by applying
Brief outline of the Fundamentals of op functions. Classific Evolutionary algorit Mechanics Approx annealing. Swarm complex systems. F Fundamentals of Ne squares problems.	course: otimization ation of op hms. Geneti imations of optimization ractals. Age eural Netwo	theory. Basic o otimization techn ic algorithms. Ge Genetic Algor n. Cellular Auto ent-based models orks. Application	ptimization prob iques. Gradient- metic algorithms ithms. Monte C omata and their . Evolutionary ga of singular valu	lems. Basic typ based optimizat as Markov proce arlo simulation applications in ames. Evolution ae decomposition	es of objective ion techniques. esses. Statistical and simulated simulations of of cooperation. n to solve least
Recommended liter Hartmann, A. K., Ri Reeves, C. R., Rowe Mitchell, M., Comp Solé, R. V., Phase Tr Ilachinski, A., Cellu Haykin, S., Neural N	ature: eger, H., Op e, J. E., Gen lexity. A Gu ransitions, P lar Automat Networks. A	otimization Algorithms: etic Algorithms: ided Tour, Oxfor Princeton Univers ta. A Discrete un Comprehensive	rithms in Physics Principles and pe of University Pres ity Press, 2011 iverse, World Sci Foundation, Prer	, Wiley, 2002 erspectives, Kluw ss, 2009 entific, 2002 ntice-Hall, 1999	ver, 2003
Course language:					
Course assessment					
	essed studen	$\frac{1}{C}$	Π	Е	БУ
A	D			Ē	I I'A

66.2

19.72

7.04

2.82

4.23

0.0

Provides: doc. RNDr. Jozef Uličný, CSc.

Date of last modification: 26.09.2017

University: P. J	. Šafárik Univer	rsity in Košice					
Faculty: Faculty of Science							
Course ID: ÚF OSA1/99	V/ Course r	Course name: Seminar in Solid State Physics					
Course type, sc Course type: 1 Recommended Per week: 1 P Course metho	ope and the m Practice d course-load (er study period d: present	ethod: hours): l: 14					
Number of cree	dits: 1						
Recommended	semester/trim	ester of the cours	e: 1.				
Course level: II	- -						
Prerequisities:							
Conditions for Active participa	course comple ation at the sem	tion: inars.					
Learning outco Students will ol and from their o	omes: otain informatio cooperating fore	ns about scientificeign institutions.	e results of vario	us research group	os from Košice		
Brief outline of Contents is dete	the course: ermined by the l	ectures and varies	every year.				
Recommended Scientific journ	literature: als.						
Course languag slovak, english	ge:						
Course assessment Total number of assessed students: 37							
А	В	C	D	E	FX		
100.0	100.0 0.0 0.0 0.0 0.0						
Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., Dr.h.c. prof. RNDr. Alexander Feher, DrSc.							
Date of last mo	dification: 26.0	9.2017					
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.				

University: P. J	University: P. J. Šafárik University in Košice						
Faculty: Facult	y of Science						
Course ID: ÚF OSB1/99	V/ Course na	Course name: Seminar in Solid State Physics					
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 1 Per study period: 14 Course method: present							
Number of crea	lits: 1						
Recommended	semester/trime	ster of the cours	e: 2.				
Course level: II	•						
Prerequisities:							
Conditions for Active participa	course complet	ion:					
Learning outco Students will ob and from their o	mes: otain informatior cooperating forei	ns about scientific gn institutions.	e results of variou	is research group	os from Košice		
Brief outline of Contents is dete	the course: ermined by the le	ectures and varies	every year.				
Recommended Scientific journ	literature: als.						
Course languag slovak, english	ge:						
Course assessment Total number of assessed students: 38							
А	В	С	D	Е	FX		
100.0	100.0 0.0 0.0 0.0 0.0						
Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., Dr.h.c. prof. RNDr. Alexander Feher, DrSc.							
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J	. Šafárik Univer	sity in Košice					
Faculty: Facult	y of Science						
Course ID: ÚF OSC1/99	V/ Course n	ame: Seminar in	Solid State Phys	sics			
Course type, sc Course type: 1 Recommended Per week: 1 Pe Course metho	ope and the mo Practice d course-load (l er study period d: present	ethod: hours): : 14					
Number of cree	lits: 1						
Recommended	semester/trime	ester of the cours	se: 3.				
Course level: II	•						
Prerequisities:							
Conditions for Active participa	course complete ation in seminar	ion: 5.					
Learning outco To obtain inform their cooperation	mes: mations about so g foreign institu	cientific results of tions.	various researc	h group from Koš	ice and from		
Brief outline of Content is deter	the course: Trained by the le	ctures and varies	every year.				
Recommended Scientific journ	literature: als.						
Course languag slovak, english	ge:						
Course assessm Total number of	Course assessment Total number of assessed students: 36						
А	В	C	D	Е	FX		
100.0	0.0	0.0	0.0	0.0	0.0		
Provides: Dr.h.	c. prof. RNDr. A	lexander Feher, I	DrSc., prof. Ing.	Martin Orendáč,	CSc.		
Date of last mo	dification: 26.0	9.2017					
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.				

University: P. J	. Šafárik Univer	sity in Košice					
Faculty: Facult	y of Science						
Course ID: ÚF OSD1/99	V/ Course n	ame: Seminar in	Solid State Phys	sics			
Course type, sc Course type: 1 Recommended Per week: 1 Pe Course metho	cope and the me Practice d course-load (l er study period d: present	ethod: nours): : 14					
Number of cree	dits: 1						
Recommended	semester/trime	ester of the cours	e: 4.				
Course level: II	•						
Prerequisities:							
Conditions for Active participa	course complet ation in seminar	ion: 5.					
Learning outco To obtain inform their cooperation	mes: mations about so g foreign institu	cientific results of tions.	various researc	h group from Koš	iceand from		
Brief outline of Content is deter	the course: Trained by the le	ctures and varies	every year.				
Recommended Scientific journ	literature: als.						
Course languag slovak, english	ge:						
Course assessm Total number of	Course assessment Total number of assessed students: 37						
А	В	C	D	Е	FX		
100.0	0.0	0.0	0.0	0.0	0.0		
Provides: Dr.h.	c. prof. RNDr. A	lexander Feher, I	DrSc., prof. Ing.	Martin Orendáč,	CSc.		
Date of last mo	dification: 26.0	9.2017					
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.				

University: P. J.	. Šafárik Univers	sity in Košice				
Faculty: Faculty of Science						
Course ID: ÚF PCHZ/14	V/ Course na	ame: Preparation	and characteriza	ation of metalic a	lloys	
Course type, sc Course type: H Recommended Per week: 3 Pe Course metho	ope and the me Practice d course-load (h er study period: d: present	thod: ours): 42				
Number of crea	lits: 3					
Recommended	semester/trimes	ster of the cours	e: 3.			
Course level: II	•					
Prerequisities:						
Conditions for Active participa	course completing tion and preparation	i on: tion of measuren	nent protocols.			
Learning outco The ability of ir mold, melt spin	mes: ndividually produ ning, milling etc	action of metal al	loys using arc m	elting, casting in	to a copper	
Brief outline of Production of a Production of a	the course: alloys using arc lloys using melt	melting. Product spinning method	tion of alloys us . Production of a	ing casting into lloys by milling o	a copper mold. of precursor.	
Recommended Hilzinger R, Rc Chen CW, Mag	literature: dewald W, Magn netism and meta	netic materials, V lurgy of soft mag	acuumschmelze, netic materials, l	, 2013 Dover publication	ns, 1986	
Course languages slovak or englise	ge: h					
Course assessm Total number of	ent f assessed studen	its: 12				
А	В	С	D	Е	FX	
100.0	0.0	0.0	0.0	0.0	0.0	
Provides: Mgr. PhD.	Vladimír Komar	nický, Ph.D., doc	. RNDr. Ján Füze	er, PhD., RNDr. I	Ladislav Galdun,	
Date of last modification: 26.09.2017						
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.			

University: P. J.	. Šafárik Univer	sity in Košice						
Faculty: Faculty	y of Science							
Course ID: ÚF PP1/99	V/ Course n	ame: Physics of S	Semiconductor 1	Elements				
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present								
Number of crea	dits: 3							
Recommended	semester/trime	ster of the cours	e: 3.					
Course level: II	•							
Prerequisities:								
Conditions for Exam, its conte	course complet nts is given by t	ion: opics of lectures.						
Learning outco Acquiring know applications in o	mes: vledge about pri experimental res	nciple of operatio search and techno	n of semicondue logy.	ctor elements and	their			
Brief outline of Basic propertie device, varistor junction transis semiconductor. coupled devices	the course: s of semiconduct, tensoelektric of tor. Junction fie Silicon chip tech	actors. Termistor elements. Semico ld-effect transisto mology and fabric	s. Hall device, onductor devices ors. MOS field-e cation technique	magnetoresistor, s with one PN ju effect transistors. es. Optoelektronic	cryosar, Gunn inction. Bipolar Contact metall- devices. Charge			
Recommended D.J. Roulston, <i>A</i> 1999	literature: An introduction	to the physics of s	semiconductor c	levices, Oxford U	niversity Press,			
Course languag english	ge:							
Course assessme Total number of	Course assessment Total number of assessed students: 20							
А	В	С	D	E	FX			
85.0	85.0 10.0 5.0 0.0 0.0 0.0							
Provides: prof.	Provides: prof. RNDr. Peter Kollár, DrSc.							
Date of last mo	dification: 26.0	9.2017						
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.					
L	1							

University: P. J.	Šafárik Univers	sity in Košice					
Faculty: Faculty	Faculty: Faculty of Science						
Course ID: Dek UPJŠ/PPZ/13	Course ID: Dek. PF UPJŠ/PPZ/13Course name: Personality Development and Key Competences for Success on a Labour Market						
Course type, sco Course type: P Recommended Per week: Per Course methoo	ope and the me ractice course-load (h study period: l: present	thod: tours): 14s					
Number of cred	lits: 2						
Recommended	semester/trime	ster of the cours	e: 1., 3.				
Course level: II.							
Prerequisities:							
Conditions for a	course completi	ion:					
Learning outco	mes:						
Brief outline of	the course:						
Recommended	literature:						
Course languag	e:						
Course assessm Total number of	ent assessed studen	its: 39					
A	В	С	D	Е	FX		
100.0	0.0	0.0	0.0	0.0	0.0		
Provides: RNDr. Peter Stefányi, PhD.							
Date of last modification: 19.02.2018							
Approved: Guar	ranteeprof. Ing.	Martin Orendáč,	CSc.				

University: P. J.	Šafárik Univers	ity in Košice					
Faculty: Faculty	of Science						
Course ID: KPPaPZ/PPZMg	Course ID: Course name: Psychology and Health Psychology (Master's Study)						
Course type, sco Course type: L Recommended Per week: 1 / 2 Course method	ppe and the met ecture / Practice course-load (h Per study perio l: present	thod: ; ours): od: 14 / 28					
Number of cred	its: 4						
Recommended s	semester/trimes	ster of the cours	e:				
Course level: II.							
Prerequisities:							
Conditions for c	ourse completi	on:					
Learning outcor	nes:						
Brief outline of t	the course:						
Recommended I	iterature:						
Course language	e:						
Course assessme Total number of	ent assessed studen	ts: 226					
A	В	С	D	Е	FX		
19.47	25.22	25.66	13.27	15.93	0.44		
Provides: PhDr.	Anna Janovská,	PhD., Mgr. Luci	a Hricová, PhD.				
Date of last mod	lification: 21.08	3.2017					
Approved: Guar	anteeprof. Ing. 1	Martin Orendáč,	CSc.				

University: P. J.	. Šafárik Univers	sity in Košice					
Faculty: Faculty	y of Science						
Course ID: ÚF PSM/18): ÚFV/ Course name: Computer simulations in magnetochemistry						
Course type, sc Course type: I Recommended Per week: 1 / 2 Course metho	ope and the me Lecture / Practice d course-load (h 2 Per study peri d: present	thod: cours): od: 14 / 28					
Number of crea	lits: 3						
Recommended	semester/trime	ster of the cours	e: 2., 4.				
Course level: II	•						
Prerequisities:							
Conditions for	course completi	ion:					
Learning outco	mes:						
Brief outline of	the course:						
Recommended	literature:						
Course languag	ge:						
Course assessm Total number of	ent f assessed studer	its: 0					
А	В	С	D	E	FX		
0.0	0.0	0.0	0.0	0.0	0.0		
Provides: RND	r. Vladimír Tkáč	, PhD., doc. RNI	Dr. Erik Čižmár,	PhD.			
Date of last mo	dification: 09.03	3.2018					
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.				

University: P. J	. Šafárik Univers	sity in Košice						
Faculty: Faculty of Science								
Course ID: ÚF RPM/14	Course ID: ÚFV/ Course name: Relaxation processes in molecular magnets RPM/14							
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present								
Number of crea	lits: 2							
Recommended	semester/trime	ster of the cours	e: 1., 3.					
Course level: II	•							
Prerequisities:								
Conditions for Discussion acco	course complete companied with the	ion: ne preparation and	l presentation of	f a short project				
Learning outco Student obtains and spins, so ca calorimetry, the	mes: basic knowledg lled relaxation p rmal conductivit	e about the dynan henomena, demo ty, etc.	nics of the energ nstrating in spec	gy transport betwe ctroscopy, ac susc	een a lattice eptibility, ac			
Brief outline of Spin-spin intera to phonons – W process. Orbacl Thermally activ temperature. R Relaxation pro Casimir and du of relaxation ti Observation of	the course: actions. Interactivaller's mechanis of process. Rama vated magnetic relaxation due to cesses due to la Pré theory. Ac mes. Examples relaxation pheno	on of spin with e sm. Spin-lattice re n process of the f relaxation. Super to quantum tunn ocalized modes. susceptibility. Co of spin-lattice re omena using vario	electromagnetic elaxation due to first and second paramagnetism. elling. Therma E' centres. "R ele-Cole diagran elaxation in mo	field. Spin-lattice o crystal field mod order. Phonon be Neél-Arrhenious lly asisted quant attling" modes. n. Debye relaxation blecular and sing l techniques.	e relaxation due dulation. Direct ottleneck effect. s law. Blocking tum tunnelling. Optical modes. on. Distribution le-ion magnets.			
Recommended literature: 1. D. Gatteschi et al. Molecular Nanomagnets, Oxford University Press, 2006. 2. A. Abragam and B. Bleaney, Electron Paramagnetic Resonance of Transition Ions, Clarendon Press Oxford 1970.								
Course language: english								
Course assessm Total number of	ent f assessed studer	nts: 1						
А	В	С	D	Е	FX			
100.0	0.0	0.0	0.0	0.0	0.0			
Provides: doc. RNDr. Alžbeta Orendáčová, DrSc.								
Date of last mo	dification: 26.09	9.2017						

University:	P. J. Šafái	rik University in	n Košice				
Faculty: Fac	culty of S	cience					
Course ID: SAA/18	ÚFV/	Course name:	Sensors and	actuators b	ased on selec	ted physical	phenomena
Course type Course type Recommen Per week: Course me	e, scope a be: Lectur ided cour 1 Per stu ethod: pre	nd the method e se-load (hours dy period: 14 sent	: :):				
Number of	credits: 2						
Recommen	ded seme	ster/trimester	of the cours	e: 2., 4.			
Course leve	l: II., III.						
Prerequisiti	es:						
Conditions	for cours	e completion:					
Learning ou	itcomes:						
Brief outlin	e of the c	ourse:					
Recommen	ded litera	ture:					
Course lang	guage:						
Course asse Total numbe	essment er of asses	ssed students: 1					
A	В	C	D	Е	FX	Ν	Р
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Provides: prof. RNDr. Rastislav Varga, DrSc., RNDr. Ladislav Galdun, PhD.							
Date of last modification: 09.03.2018							
Approved:	Guarantee	prof. Ing. Mart	in Orendáč,	CSc.			

University: P. J. Šafá	rik University in Košice					
Faculty: Faculty of S	cience					
Course ID: ÚFV/ SKM/14	Course name: Scanning probes microscopy of nanostructures					
Course type, scope a Course type: Lectur Recommended cou Per week: 2 Per stu Course method: pro	and the method: re rse-load (hours): rdy period: 28 esent					
Number of credits: 3	3					
Recommended seme	ster/trimester of the course: 2.					
Course level: II.						
Prerequisities:						
Conditions for cours exam	se completion:					
Learning outcomes: The students will lea on surfaces.	rn about various methods of visualization and fabrication of nanostructures					
Brief outline of the c	course:					

Historical overview of microscopy, resolution limits of optical microscopy. Scanning and transmission electron microscopy – principles and applications. Basics of tunneling spectroscopy, local density of electron states, molecular orbitals. Scanning tunneling microscopy of molecules and organic nanostructures. Principles of atomic force microscopy, imaging of organic nanostructures. Force curves method. Overview and basic principles of various other scanning probes microscopies (magnetic force microscopy, Kelvin probe microscopy, electrochemical scanning tunneling microscopy, scanning near-field optical microscopy etc.). Scanning probe microscopy at low temperatures and in ultra-high vacuum. Dynamic visualization by scanning probe microscopies. Manipulation of nanostructures using scanning probe microscopies. The course includes practical demonstrations of some of the discussed techniques in the laboratory.

Recommended literature:

1. Roland Wiesendanger: Scanning Probe Microscopy and Spectroscopy: Methods and Applications, Cambridge University Press 1994

E.L. Wolf: Principles of electron tunneling spectroscopy, Oxford university press, 1989
 N. Yao, Z. L. Wang (ed.), Handbook of microscopy for nanotechnology, Kluwer academic publishers 2005

4. P. Samuely (ed.), Kryofyzika a nanoelektronika, ÚEF SAV 2011

Course language:

Slovak or English

Course assessment							
Total number of assessed students: 10							
А	В	С	D	Е	FX		
100.0	0.0	0.0	0.0	0.0	0.0		

Provides: Mgr. Tomáš Samuely, PhD.

Date of last modification: 26.09.2017

University: P. J.	. Šafárik Univers	ity in Košice						
Faculty: Faculty of Science								
Course ID: ÚF SPE1/03	V/ Course na	me: Solid State	Spectroscopy					
Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 3 / 1 Per study period: 42 / 14 Course method: present								
Number of crea	lits: 5							
Recommended	semester/trimes	ster of the cours	e: 3.					
Course level: II	•							
Prerequisities:								
Conditions for Exam interwiev	<mark>course completi</mark> v.	on:						
Learning outco Explanation of radiospectrosco theoretical know	mes: the principles of py (electron para vledge will be co	Mössbauer spect magnetic resona ompleted by the v	roscopy, infrared nce, nuclear mag vork in research	d spectroscopy an gnetic resonance) laboratories.	d . The			
Brief outline of the course: Mössbauer spectroscopy: Mössbauer effect. Hyperfine coupling. Electric monopole and quadrupole, and magnetic dipole interactions. Mössbauer spectroscopy, analysis of Mössbauer spectra – intensity and width of lines, isomer shift, quadrupole splitting and magnetic splitting. Infrared spectroscopy: Harmonic and anharmonic oscilator. Vibrational spectra. IR spectrometers, techniques, sample preparation. NMR/EPR spectroscopy: Electron spin. Crystal field. Electron spectra and transitions. EPR technique. Interactions of nuclei with magnetic and electric fields. Nuclear paramagnetism. Continual wave and pulse nuclear magnetic resonance techniques. Relaxation processes in nuclear spin system. One dimensional 1H and 13C NMR of liquid samples. Two-dimensional NMR spectra. Principles, measuring techniques. Solid-state NMR. NMR of								
Recommended 1. Dickson P.E. 2. Slichter C. P.	Recommended literature: 1. Dickson P.E., Berry F.J.: Mössbauer spectroscopy. Cambridge University Press, London 1986. 2. Slichter C. P.: Principles of Magnetic Resonance. Springer-Verlag. London, 1990.							
Course languag english	ge:							
Course assessment Total number of assessed students: 35								
A	В	С	D	E	FX			
60.0	14.29	11.43	11.43	2.86	0.0			
Provides: doc. l Tomašovičová,	RNDr. Alžbeta O CSc.	rendáčová, DrSc	e., doc. RNDr. Já	n Imrich, CSc., R	NDr. Natália			

Date of last modification: 26.09.2017

University: P. J. Šafárik University in Košice						
Faculty: Faculty of Science						
Course ID: ÚFV/ SPFKLa/14Course name: Semestral work I						
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: present						
Number of credits: 2						
Recommended semester/trimester of the course: 1.						
Course level: II.						
Prerequisities:						
Conditions for course completion: Successful meeting the goals formulated by the supervisor at the beginning of the semester in required extent.						
Learning outcomes: Students become familiar and obtain skills in scientific work related to experimental study of solids by involving them in solving scientific problems in research teams.						
Brief outline of the course: Solving of selected problems associated with experimental study in solid state physics.						
Recommended literature: Selected scientific journals and books.						
Course language: slovak, english						
Course assessment Total number of assessed students: 20						
A B C D E FX						
100.0 0.0 0.0 0.0 0.0						
Provides:						
Date of last modification: 26.09.2017						
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.						

University: P. J.	Šafárik Univers	ity in Košice					
Faculty: Faculty	Faculty: Faculty of Science						
Course ID: ÚFV SPFKLb/14	// Course na	Course name: Semestral work II					
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: present							
Number of cred	its: 6						
Recommended s	semester/trimes	ter of the course	e: 2.				
Course level: II.							
Prerequisities: U	ÚFV/SPFKLa/14	1					
Conditions for c Succesful meetin required extent.	course completing the goals form	on: nulated by the su	pervisor at the	beginning of the s	semester in		
Learning outcome Students become solids by involve	mes: e familiar and ob ing them in solv	otain skills in scie	entific work rel blems in resear	ated to experimen rch teams.	tal study of		
Brief outline of Solving of selec	the course: ted problems ass	sociated with exp	erimental study	y in solid state phy	ysics.		
Recommended literature: Selected scientific journals and books.							
Course language: slovak, english							
Course assessment Total number of assessed students: 21							
А	В	С	D	Е	FX		
95.24	95.24 0.0 4.76 0.0 0.0 0.0						
Provides:							
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J.	Šafárik Univers	ity in Košice					
Faculty: Faculty	of Science						
Course ID: ÚFV SPFKLc/14	V/ Course name: Semestral work III						
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: present							
Number of cred	its: 6						
Recommended s	semester/trimes	ter of the cours	e: 3.				
Course level: II.							
Prerequisities: (JFV/SPFKLb/14	1					
Conditions for c Succesful meetir required extent.	ourse completing the goals form	on: nulated by the su	pervisor at the b	beginning of the s	emester in		
Learning outcor Students become solids by involvi	nes: e familiar and ob ing them in solvi	tain skills in scie	entific work rela blems in researc	ted to experiment th teams.	tal study of		
Brief outline of a Solving of select	the course: ted problems ass	ociated with exp	erimental study	in solid state phy	vsics.		
Recommended literature: Selected scientific journals and books.							
Course language: slovak, english							
Course assessment Total number of assessed students: 16							
A	В	С	D	E	FX		
100.0 0.0 0.0 0.0 0.0							
Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., prof. Ing. Martin Orendáč, CSc., doc. RNDr. Erik Čižmár, PhD., Mgr. Tomáš Samuely, PhD.							
Date of last modification: 26.09.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J. Šafárik University in Košice							
Faculty: Fa	Faculty: Faculty of Science						
Course ID: SPR1/00	ÚFV/	JFV/ Course name: Special Practical Exercises I					
Course type Course type Recomment Per week: Course met	e, scope an pe: Practic nded cour 3 Per stud ethod: pre	nd the method e se-load (hours dy period: 42 sent	: :):				
Number of	credits: 3						
Recommen	ded semes	ster/trimester	of the cours	e: 1.			
Course leve	el: II.						
Prerequisit	ies:						
Conditions Participatio	for cours n in exerci	e completion: ses, reports fro	m all exercie	es.			
The objecti a. To gain s b. To gain s c. To gain e Brief outlin Measureme observation Measureme of domain v	ves of the ome physi some pract experience te of the co ent of bas unt of magr walls and r	laboratory are: cal inside into ice in data colle and report writ ourse: sic magnetic properties neasurement of	some of the o ection, analysing presentation properties at using a SQU f magnetostri	concepts pre sis and inter tion and resu t ac and d ID magneto ction.	sented in the pretation of re alts. c magnetisat meter. Measu	lectures. esumance. tion, domai trement of th	n structure le dynamics
Recommen Tumanski S Fiorillo F, C Dufek M., I Brož J. a ko	ded litera 6, Handboo Characteriz Hrabák J., bl.: Základ	ture: ok of magnetic cation and Mea Trnaka Z.: Mag y fysikálnich m	measuremen surement of I gnetická měř něření, SPN,	ts, CRC pre Magnetic M ení, SNTL, 1974, Praha	ss, 2011. aterials, Elsev 1964, Praha	vier, 2004.	
Course language: Slovak or English							
Course assessment Total number of assessed students: 27							
А	В	C	D	Е	FX	Ν	Р
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Provides: doc. RNDr. Adriana Zeleňáková, PhD., doc. RNDr. Ján Füzer, PhD., RNDr. Ladislav Galdun, PhD.							
Date of last modification: 26.09.2017							
Approved:	Guarantee	prof. Ing. Mart	in Orendáč,	CSc.			

University:	P. J. Šafári	k University in	n Košice				
Faculty: Fa	culty of Sc	ience					
Course ID: SPR2/09	ÚFV/	V/ Course name: Special Practicum II					
Course typ Course ty Recomme Per week: Course mo	e, scope an pe: Practice nded cours 3 Per stud ethod: pres	id the method e se-load (hours ly period: 42 eent	:)):				
Number of	credits: 4						
Recommen	ded semes	ter/trimester	of the cours	e: 2.			
Course leve	el: II.						
Prerequisit	ies:						
Conditions Theoretical analysis of Summary c and knowle experiment Learning o To obtain fr condensed	backgroun the experim of the work edges by the elaborates utcomes: undamental matter, prin	d of the practi nental data and on practices (t e experiments.).	ces, the active l quality of the heoretical bar The analysis d experiment emperatures.	vities and kn he experime ackground o s of the expe tal skills in a	owledges by nt elaborates. f the practices erimental data area of selecte	the experim s, the activit and quality ed physical p	ents. The ies of the research of
Brief outlin Vacuum te Magnetic su characterisa Recommen	e of the co chnology, usceptibilit ation of the ded literat	urse: Calibration of y and magnetis system. ure:	the thermonation, Electr	meters, Hea ical resistivi	t capacity, E ty: measurem	lectron-spin ent, analysis	resonance, s of the data,
J. H. Moore II. and III.,	e and N. D. IoP Publisl	Spencer: Ency hing Ltd. 2001	yclopedia o (, ISBN 0750	Chemical Ph 303131.	sysics and Phy	ysical Chem	istry Vol. I.,
Course lan	guage:						
Course asso Total numb	essment er of assess	sed students: 2	4				
Α	В	С	D	E	FX	Ν	Р
70.83	12.5	12.5	0.0	0.0	0.0	0.0	4.17
Provides: d	Provides: doc. RNDr. Erik Čižmár, PhD., prof. Ing. Martin Orendáč, CSc.						
Date of last	t modificat	ion: 26.09.201	7				
Approved:	Guarantee	orof. Ing. Mart	in Orendáč,	CSc.			

University: P. J. Šafá	rik Univers	ity in Košice				
Faculty: Faculty of S	cience					
Course ID: KPPaPZ/SPVKE/07	KE/07 Course name: Social-Psychological Training of Coping with Critical Life Situations					
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present						
Number of credits: 2						
Recommended seme	ster/trimes	ster of the course: 2.				
Course level: II.						
Prerequisities:						
Conditions for cours	e completi	on:				
Learning outcomes:						
Brief outline of the c	ourse:					
Recommended litera	ture:					
Course language:	Course language:					
Course assessment Total number of assessed students: 126						
abs	abs n z					
97.62 2.38 0.0						
Provides: Mgr. Ondrej Kalina, PhD.						
Date of last modification: 21.08.2017						
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.						

University P I	Šafárik Univer	sity in Košice					
Faculty: Faculty of Science							
Course ID: ÚF SVKK/99	V/ Course r	Course name: Student Scientific Conference					
Course type, so Course type: Recommende Per week: Pe Course metho	cope and the mo d course-load (r study period: od: present	ethod: hours):					
Number of cree	dits: 4						
Recommended	semester/trim	ester of the cours	e: 2., 4.				
Course level: I	[.						
Prerequisities:							
Conditions for Research activi Presentation of	course completities of a student the achieved re	tion: during semester sults at the Scienti	ific Student Con	ference at the fact	ulty level.		
Learning outco Students will of	omes: btain experience	e with presentation	n of achieved sci	ientific results.			
Brief outline of As required by	f the course: individual topic	es of research.					
Recommended According to re	literature: equirements of i	ndividual topics o	f student works				
Course langua slovak, english	ge:						
Course assessment Total number of assessed students: 48							
А	В	C	D	Е	FX		
100.0	0.0	0.0	0.0	0.0	0.0		
Provides:	Provides:						
Date of last mo	dification: 01.0	03.2018					
Approved: Gua	aranteeprof. Ing.	Martin Orendáč,	CSc.				

University: P. J. Šafárik University in Košice							
Faculty: Faculty of Science							
Course ID: ÚF TKL1/99	V/ Course name: Theory of Condensed Matter						
Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 4 / 2 Per study period: 56 / 28 Course method: present							
Number of crea	lits: 8						
Recommended	semester/trimes	ster of the cours	e: 1.				
Course level: II							
Prerequisities:							
Conditions for Successful pass	course completi ing of the final o	on: ral exam.					
Learning outco To manage basi electron-electro	mes: c methods of qua n, electron-phon	asiparticle formation interactions, r	lism of Solid Sta nagnons)	te Physics (electr	ons, phonons,		
description. The a periodic poter Nearly free elect tensor. Lattice v optical modes. atractive interact	e ideal crystal, c ntial field, Block fron theory. Tight vaves. Dynamica Phonons in solic tion between ele	lirect and recipc stheorem. Born binding approxi al matrix. Linear ls. Electron-phor ctrons.	al lattice. Brawa n-Karmán bound mation. Existenc monoatomic an non interactions.	aiss elementary c dary conditions, l e of energy bands d diatomic lattice The Fröhlich Ha	cell. Electron in Brillouin zones. Effective mass es. Acoustic and amiltonian. The		
 Recommended literature: [1.] Ch. Kittel: Quantum Theory of Solids, John Wiley & Sons Inc, 1985. [2.] N.W. Ashcroft, N.D. Mermin: Solid State Physics, Harcourt College Publishers, 1976. [3.] P.L. Taylor: A Quantum Approach to the Solid State, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1970. [4.] J.M. Ziman, Principles of the Theory of Solids, University Press, Cambridge, 1972. [5.] A.O.E. Animalu, Intermediate Quantum Theory of Crystalline Solids, Prentice-Hall, Inc., Englewood Cliffs New Jersey 1981 							
Course language:							
Course assessment Total number of assessed students: 85							
А	В	С	D	E	FX		
55.29 11.76 16.47 8.24 8.24 0.0							
Provides: prof.	RNDr. Michal Ja	ščur, CSc.					
Date of last modification: 26.09.2017							
University: P. J.	Šafárik Univer	sity in Košice					
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Faculty: Faculty of Science							
Course ID: ÚF TVKL/14	V/ Course n	Course name: Transport properties of condensed matter					
Course type, sc Course type: I Recommended Per week: 2 / 1 Course method	ope and the me Lecture / Practic d course-load (l Per study per d: present	ethod: :e hours): iod: 28 / 14					
Number of cred	lits: 4						
Recommended	semester/trim	ester of the cours	e: 2.				
Course level: II	•						
Prerequisities:							
Conditions for successful passi	course completing final exam	tion:					
Learning outco To provide to st teach students to	mes: udents the basic o apply theoreti	c knowledge abou cal knowledge for	t the theory of t a description o	ransport phenome of real systems.	na in solids. To		
Brief outline of Occupation nur distribution of e Galvanomagnet time and scatte Scattering on io	the course: nber representa electrons in met ic phenomena. ring processes. nised impurity	ation. Second qua als. Density of sta Thermal conduc Electron-phonon atoms. Supercond	ntization for be tes. Boltzmann ctivity. Thermo interaction and uctivity.	osons and fermion equation. Electric pelectric phenome l scattering on acc	ns. Equilibrium cal conductivity. ena. Relaxation oustic phonons.		
Recommended J. M. Ziman, El Electrons and P	Recommended literature: J. M. Ziman, Electron and Phonons: The Theory of Transport Phenomena in Solids, Electrons and Phonons: The Theory of Transport Phenomena in Solids, Oxford (2001).						
Course languag slovak, english	ge:						
Course assessm Total number of	ent f assessed stude	nts: 2					
А	В	C	D	Е	FX		
50.0	0.0	50.0	0.0	0.0	0.0		
Provides: RND	r. Pavol Farkašo	ovský, DrSc.	-				
Date of last mo	dification: 26.0	9.2017					
Approved: Gua	ranteeprof. Ing.	Martin Orendáč,	CSc.				

University:	University: P. J. Šafárik University in Košice						
Faculty: Fa	Faculty: Faculty of Science						
Course ID: TVa/11	ÚTVŠ/ C	ÚTVŠ/ Course name: Sports Activities I.					
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of	credits: 2						
Recommen	ded semeste	er/trimester	of the cours	e: 1.			
Course leve	e l: I., I.II., II						
Prerequisit	ies:						
Conditions Conditions Min. 80% c	for course of for course of active part	completion: ompletion: ticipation in c	elasses.				
Learning ou Increasing p relationship Brief outlin Brief outlin	atcomes: bhysical con of students e of the cou e of the cou	dition and pe to the selecte irse: rse:	erformance weed sports action	vithin individ	lual sports. S continual imp	trengthening provement.	the
Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, basketball, badminton, floorball, yoga, pilates, swimming, body-building, indoor football, self-defence and karate, table tennis, sports for unfit persons, streetball, tennis, and volleyball. In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness. In addition to these sports, the Institute offers for those who are interested winter and summer							
the premise	the premises of the faculty or University or competitions with national or international participation.						
Recommen	ded literatu	re:					
Course lang	Course language:						
Course asse Total numb	essment er of assesse	ed students: 1	1672				
abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
88.42	0.01	0.0	0.0	0.0	0.03	7.59	3.96

Provides: Mgr. Peter Bakalár, PhD., Mgr. Dana Dračková, PhD., Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., Mgr. Marek Valanský, prof. RNDr. Stanislav Vokál, DrSc., Mgr. Marcel Čurgali, Ing. Iveta Cimboláková, PhD.

Date of last modification: 18.08.2017

Chiver Sity.	P. J. Šafárik	University in	n Košice				
Faculty: Faculty of Science							
Course ID: TVb/11	Vourse ID: ÚTVŠ/ Course name: Sports Activities II. Vb/11						
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of	credits: 2						
Recommen	ded semeste	er/trimester	of the cours	e: 2.			
Course leve	el: I., I.II., II						
Prerequisit	ies:						
Conditions Conditions Final assess	for course of for course constant and ac	completion: ompletion: ctive participa	ation in class	es - min. 75%	/0		
Learning of Learning of Increasing j relationship	utcomes: utcomes: physical con o of students	dition and pe to the selecte	erformance w ed sports acti	vithin individ vity and its c	ual sports. S continual imp	trengthening provement.	; the
Brief outline of the course: Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, basketball, badminton, floorball, yoga, pilates, swimming, body-building, indoor football, self-defence and karate, table tennis, sports for unfit persons, streetball, tennis, and volleyball. In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness. In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.							
in the first and particul physical co Last but no means of a In addition physical edu the premise	two semester larities of incondition, coo t least, the ir special prog to these spe ucation train s of the facul	ers of the firs lividual sport rdination abi nportant role ram of medic orts, the Inst ings with an a ty or Univers	t level of edu s, motor skill lities, physic of sports act cal physical e itute offers f attractive pro-	ucation stude ls, game activi- cal performan- ivities is to e education to it for those who gram and org titions with n	ents will mas vities, they w ince, and mo liminate swi influence and o are interes anises variou ational or int	ster basic cha ill improve la tor performa mming illite d mitigate un ted winter a us competition ternational pa	aracteristics evel of their ince fitness. racy and by ifitness. and summer ons, either at articipation.
In the first and particul physical co Last but no means of a In addition physical edu the premise	two semester larities of incondition, coo t least, the ir special prog to these spe ucation train s of the facul ded literatu	ers of the firs lividual sport rdination abi nportant role ram of medic orts, the Inst ings with an a ty or Univers re:	t level of edu s, motor skill lities, physic of sports act cal physical e itute offers f attractive pro-	ucation stude ls, game activities is to e education to it for those who gram and org titions with n	ents will mas vities, they w ince, and mo liminate swi influence and o are interes anises variou ational or int	ster basic cha ill improve la tor performa mming illite d mitigate un ted winter a us competition ternational pa	aracteristics evel of their ince fitness. racy and by ifitness. and summer ons, either at articipation.
In the first and particul physical co Last but no means of a In addition physical edu the premise Recommen Course lang	two semester larities of incondition, coo t least, the ir special prog to these spe ucation train s of the facul ded literatu guage:	ers of the firs lividual sport rdination abi nportant role ram of medic orts, the Inst ings with an a ty or Univers re:	t level of edu s, motor skill lities, physic of sports act cal physical e itute offers f attractive pro-	ucation stude ls, game activities is to e education to it for those who gram and org titions with n	ents will mas vities, they w ince, and mo liminate swi influence and o are interes anises variou ational or int	ster basic cha ill improve la tor performa mming illite d mitigate un ted winter a us competition ternational pa	aracteristics evel of their ince fitness. racy and by ifitness. and summer ons, either at articipation.
in the first and particul physical co Last but no means of a In addition physical ed the premise Recommen Course lang Course asso Total numb	two semester larities of incondition, coo t least, the ir special prog to these spe ucation train s of the facult ded literatu guage: essment er of assesse	ers of the firs lividual sport rdination abi nportant role ram of medic orts, the Inst ings with an a ity or Univers re:	t level of edu s, motor skill lities, physic of sports act cal physical e itute offers f attractive pro- sity or compe	ucation stude ls, game active cal performant ivities is to e education to it for those who gram and org titions with n	ents will mas vities, they w ince, and mo liminate swi influence and o are interes anises variou ational or int	ster basic cha ill improve la tor performa mming illite d mitigate un ted winter a us competition ternational pa	aracteristics evel of their ince fitness. racy and by ifitness. and summer ons, either at articipation.
in the first and particul physical co Last but no means of a In addition physical ed the premise Recommen Course lang Course asso Total numb abs	two semester larities of incondition, coo t least, the ir special prog to these spe ucation train s of the facul ded literatu guage: essment er of assesse abs-A	ers of the firs lividual sport rdination abi nportant role ram of medic orts, the Inst ings with an a ity or Univers re: ed students: 1 abs-B	t level of edu s, motor skill lities, physic of sports act cal physical e itute offers f attractive pro- sity or compe 0971 abs-C	abs-D	abs-E	ster basic cha ill improve la tor performa mming illite d mitigate un ited winter a us competition ternational pa	neabs

Provides: Mgr. Peter Bakalár, PhD., Mgr. Dana Dračková, PhD., Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., Mgr. Marek Valanský, prof. RNDr. Stanislav Vokál, DrSc., Mgr. Marcel Čurgali, Ing. Iveta Cimboláková, PhD.

Date of last modification: 18.08.2017

University:	University: P. J. Šafárik University in Košice						
Faculty: Fa	culty of So	eience					
Course ID: TVc/11	ÚTVŠ/	'Š/ Course name: Sports Activities III.					
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of	credits: 2						
Recommen	ded semes	ter/trimester	of the cours	e: 3.			
Course leve	e l: I., I.II.,	II					
Prerequisit	ies:						
Conditions	for cours	e completion:					
Learning of	utcomes:						
Brief outlin	e of the co	ourse:					
Recommen	ded litera	ture:					
Course lang	guage:						
Course asse Total numb	essment er of asses	sed students: 6	910				
abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
89.84	0.04	0.0	0.0	0.0	0.03	4.23	5.86
Provides: Mgr. Marcel Čurgali, Mgr. Peter Bakalár, PhD., Mgr. Dana Dračková, PhD., Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., Mgr. Marek Valanský, prof. RNDr. Stanislav Vokál, DrSc., Ing. Iveta Cimboláková, PhD.							
Date of last modification: 18.08.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University:	University: P. J. Šafárik University in Košice						
Faculty: Fac	culty of So	eience					
Course ID: TVd/11	ÚTVŠ/	Course name:	: Sports Acti	vities IV.			
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of	credits: 2						
Recomment	ded semes	ter/trimester	of the cours	e: 4.			
Course leve	l: I., I.II.,	II					
Prerequisiti	es:						
Conditions	for cours	e completion:					
Learning ou	itcomes:						
Brief outline	e of the co	ourse:					
Recommend	ded litera	ture:					
Course lang	guage:						
Course asse Total numbe	ssment er of asses	sed students: 5	045				
abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
85.09	0.3	0.04	0.0	0.0	0.0	6.82	7.75
Provides: Mgr. Marcel Čurgali, Mgr. Peter Bakalár, PhD., Mgr. Dana Dračková, PhD., Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., Mgr. Marek Valanský, prof. RNDr. Stanislav Vokál, DrSc., Ing. Iveta Cimboláková, PhD.							
Date of last modification: 18.08.2017							
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J.	Šafárik Univers	ity in Košice				
Faculty: Faculty of Science						
Course ID: KPPaPZ/UPR/03	Course na	Course name: The Art of Aiding by Verbal Exchange				
Course type, sco Course type: P Recommended Per week: 2 Pe Course method	ope and the met ractice course-load (h r study period: l: present	thod: ours): 28				
Number of cred	its: 2					
Recommended s	semester/trimes	ster of the cours	e: 4.			
Course level: II.						
Prerequisities:						
Conditions for c	course completi	on:				
Learning outcom	mes:					
Brief outline of	the course:					
Recommended	literature:					
Course languag	e:					
Course assessme Total number of	ent assessed studen	ts: 49				
A	В	С	D	Е	FX	
85.71	4.08	2.04	2.04	2.04	4.08	
Provides: Mgr. (Provides: Mgr. Ondrej Kalina, PhD.					
Date of last modification: 21.08.2017						
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.						

University: P. J	University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science						
Course ID: ÚF VOM/09	V/ Course	Course name: The Universe at Microscopic Level				
Course type, sc Course type: 1 Recommended Per week: 2 Pe Course metho	cope and the m Lecture d course-load (er study period d: present	ethod: hours): l: 28				
Number of crea	dits: 3					
Recommended	semester/trim	ester of the cours	e: 1., 3.	_		
Course level: II	- -					
Prerequisities:						
Conditions for	course comple	tion:				
Learning outco To provide the selementary part	mes: students with the ticle level.	e recent knowledg	e of the structure	e of the Universe	at the	
Brief outline of The lectures pro phases like qua structure of nov interstellar and	the course: ovide an insight ark-gluon plast wadays Univer inter galactic sp	into the microstruna, baryogenesis se: main sequence bace, dark matter a	cture of the Univ and first nuclei stars, white dw nd dark energy a	verse - starting wi creation and con arfs, neutron sta nd cosmic rays.	ith early cosmic ntinue with the rs, black holes,	
 Recommended literature: 1. D. Griffiths: Introduction to Elementary Particles, Wiley-VCH, Weinheim, 2004 2. D. Perkins: Particle Astrophysics, Oxford University Press, Oxford, 2003 3. D. Prialnik: An Introduction to the Theory of Stellar Structure and Evolution, Cambridge University Press, Cambridge, 2000 						
Course languag	ge:					
Course assessm Total number of	Course assessment Total number of assessed students: 17					
А	В	С	D	Е	FX	
100.0	0.0	0.0	0.0	0.0	0.0	
Provides: doc. 1	RNDr. Marek E	ombara, PhD.				
Date of last mo	dification: 26.	09.2017				
Approved: Gua	ranteeprof. Ing	. Martin Orendáč,	CSc.			
L						

University:	University: P. J. Šafárik University in Košice						
Faculty: Faculty of Science							
Course ID: VPM/18	: ÚFV/ Course name: Selected problems of numerical methods in micro- magnetism						
Course typ Course tyj Recomme Per week: Course me	e, scope ar pe: Lecture nded cour 1 Per stud ethod: pres	id the method se-load (hours ly period: 14	: :):				
Number of	credits: 2						
Recommen	ded semes	ter/trimester	of the cours	e: 2., 4.			
Course leve	el: II., III.						
Prerequisit	ies:						
Conditions	for course	completion:					
Learning o	utcomes:						
Brief outlin	e of the co	urse:					
Recommen	ded literat	ure:					
Course lan	guage:						
Course asse Total numb	Course assessment Total number of assessed students: 0						
А	В	C	D	Е	FX	Ν	Р
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Provides: RNDr. Kornel Richter, PhD.							
Date of last	Date of last modification: 09.03.2018						
Approved: Guaranteeprof. Ing. Martin Orendáč, CSc.							

University: P. J	University: P. J. Šafárik University in Košice						
Faculty: Facult	y of Science						
Course ID: ÚF ZTE/03	V/ Course na	me: Technology	v of Condensed N	Maters			
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of crea	lits: 3						
Recommended	semester/trimes	ster of the cours	e: 1.				
Course level: II	•						
Prerequisities:							
Conditions for 50 % maintaine 50% final outpu	course completi d output, written it, wtitten test	on: test					
Learning outco The course give phase transition	mes: es information ab s, Plastic deform	out principles of ation, strethenni	solidification, p ng and Racrystal	recipitatin. Thern llisation and Hot	nodynamics of working		
Brief outline of Principles of sol ingot casting, of metallic ma solutions, solid Nonequiblirium intermetallic ca by phase trans precipitation ha reaction, Strain Ferrous alloys.	 Brief outline of the course: Principles of solidification: solidification defects, casting processes for manufacturing components, ingot casting, directional solidification, single crystal growth and epitaxial growth, joining of metallic materials. Solid solutions and phase equilibrium: phase diagrams, solubility and solutions, solid-solution strengthening. Relationship between properties and phase diagram. Nonequiblirium solidificatin and segregation. Dispersion strengthening and eutectic phase diagram: intermetallic compounds, eutectic phase diagram, eutectic alloys. Dispersion strengthening by phase transformations and heat treatment: nucleation and growth in solid-state reactions, precipitation hardening, age hardening, eutectoid reaction – pearlite, bainite and martensitic reaction, Strain hardening snd annealing. Hot working, recrystallisation. Superplastic forming. 						
 Recommended literature: 1. D.R.Askeland and P.P. Phulé, The Science and Engineering of Materials, Thomson 2003. 2. R.W. Cahn et al, Physical Metalurgy I, Elsevier, 1983, ISBN - 0-444-86786-4 3. R.W. Cahn et al, Physical Metalurgy I, Elsevier, 1983, ISBN - 0-444-86787-2 							
Course languag English	Course language: English						
Course assessm	ient fassessed studen	ts: 35					
A	B	C	D	Е	FX		
57.14	40.0	2.86	0.0	0.0	0.0		
		/1_00	ι				

Provides: prof. RNDr. Pavol Sovák, CSc.

Date of last modification: 26.09.2017

University: P. J. Šafárik University in Košice						
Faculty: Faculty of Science						
Course ID: ÚTVŠ/ Course nat ÚTVŠ/CM/13	ne: Seaside Aerobic Exercise					
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: Per study period: 36s Course method: present						
Number of credits: 2						
Recommended semester/trimest	er of the course:					
Course level: I., II.						
Prerequisities:						
Conditions for course completion Conditions for course completion Attendance	1:					
Learning outcomes: Learning outcomes: Students will be provided an overview of possibilities how to spend leisure time in seaside conditions actively and their skills in work and communication with clients will be improved. Students will acquire practical experience in organising the cultural and art-oriented events, with the aim to improve the stay and to create positive experiences for visitors						
 Brief outline of the course: Brief outline of the course: 1. Basics of seaside aerobics 2. Morning exercises 3. Pilates and its application in seaside conditions 4. Exercises for the spine 5. Yoga basics 6. Sport as a part of leisure time 7. Application of projects of productive spending of leisure time for different age and social groups (children, young people, elderly) 8. Application of seaside cultural and art-oriented activities in leisure time 						
Recommended literature:						
Course language:						
Course assessment Total number of assessed students	: 33					
abs	n					
12.12	87.88					
Provides: Mgr. Alena Buková, Ph	D., Mgr. Agata Horbacz, PhD.					
Date of last modification: 18.08.2017						