Study plan

Name of study plan: Fyzikální inženýrství materiálů

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Physical Engineering of Materials

Type of study: Follow-up master full-time

Required credits: 0

Elective courses credits: 120 Sum of credits in the plan: 120

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 0

The role of the block: P

Code of the group: NMSPFIM1

Name of the group: MDP P_FIMN 1st year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 17 courses

Credits in the group: 0 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
14ADYK	Applied Dynamics of Continuum Hanuš Seiner Hanuš Seiner Hanuš Seiner (Gar.)	Z,ZK	2	2P+0C	Z	Р
14EM2	Elasticity 2 Vladislav Oliva, Aleš Materna Vladislav Oliva Vladislav Oliva (Gar.)	Z,ZK	4	2P+2C	Z	Р
14EXME	Experimental Mechanics Ondřej Kovářík Ondřej Kovářík Ondřej Kovářík (Gar.)	KZ	5	2P+2C	Z	Р
14FRAM	Fractography and Microanalysis Petr Haušild, Jan Siegl Jan Siegl (Gar.)	Z,ZK	2	2P+0C	L	Р
14FPU	Functional Surface Modifications Ondřej Kovářík, Radek Mušálek Ondřej Kovářík Ondřej Kovářík (Gar.)	KZ	2	2P+0C	L	Р
14FME1	Physical Metallurgy 1 Miroslav Karlík Miroslav Karlík (Gar.)	Z,ZK	5	2P+2C	Z	Р
14FME2	Physical Metallurgy 2 Petr Hausild Petr Hausild (Gar.)	Z,ZK	3	2P+0C		Р
14LM1	Fracture Mechanics 1 Jiří Kunz Jiří Kunz Jiří Kunz (Gar.)	Z,ZK	2	2P+0C	Z	Р
14LM2	Fracture Mechanics 2 Jiří Kunz Jiří Kunz Jiří Kunz (Gar.)	Z,ZK	2	2P+0C	L	Р
14MMIM	Micromechanical and Indentation Methods Jaroslav Čech Jaroslav Čech (Gar.)	KZ	2	1P+1C	L	Р
14MIP1	Miniprojects 1 Ondřej Kovářík, Jaroslav Čech Jaroslav Čech (Gar.)	KZ	3	0P+2C	Z	Р
14MIP2	Miniprojects 2 Ondřej Kovářík, Jaroslav Čech Jaroslav Čech (Gar.)	KZ	3	0P+2C	L	Р
14PLA	Plasticity Vladislav Oliva, Aleš Materna Vladislav Oliva Vladislav Oliva (Gar.)	Z,ZK	3	2P+1C	L	Р
14PM	Computational Mechanics Aleš Materna Aleš Materna Aleš Materna (Gar.)	KZ	2	2P+0C	L	Р
14VUSM1	Research Project 1 Aleš Materna Aleš Materna (Gar.)	Z	6	0+6	1	Р
14VUSM2	Research Project 2 Aleš Materna Aleš Materna Aleš Materna (Gar.)	KZ	8	0+8	2	Р
14UM	Fatigue of Materials Ondřej Kovářík, Hynek Lauschmann Hynek Lauschmann (Gar.)	KZ	2	2P+0C	L	Р

Characteristics of the courses of this group of Study Plan: Code=NMSPFIM1 Name=MDP P_FIMN 1st year

Abstract: The course is based on previously acquired general physical and physical metallurgical knowledge and applies this knowledge to real systems such as Fe-C and Fe-X-C, multicomponent Fe and Ni-based alloys, etc., which are the basis of steels and special structural materials. Since the Physical Metallurgy 2 builds on the previous, more theoretically oriented courses of Metal Physics and Physical Metallurgy 1, added emphasis is placed on applications of real systems in engineering. 14.LM1 Fracture Mechanics 1 Z,ZK 2 Abstract: Mechanisms and modes of fracture. Stress and strain field in the vicinity of notch or crack tip. Parameters of linear elastic fracture mechanics. Total energy balance approach. Fracture toughness of materials and crack stability examination. Application in research and engineering practice. 14.LM2 Fracture Mechanics 2 Z,ZK 2 Abstract: Parameters of non-linear elastic-plastic fracture mechanics. Fracture toughness of structural alloys in the case of general yielding. Fatigue of materials - fundamentals, fatigue crack propagation under various conditions, application of fracture mechanics. Case studies. 14.LMM Micromechanical and Indentation Methods KZ 2 2 2 2 2 2 2 2 2 2				
Abstract. This could be all with an advanced wheathours of continuous systems (springs, rads, beams, membrones, plates, shelp), equations of motion, method of solution and basic playments characteristics. 14ENUX [Elasticity 2] ACRICAL This could be set with an advanced theory of elasticity - building of long straight columns, torsion of non-circular shafts, various plane as the produce of the control of the columns of th	14ADYK	Applied Dynamics of Continuum	Z,ZK	2
Abstract. The course desired the analyses is an advanced theory of elasticity - buckling of long straight columns, torsion of non-cloular shafts, various plane steres and pane shaft problems, Kilchindh Spakes, which. The empirates is made on methods and sensitive relevant to general sold mechanics and materials science applications. KZ 5 Abstract. The course recreents an overview of current operations and procedure in the following fleds: - experimental simple of the man mechanical quantities (cross, diagnoments. Trock records, pressure, etc.): - experiments of presented methods are immediately demonstrated in the licitoral procedure, shoranaysis. Every bur from the experiments of the experimental sample of the presented methods are immediately demonstrated in the licitoral procedure, shoranaysis. Every bur from the experiments of the experimental sample and prospers of the procedure, shoranaysis. Every bur from the experiments of the experiments of the presented in the same of the same of the presented in the same of	Abstract: Natural, free, t		method of solutio	n and basic
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Abstract. The course desist with an advanced theory of elastidity - buckings followings, to listending Sales, which the emphasis in make on methods and meals interend to great and methods and market interesting explanations. 14EXME Exportmental Mechanics Sales Sa	14EM2	Elasticity 2	Z,ZK	4
HAEME Experimental Mechanics Antotact The course represents an overview of current experimental methods and procedures in the following fields: - experimental analysis of the main mechanical quantities, displacement, force, torque, pressure, etc.) - experimental formatics (shahem, vibration transduces, during fields) into theoretical and experimental field methods of the contraction of the subdivision systems of the subdivision of the subdivisi	Abstract: The course de	· · · · · · · · · · · · · · · · · · ·		problems,
Abstract. The course recreption an overview of current operamental methods and procedures in the following fields:- experimental analysis of the main mechanical quantities (stream, displacement, brock process, pressure, etc.), experimental programs (shakese, vitablish canaduces, damping, chained, process). Every fur house is equivalently divided in the theoritical and experimental. The presented methods are immediately demonstrated in the laboratory in proups of maximal produces are received in the throat process. The process of the process	Kirchhoff's plates, shells	s. The emphasis is made on methods and results relevant to general solid mechanics and materials science applications.		
displacement, force, force, pressure, etc.), - experimental dynamics (plakes, vibration transducent, durings, bitanically, vibranalysis). Every four hours lecture is expecialized in the indisortion of proposed produced are research teams. Each team has a futor at hard to guide the students through the experimental teams and progress are experimental teams and marks about his non-morth silling proposed and consistent flexical and consecsable methods of desprimental research about and shared the students are experimentally as a student of the students and second consecsable methods of desprimental research about the students and second consistent produced to desprimental research and experimental research and experimental research and experimental second in the common of alluve analyses. Helitopotal post-experimental second research and experimental research and	14EXME	Experimental Mechanics	KZ	5
into theorotical and experimental. The presented methods are immediately commentated in the laboratory in groups of maximally three students are reaponable to the proper fulfillment of the experimental tasks and so year week the properties. One students of the experimental tasks and prepares a experimental report at home and hands is back in one month three. 14FRAM Fractography and Microanalysis 2,Z,K 2 2 Abstract. Estate and accessible methods of experimental materials characterization in microclume, their application in the study of material properties and in the domain of failure analysis. Relationships technology methods are prepared in the domain of failure analysis. Relationships technology and applications are failure processes. 14FPU Functional Surface Modifications and the students of surface modification and coating technologies. Process parameters and their influence on surface and coating properties. Coating materials, deposition technology and application areas. Additive manufacturing and near net shape deposition. Visits to thermal spay about Laboratory prepared and administeration of coatings. 14FME1 Physical Metallurgy 1 Physical Metallurgy 2 Physical Metallurgy 2 Physical Metallurgy 2 Abstract Estate produces on introduction to deposition processes as radiation demangs, outdation and controls is given. 14FME2 Physical Metallurgy 2 Abstract The course is tased on previously acquired general physical and physical metallurgical knowledge and applications in the field of processing and therrom metallurgical introduction in the basic of southern and previously acquired general physical and physical metallurgical knowledge and applicate bits on Medicine and applications of real systems a unhard and reads abbility and physical metallurgical knowledge and applications in the field of processing and therrom metallurgical introduces of the Physical Metallurgy 2 builds on the physical Metallur	Abstract: The course rep	presents an overview of current experimental methods and procedures in the following fields: - experimental analysis of the ma	ain mechanical qu	antities (stress,
tram ha a futur at hand to guide the students through the experimental tasks and to solve an eventual problems. One student is designated a learn leader and is responsible for the proport fulliment of the experimental tasks and propages as experimental report at home and native to the non-training to the experimental tasks and propages as experimental report at home and shall be back in one month time. Abstract Back and accessable methods of desprimental materials characterization in microvolume, their application in the study of material proporties and in the domain of failure analysis. Relationships between processing technology, mechanical properties and failure processes. IEFU Functional Studence modifications according to technology and applications. Surface modification and coating technologies. Process parameters and their influence on surface and coating processor. Souting materials, deposition technology and application areas. Additive manufacturing and near not shape deposition. Visits to themselve programation and characterization of coatings. IEFNET Physical Metallurgy Surface Modification of coatings and application and characterization of coatings. IEFNET Physical Metallurgy Surface Modification of processing and them on mechanical treatment of different studentum internals. The Internal physical processing are studentum internals. The Internal physical processing and them on mechanical treatment of different studentum internals. The Internal physical processing are studentum internals. Surface the Physical Metallurgy 2 builds on the provious, more theoretically contributed under the Internal physical processing and physical internal physical processing and physical internal physical processing and physical physical physical	displacement, force, tord	que, pressure, etc.), - experimental dynamics (shakers, vibration transducers, damping, balancing, vibroanalysis). Every four ho	urs lecture is equi	valently divided
proper full-fillment of the experimental task and programs a experimental report at home and hands it back in one morth time. IFRALO party and Microanalysis. Activate: Basks and accessable methods of experimental materials characterization in microcolume, their application in the study of material properties and in the domain of failure analysis. Relationships between processing ethonicity, mechanical properties and failure processes. IFRU Functional Surface Modifications Ashartact: Calegories of surface modification according to technology and application. Surface modification and coating technologies. Process parameters are their influences on surface and coating properties. Coating materials, deposition technologies and application areas. Additive manufacturing and near not shape deposition. Visits to thermal spray labs. Laboratory preparation and dotainers/scale inclinations and coating properties. Coating materials, deposition technologies and applications in the field of processing and thermore material treatment of different structural materials. Furthermore, as introduction to degradation processes as radiation damage, occidation in the field of processing and thermore mechanic treatment of different structural materials. Furthermore, as introduction to degradation processes as radiation damage, occidation and corrosion is given. IFRUME Physical Metallurgy 2 bulls on proviously acquired organization of proviously acquired organization of seeds and applicate this knowledge to real systems such as For Carl Fex. X-millionermore for an Private organization and proviously acquired organizations of seed systems in engineering. IFRUME Physical Metallurgy 2 bulls on proviously acquired organization and proviously acquired organizations of seed systems in engineering. IFRUME Physical Metallurgy 2 bulls on proviously acquired general physical metallurgical knowledge and applicate this knowledge to real systems used to applicate the proviously acquired and physical metallurgical knowledge and applicate this	•			
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14FPU Functional Surface Modifications Anterot Categories of surface modification according to between obstances and extendent occurrence on surface and coating properties. Coating materials, deposition between objects and application areas. Additive manufacturing and near net shape deposition. Veils to thermal spray labs. Laboratory preparation and characterization of coatings. 14FME1 Physicial Motallurgy 1 Abstract: Basic principles of motal physics, acquired in proceeding courses, are extended to the applications in the field of processing and therm mechanical treatment of different structural materials. Furthermore, an introduction to degradation processes as radiation damage, couldation and corrosion is given. 14FME2 Physicial Motallurgy 2 Abstract: The course is based on previously acquired general physical and physical metallurgical knowledge and applies this knowledge to real systems such as Fa-C and Fs-X-C. All PME2 Physicial Metallurgy 2, e., which are the basis of steeke and special structural radients. Since the Physical Metallurgy 2 bulls on the previous, more theoretically oriented courses of Metal Physics and Physical Metallurgy 1, added emphasis is placed on applications of real systems in engineering. 14LM1 Fracture Mechanics 1 Abstract: Mechanisms and modes of fracture. Stress and strain field in the vicinity of notion or crack tip. Parameters of linear elastic fracture mechanics. Total energy balance approach. Feature bulls of the previous process of materials and crack stability examination. Application in research and engineering practice. 14LM2 Fracture Mechanics 2 Abstract: Brancher of non-linear elastice dysals finature mechanics. Exacture bullymess of structural alloys in the case of general yielding. Falique of materials - fundamentals, disquerack procession, microcarditive the bending, etc.) in electron microscopes from the example of the course. The paradical measurements are the essential part of the course will be course to in present to the subdents the methods of			s and in the doma	un or ialiure
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Abstract. Mechanisms and modes of fracture. Stress and strain field in the vicinity of notion or rack tip. Parameters of linear elastic fracture mechanics. Total energy balance approach. Fracture toughness of materials and crack stability examination. Application in research and engineering practice. 74 LMZ Fracture Mechanics 2 Abstract. Parameters of non-linear elastic-plastic fracture mechanics. Fracture toughness of structural alloys in the case of general yielding. Fatigue of materials. Integration of the control of the students the methods of determination of materials mechanical properties in the micro-volume. The course will focus mainty on the penetration methods (classical hardness tests and nanoindentation, small punch test, scratch tests, etc.). In-situ methods which enable direct observation of micromechanical tests (micropillar compression, microcantilever bending, etc.) in electron microscopes forms the second topic of the course. The practical measurements are the essential part of the course. At the end of the course, the students should be able to choose the appropriate technique (taking into account the advantages and limitations of individual methods) for characterization of the properties of investigated materials/components. 14MIP1 Miniprojects 1 KZ 3 Abstract: The course should complete and extend knowledge gained in theoretical courses. The students carry out two miniprojects of a larger extend on the up to date topic from the field of physical metallurgy, fracture mechanics, material preparation, mechanical characterization of materials, microscopy, non-destructive testing etc. Under the supervision of the lecture, the students get the theoretical basis on the given topic, they will carry out the measurements and perform a critical analysis of the results. The evaluation will be based on the electure, the students get the theoretical basis on the given topic, they	oriented courses of Met	al Physics and Physical Metallurgy 1, added emphasis is placed on applications of real systems in engineering.		
Fracture toughness of materials and crack stability examination. Application in research and engineering practice. 14LM2 Fracture Mechanics 2 Z,ZK 2 Abstract: Parameters of non-linear elastisc-plastic fracture mechanics. Fracture toughness of structural alloys in the case of general yielding. Fatigue of materials-1-undamentals, fatigue crack propagation under various conditions, application of fracture mechanics. Case studies. 14MMIM Micromechanical and Indentation Methods KZ 2 Alm of the course is to present to the students the methods of determination of materials mechanical properties in the micro-volume. The course will focus mainly on the penetration compression, microcartillever bending, etc.) in electron microscopes forms the second topic of the course. The practical measurements are the essential part of the course, the students should be able to choose the appropriate technique (taking into account the advantages and limitations of individual methods) for characterization of the properties of investigated materialis/components. 14MIP1 Miniprojects KZ 3 Abstract: The course should complete and extend knowledge gained in theoretical courses. The students carry out two miniprojects of a larger extent on the up to date topic from the field of physical metallurgy, fracture mechanics, material preparation, mechanical characterization of materials, microscopy, non-destructive testing etc. Under the supervision of the lecturer, the students get the theoretical beasis on the given topic, they will carry out the measurements and perform a critical analysis of the results. The evaluation will be based on the submitted measurement reports. 14MIP2 Miniprojects 2 Mini	14LM1	Fracture Mechanics 1	Z,ZK	2
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during common regular meetings and discussions. 14VUSM2 Research Project 2 KZ 8 Abstract: The research project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor during common regular meetings and discussions. 14UM Fatigue of Materials Abstract: Lectures are concerned with explanation of conditions, causes and mechanisms of fatigue damage, as well as material fatigue characteristics, diagrams, equations and		· · · · · · · · · · · · · · · · · · ·	_	-
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Code of the group: NMSPFIM2

Name of the group: MDP P_FIMN 2nd year Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 9 courses

Credits in the group: 0 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
14ANP	Failure Analysis Jan Siegl, Jaroslav Čech Jan Siegl Jan Siegl (Gar.)	ZK	3	2P+0C	L	Р
14DPSM1	Diploma Thesis 1 Vladislav Oliva, Petr Haušild Vladislav Oliva (Gar.)	Z	10	0+10	3	Р
14DPSM2	Diploma Thesis 2 Petr Haušild Petr Haušild (Gar.)	Z	20	0+20	4	Р
14NDT	Nondestructive Diagnostics Ondřej Kovářík Ondřej Kovářík Ondřej Kovářík (Gar.)	Z	2	2P+0C	Z	Р
14NEKM	Non-metallic Naterials Miroslav Karlík Miroslav Karlík (Gar.)	Z,ZK	2	2P+0C	Z	Р
14PP	Pre-diploma Experience Petr Haušild Petr Haušild (Gar.)	Z	4	2XT	Z	Р
14SMT	Seminar - New Trends in Materials Engineering Aleš Materna, Jiří Kunz Jiří Kunz Jiří Kunz (Gar.)	Z	3	2P+1C	Z	Р
14SFM	Seminar Physics of materials Hynek Lauschmann, Karel Tesař Hynek Lauschmann Karel Tesař (Gar.)	KZ	5	0P+4C	L	Р
11VDM	Intrinsic Dynamics of Materials Hanuš Seiner Hanuš Seiner (Gar.)	ZK	3	2+0	Z	Р

Characteristics of the courses of this group of Study Plan: Code=NMSPFIM2 Name=MDP P FIMN 2nd year

14ANP	Failure Analysis	ZK	3
Abstract: Lectores	summarise basic methods of fractographic analysis used both in the research of new materials and technologies and in the faili	ure analysis of machine	s and structures
The first part of lect	tures deals with historical background of fractography in relation with experimental techniques. The second part deals with deta	il description of differer	nt methodologica
procedures of fract	tographic analysis. All methods are illustrated by the help of case studies realised in fractographic laboratory of the Departm	ent of Materials.	
14DPSM1	Diploma Thesis 1	Z	10
Abstract: The diplor	ma project is based on a topic approved by the administrators of the programme, department and by the dean. The student is	guided by the project s	upervisor during
common regular m	neetings and discussions.		
14DPSM2	Diploma Thesis 2	Z	20
Abstract: The diplo	ma project is based on a topic approved by the administrators of the programme, department and by the dean. The student is	guided by the project s	upervisor during
common regular m	neetings and discussions.		
14NDT	Nondestructive Diagnostics	Z	2
Abstract: The cours	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evalu-	ation (NDE), and inspe	tion (NDI, SHM
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of materials and str	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evalu-	on, nonlinear ultrasoni	spectroscopy
of materials and str	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evalu- tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emissi	on, nonlinear ultrasoni	spectroscopy
of materials and str and tomography, et 14NEKM	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evalu- tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emissi etc.). The education is completed by practical laboratory training in selected methods and also by excursions into industrial co	on, nonlinear ultrasonion pmpanies working on NZ,ZK	spectroscopy DT/NDE.
of materials and str and tomography, et 14NEKM Abstract: This cours	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evalu- tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emission). The education is completed by practical laboratory training in selected methods and also by excursions into industrial contents. Non-metallic Naterials	on, nonlinear ultrasonion mpanies working on NZ,ZK omposites. These mater	spectroscopy DT/NDE.
of materials and str and tomography, et 14NEKM Abstract: This cours	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evalu- tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emissi stc.). The education is completed by practical laboratory training in selected methods and also by excursions into industrial or Non-metallic Naterials rese explains the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and co	on, nonlinear ultrasonion mpanies working on NZ,ZK omposites. These mater	spectroscopy DT/NDE.
of materials and str and tomography, et 14NEKM Abstract: This cours as single material f 14PP	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluative tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emissive.). The education is completed by practical laboratory training in selected methods and also by excursions into industrial composition. Non-metallic Naterials rise explains the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and conforce construction, they can form protective coatings or they may be used as components for the functionally graded materials.	on, nonlinear ultrasonion panies working on Non Z,ZK omposites. These mater	e spectroscopy IDT/NDE. 2 rials can be used
of materials and str and tomography, et 14NEKM Abstract: This cours as single material f 14PP	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluative tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emission). The education is completed by practical laboratory training in selected methods and also by excursions into industrial components. Non-metallic Naterials are explains the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and components for the functionally graded materials. Pre-diploma Experience experience on the given subject in the laboratory.	on, nonlinear ultrasonion panies working on Non Z,ZK omposites. These mater	e spectroscopy IDT/NDE. 2 rials can be used
of materials and strand tomography, et 14NEKM Abstract: This cours as single material f 14PP Abstract: Working & 14SMT	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluative tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emission). The education is completed by practical laboratory training in selected methods and also by excursions into industrial components. Non-metallic Naterials rese explains the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and conforce construction, they can form protective coatings or they may be used as components for the functionally graded materials. Pre-diploma Experience	on, nonlinear ultrasonic ompanies working on N	e spectroscopy DT/NDE. 2 rials can be used 4
of materials and strand tomography, et and tomography, et 14NEKM Abstract: This courses single material full full full full full full full fu	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluative tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emission). The education is completed by practical laboratory training in selected methods and also by excursions into industrial components. Non-metallic Naterials rese explains the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and components for the functionally graded materials. Pre-diploma Experience experience on the given subject in the laboratory. Seminar - New Trends in Materials Engineering	on, nonlinear ultrasonic ompanies working on N	c spectroscopy DT/NDE. 2 rials can be used 4
of materials and strand tomography, et and tomography, et 14NEKM Abstract: This courses single material full full full full full full full fu	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluative tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emissive.). The education is completed by practical laboratory training in selected methods and also by excursions into industrial composition in the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and composition for construction, they can form protective coatings or they may be used as components for the functionally graded materials. Pre-diploma Experience experience on the given subject in the laboratory. Seminar - New Trends in Materials Engineering earch findings in the field of research and development of new materials and technologies, degradation processes, experiments master theses.	on, nonlinear ultrasonic ompanies working on N	e spectroscopy DT/NDE. 2 rials can be used 4
of materials and strand tomography, et and tomography, et 14NEKM Abstract: This cours as single material for 14PP Abstract: Working of 14SMT Abstract: New rese results of the stude 14SFM	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluative tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emission). The education is completed by practical laboratory training in selected methods and also by excursions into industrial components. Non-metallic Naterials rese explains the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and components for the functionally graded materials. Pre-diploma Experience experience on the given subject in the laboratory. Seminar - New Trends in Materials Engineering earch findings in the field of research and development of new materials and technologies, degradation processes, experiments.	on, nonlinear ultrasonic ompanies working on N Z,ZK omposites. These mater Z	c spectroscopy DT/NDE. 2 rials can be used 4 3 ntations of partia
of materials and strand tomography, et and tomography, et 14NEKM Abstract: This cours as single material for 14PP Abstract: Working of 14SMT Abstract: New rese results of the stude 14SFM	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluative tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emissive.). The education is completed by practical laboratory training in selected methods and also by excursions into industrial composition in the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and composition for construction, they can form protective coatings or they may be used as components for the functionally graded materials. Pre-diploma Experience experience on the given subject in the laboratory. Seminar - New Trends in Materials Engineering earch findings in the field of research and development of new materials and technologies, degradation processes, experiments master theses. Seminar Physics of materials on and replenishment of knowledge from the main profile subjects. Case studies.	on, nonlinear ultrasonic ompanies working on N Z,ZK omposites. These mater Z	c spectroscopy DT/NDE. 2 rials can be used 4 3 ntations of partia
of materials and strand tomography, et and tomography, et 14NEKM Abstract: This cours as single material from 14PP Abstract: Working et 14SMT Abstract: New reseresults of the stude 14SFM Abstract: Reiteratio 11VDM	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluative tructures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emissive.). The education is completed by practical laboratory training in selected methods and also by excursions into industrial composition. Non-metallic Naterials rese explains the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and composition of construction, they can form protective coatings or they may be used as components for the functionally graded materials. Pre-diploma Experience experience on the given subject in the laboratory. Seminar - New Trends in Materials Engineering earch findings in the field of research and development of new materials and technologies, degradation processes, experiments master theses. Seminar Physics of materials	on, nonlinear ultrasonic ompanies working on N Z,ZK omposites. These mater Z Z tal methods etc. Preser KZ	c spectroscopy DT/NDE. 2 rials can be use 4 3 ntations of partia

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 0

The role of the block: PV

Code of the group: NMSPFIMPV1

Name of the group: MDP P_FIMN Required optional courses 1st year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 1 course

Credits in the group: 0

Note on the group: Student si volí alespoň 1 předmět

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
01ASM	Application of Statistical Methods Tomáš Hobza Tomáš Hobza (Gar.)	KZ	2	2+0		PV
01VAMB	Variational Methods B	KZ	2	2	Z	PV

Characteristics of the courses of this group of Study Plan: Code=NMSPFIMPV1 Name=MDP P_FIMN Required optional courses 1st year

O1ASM Application of Statistical Methods KZ 2
The course focuses on applications of selected methods of statistical data analysis to concrete problems including their solutions using statistical software. Namely we will deal with: hypotheses tests about parameters of normal distribution, nonparametric methods, contingency tables, linear regression and correlation, analysis of variance.

hypotheses tests about parameters of normal distribution, nonparametric methods, contingency tables, linear regression and correlation, analysis of variance.

O1VAMB Variational Methods B

The course is devoted to the methods of classical variational calculus - functional extrema by Euler equations, second functional derivative, convexity or monotonicity. Further, it contains investigation of quadratic functional, generalized solution, Sobolev spaces and variational problem for elliptic PDE's.

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

The role of the block: V

Code of the group: NMSPFIMV

Name of the group: MDP P_FIMN Optional courses

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

Credits in the group: 0 Note on the group:

problems.

Note on the grou	· ·					
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
11AND	Applied Neutron Diffractometry Monika Kučeráková, Stanislav Vratislav Stanislav Vratislav Stanislav Vratislav (Gar.)	ZK	2	2	Z	V
11DAN	Diffraction Analysis of Mechanical Stress Nikolaj Ganev, Ivo Kraus Ivo Kraus Nikolaj Ganev (Gar.)	ZK	2	2	Z	V
11FPPL	Physics of Solid State Phase Transitions Jiří Hlinka Jiří Hlinka Jiří Hlinka (Gar.)	ZK	2	2	L	٧
11FPOR	Physics of Surfaces and Interfaces Ladislav Kalvoda, Jakub Skočdopole Ladislav Kalvoda Ladislav Kalvoda (Gar.)	ZK	2	2P+0C	Z	V
04MGA1	English for Academic Purposes Speaking Practice - intermediate Nathaniel Patton (Gar.)	Z	2	0+2	L,Z	V
04MGA2	Academic English Writing and Presentation Course - intermadiate Darren Copeland (Gar.)	Z	2	0+2	L,Z	V
11NAMA	Nanomaterials - Preparation and Characteristics Irena Kratochvílová Irena Kratochvílová (Gar.)	Z,ZK	2	2+0	L	V
11NMV	Neutronography in Material Research Monika Kučeráková, Stanislav Vratislav Monika Kučeráková Stanislav Vratislav (Gar.)	ZK	2	2	L	V
11SMAM	Smart Materials and Their Applications Zdeněk Potůček, Petr Sedlák Zdeněk Potůček Zdeněk Potůček (Gar.)	ZK	2	2+0	Z	٧
01SKE	System Reliability and Clinical Experiments Václav Kůs Václav Kůs Václav Kůs (Gar.)	KZ	3	2+0	L	٧
01SUP	Start-up Project Přemysl Rubeš Přemysl Rubeš (Gar.)	KZ	2	2P+0C		٧
14UAOB	Introduction to image analysis Hynek Lauschmann Hynek Lauschmann (Gar.)	KZ	2	1P+1C		٧
12PYTHN	Scientific Programming in Python Jakub Urban, Pavel Váchal Pavel Váchal Pavel Váchal (Gar.)	Z	2	0+2	L	٧

Characteristics of the courses of this group of Study Plan: Code=NMSPFIMV Name=MDP P_FIMN Optional courses

11AND	Applied Neutron Diffractometry	ZK	2
This lecture introduces	the neutron diffraction method as the method used in solid state physics research and the materials sciences. The basic princ	ciples of the nucle	ar and magnetic
neutron scattering are g	jiven, as well as the comparative properties to the X-ray method. The basic concept of this method is illustrated by many prac	ctical examples.	

11DAN Diffraction Analysis of Mechanical Stress ZK 2
Course description: The course contains the fundamentals of diffraction stress analysis with a strong emphasis on the illustrations of the capability of X-ray diffraction to solve engineering

11FPPL	Physics of Solid State Phase Transitions	ZK	2
A number of interesting	properties of crystalline materials are directly related or significantly influenced by occurrence of specific phase transitions. T	he purpose of this	course is to
provide unifying view or	various types phase transitions encountered in solid state physics, with the emphasize on continuous symmetry braking pha	ase transitions.	
11FPOR	Physics of Surfaces and Interfaces	ZK	2
Description is provided	of basic thermodynamic properties, atomary and electronic structure of surfaces and interfaces. The physical models valid for	r bulk sysstems ar	e juxtaposed
with the changes due to	introduction of new surface/interface. The theoretical treatment is followed by overview of experimental techniques applied to	preparation of su	rface structures
and to study of chemica	l composition and structural arrangement of the latter. In addition, brief overview is given of simulation approaches suitable fo	or analysis and pre	ediction of
properties of selected s	ystems. All the subjects are demonstrated on praktical exaples of case studies.		
04MGA1	English for Academic Purposes Speaking Practice - intermediate	Z	2
Optional course offers N	Aaster's Degree students at intermediate level of English a chance to improve, develop, and strengthen their vocabulary and	speaking skills. Co	
l .	professional interests and situations of students and choice of topics will be agreed on with tutor. Course is a non-graded ass		•
04MGA2	Academic English Writing and Presentation Course - intermadiate	Z	2
	ible free sequel to course 04MGA1, offers Master's degree students at intermediate level of English a chance to develop, imp	orove, and strengtl	hen their writing
' ' '	Syllabus will respond to specific professional needs of participants, but will include also writing and preparing a presentation	, ,	0
	aster thesis in English and presenting chosen facts. Course will thus prepare students for presentations at conferences. Course		
course.		· ·	
11NAMA	Nanomaterials - Preparation and Characteristics	Z.ZK	2
	ethods of preparation of nanomaterials, their structure, specific properties and applications. The properties of carbon and silic	_,	nd lavers will be
	aim of the subject is to explain the relationships between physical / chemical properties of nanoparticulate materials and their		•
11NMV	Neutronography in Material Research	ZK	2
	powerful method for a detailed understanding of the static and dynamic properties on atomic scale of materials in many field		
	fundamental principles of nuclear and magnetic scattering and penetration of thermal neutrons. From this point of view the follo		=
	o industrial scaling, neutron penetration though machinable materials (and consequent case of construction of environmental ch	• .	
· ·	possibilities. Examples of the different neutron scattering techniques are given.	,,	
11SMAM	Creary Materials and Their Applications		
	Smart Materials and Their Additions	<i>7</i> K	2
Smart or responsive ma	Smart Materials and Their Applications terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by cha	ZK Inges in some exte	2 ernal conditions.
1	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by cha	nges in some exte	ernal conditions.
The properties respond	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chang to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for	inges in some exter r. The number of th	ernal conditions. neir applications
The properties respond is growing steadily. Pass	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chaing to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for sive and active vibration damping, airbag sensors, acoustic transducers, precision positioners, miniature ultrasonic motors, variety.	inges in some exter r. The number of the ascular stents, eye	ernal conditions. neir applications eglass frames,
The properties respond is growing steadily. Pass cellular phone antennas	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chang to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for	inges in some exter The number of the ascular stents, eye physical propertie	ernal conditions. neir applications glass frames, es, experimental
The properties respond is growing steadily. Pass cellular phone antennas methods of investigation	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chain go to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for sive and active vibration damping, airbag sensors, acoustic transducers, precision positioners, miniature ultrasonic motors, var, light sensitive glasses or photochromic and thermochromic clothes could serve as a few examples. Lectures are focused on	inges in some exte r. The number of the scular stents, eye physical propertic dielectric elastome	ernal conditions. neir applications iglass frames, es, experimental ers, ferroelectric
The properties respond is growing steadily. Pass cellular phone antennas methods of investigation materials and shape-me	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chain good to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for sive and active vibration damping, airbag sensors, acoustic transducers, precision positioners, miniature ultrasonic motors, var, light sensitive glasses or photochromic and thermochromic clothes could serve as a few examples. Lectures are focused on and possible application of color changing materials, light emitting materials, piezoelectric materials, conducting polymers, commonly materials. Attention is also paid to the effect of phase transitions on physical properties of smart materials and to their	inges in some externations. The number of the scular stents, eye physical propertied dielectric elastomenumerical simulat	ernal conditions. neir applications iglass frames, es, experimental ers, ferroelectric ions.
The properties respond is growing steadily. Pass cellular phone antennas methods of investigation materials and shape-methods of the standard shape of the	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chang to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for sive and active vibration damping, airbag sensors, acoustic transducers, precision positioners, miniature ultrasonic motors, var, light sensitive glasses or photochromic and thermochromic clothes could serve as a few examples. Lectures are focused on and possible application of color changing materials, light emitting materials, piezoelectric materials, conducting polymers, comory materials. Attention is also paid to the effect of phase transitions on physical properties of smart materials and to their System Reliability and Clinical Experiments	inges in some extern. The number of the scular stents, eye physical propertied dielectric elastomenumerical simulat	ernal conditions. neir applications glass frames, es, experimental ers, ferroelectric ions.
The properties respond is growing steadily. Pass cellular phone antennas methods of investigation materials and shape-methods. The main goal of the sul	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chang to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for sive and active vibration damping, airbag sensors, acoustic transducers, precision positioners, miniature ultrasonic motors, various tive glasses or photochromic and thermochromic clothes could serve as a few examples. Lectures are focused on and possible application of color changing materials, light emitting materials, piezoelectric materials, conducting polymers, commony materials. Attention is also paid to the effect of phase transitions on physical properties of smart materials and to their system Reliability and Clinical Experiments System Reliability and Clinical Experiments Diect is to provide the mathematical principles of reliability theory and techniques of survival data analysis, reliability of componing the componing transitions are provided to the mathematical principles of reliability theory and techniques of survival data analysis, reliability of componing the componing transitions are provided to the mathematical principles of reliability theory and techniques of survival data analysis, reliability of componing transitions are provided to the componing transitions are provided to the componing transitions and the provided transitions are provided to the componing transitions and the provided transitions are provided to the componing transitions are provided to the componing transitions and the provided transitions are provided to the componing transitions and the provided transitions are provided to the componing transitions and the provided transitions are provided transitions.	Inges in some extern. The number of the scular stents, eye physical propertied dielectric elastomenumerical simulat KZ ent systems, asyr	ernal conditions. neir applications glass frames, es, experimental ers, ferroelectric ions. 3 nptotic methods
The properties respond is growing steadily. Pass cellular phone antennas methods of investigation materials and shape-methods. The main goal of the sulfor reliability, concept of	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chang to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for sive and active vibration damping, airbag sensors, acoustic transducers, precision positioners, miniature ultrasonic motors, various to ensure the sensitive glasses or photochromic and thermochromic clothes could serve as a few examples. Lectures are focused on and possible application of color changing materials, light emitting materials, piezoelectric materials, conducting polymers, of emory materials. Attention is also paid to the effect of phase transitions on physical properties of smart materials and to their system Reliability and Clinical Experiments System Reliability and Clinical Experiments Diject is to provide the mathematical principles of reliability theory and techniques of survival data analysis, reliability of componexperiments under censoring and their processing in clinical trials (life-time models). The techniques are illustrated and teste	Inges in some extern. The number of the scular stents, eye physical propertied dielectric elastomenumerical simulat KZ ent systems, asyr	ernal conditions. neir applications glass frames, es, experimental ers, ferroelectric ions. 3 nptotic methods
The properties respond is growing steadily. Pass cellular phone antennas methods of investigation materials and shape-methods. The main goal of the sulfor reliability, concept of originating from lifetime.	terials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by chang to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for sive and active vibration damping, airbag sensors, acoustic transducers, precision positioners, miniature ultrasonic motors, verall, light sensitive glasses or photochromic and thermochromic clothes could serve as a few examples. Lectures are focused on and possible application of color changing materials, light emitting materials, piezoelectric materials, conducting polymers, of emory materials. Attention is also paid to the effect of phase transitions on physical properties of smart materials and to their system Reliability and Clinical Experiments System Reliability and Clinical Experiments Diject is to provide the mathematical principles of reliability theory and techniques of survival data analysis, reliability of compon experiments under censoring and their processing in clinical trials (life-time models). The techniques are illustrated and teste material experiments and clinical trials.	Inges in some extent. The number of the scular stents, eye physical properties dielectric elastome numerical simulat KZ ent systems, asynd within practical	ernal conditions. neir applications glass frames, ses, experimental errs, ferroelectric ions. 3 nptotic methods examples
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List of courses of this pass:

Completion Credits

Name of the course

Code

01ASM	Application of Statistical Methods	KZ	2	
The course focuse	es on applications of selected methods of statistical data analysis to concrete problems including their solutions using statistical softw	are. Namely we wi	Il deal with:	
hypoth	eses tests about parameters of normal distribution, nonparametric methods, contingency tables, linear regression and correlation, ar	alysis of variance.		
01SKE	System Reliability and Clinical Experiments	KZ	3	
The main goal of the subject is to provide the mathematical principles of reliability theory and techniques of survival data analysis, reliability of component systems, asymptotic metho				
for reliability, co	ncept of experiments under censoring and their processing in clinical trials (life-time models). The techniques are illustrated and teste	d within practical e	xamples	
	originating from lifetime material experiments and clinical trials.			
01SUP	Start-up Project	KZ	2	
01VAMB	Variational Methods B	KZ	2	
The course is devo	ted to the methods of classical variational calculus - functional extrema by Euler equations, second functional derivative, convexity or m	onotonicity. Furthe	r, it contains	
	investigation of quadratic functional, generalized solution, Sobolev spaces and variational problem for elliptic PDE's.			
04MGA1	English for Academic Purposes Speaking Practice - intermediate	Z	2	
Optional course o	ffers Master's Degree students at intermediate level of English a chance to improve, develop, and strengthen their vocabulary and sp	eaking skills. Cour	se syllabus	
will respond to specific professional interests and situations of students and choice of topics will be agreed on with tutor. Course is a non-graded assessment course.				
04MGA2	Academic English Writing and Presentation Course - intermadiate	Z	2	
Optional course, a possible free sequel to course 04MGA1, offers Master's degree students at intermediate level of English a chance to develop, improve, and strengthen their writing				
and presentation skills. Syllabus will respond to specific professional needs of participants, but will include also writing and preparing a presentation on own research topic, a search,				

instruction on writing Master thesis in English and presenting chosen facts. Course will thus prepare students for presentations at conferences. Course is course.	s a non-graded as	sessment
11AND Applied Neutron Diffractometry	ZK	2
This lecture introduces the neutron diffraction method as the method used in solid state physics research and the materials sciences. The basic principles neutron scattering are given, as well as the comparative properties to the X-ray method. The basic concept of this method is illustrated by many		_
11DAN Diffraction Analysis of Mechanical Stress	ZK	2
Course description: The course contains the fundamentals of diffraction stress analysis with a strong emphasis on the illustrations of the capability of X-ray d problems.		
11FPOR Physics of Surfaces and Interfaces	ZK	2
Description is provided of basic thermodynamic properties, atomary and electronic structure of surfaces and interfaces. The physical models valid for bu	, ,	•
with the changes due to introduction of new surface/interface. The theoretical treatment is followed by overview of experimental techniques applied to prepare and to study of chemical composition and structural arrangement of the latter. In addition, brief overview is given of simulation approaches suitable for properties of selected systems. All the subjects are demonstrated on praktical exaples of case studies.		
11FPPL Physics of Solid State Phase Transitions	ZK	2
A number of interesting properties of crystalline materials are directly related or significantly influenced by occurrence of specific phase transitions. The		
provide unifying view on various types phase transitions encountered in solid state physics, with the emphasize on continuous symmetry braking		
11NAMA Nanomaterials - Preparation and Characteristics	Z,ZK	2
The course describes methods of preparation of nanomaterials, their structure, specific properties and applications. The properties of carbon and silicon r		
analyzed in detail. The aim of the subject is to explain the relationships between physical / chemical properties of nanoparticulate materials and their	main structural fea	atures.
11NMV Neutronography in Material Research	ZK	2
Neutron diffraction is a powerful method for a detailed understanding of the static and dynamic properties on atomic scale of materials in many field of	sciences and indu	
course introduces to the fundamental principles of nuclear and magnetic scattering and penetration of thermal neutrons. From this point of view the followin	g aspects are very	important:
sample size in relation to industrial scaling, neutron penetration though machinable materials (and consequent case of construction of environmental chamb	pers), neutron atom	nic contrast
and magnetic scattering possibilities. Examples of the different neutron scattering techniques are given.		
11SMAM Smart Materials and Their Applications	ZK	2
Smart or responsive materials have one or more properties, such as shape, conductivity or color, that can be dramatically and reversibly altered by changes	s in some external	conditions.
The properties responding to external stimuli (heat, stress, electric field, light) influences what types of applications the smart material can be used for. The	e number of their a	pplications
is growing steadily. Passive and active vibration damping, airbag sensors, acoustic transducers, precision positioners, miniature ultrasonic motors, vascu	· -	
cellular phone antennas, light sensitive glasses or photochromic and thermochromic clothes could serve as a few examples. Lectures are focused on physical countries are focused on physical countries and thermochromic clothes could serve as a few examples. Lectures are focused on physical countries are focused on physical countries are focused on physical countries.		•
methods of investigation and possible application of color changing materials, light emitting materials, piezoelectric materials, conducting polymers, diele-		
materials and shape-memory materials. Attention is also paid to the effect of phase transitions on physical properties of smart materials and to their		
11VDM Intrinsic Dynamics of Materials	ZK	3
The course gives an introductory overview of dynamical phenomena taking place in the materials, with the main focus laid on the elastic wave propagation	n (and its interaction	on with the
microstructure), dynamic plasticity, phase transition fronts kinetics, and dynamic fracture mechanics.		2
12PYTHN Scientific Programming in Python The aim of this course is to learn the fundamentals of the modern Python programming language with a focus on scientific computing. Emphasis is placed	Z	_
problems. The course is to rear the fundamentals of the modern rythor programming ranguage with a focus on scientific computing. Emphasis is placed problems. The course is performed in an interactive form of practical exercises, whose topics are tailored to the content of other subjects, study level, and		
also involved in ongoing research. In the introductory part of the course, students learn the basic features of Python?from basic types to object oriented		
The greater part of the course focuses on specific features of Python for scientific programming. Presented are the main numerical libraries NumPy, SciP		_
library. We show how to generate efficient code, how to combine Python with other languages, what tools are available.		
14ADYK Applied Dynamics of Continuum	Z,ZK	2
Abstract: Natural, free, transient and forced vibrations of continuous systems (strings, rods, beams, membranes, plates, shells), equations of motion, m	ethod of solution a	ınd basic
dynamical characteristics.		
14ANP Failure Analysis	ZK	3
Abstract: Lectores summarise basic methods of fractographic analysis used both in the research of new materials and technologies and in the failure analysis		
The first part of lectures deals with historical background of fractography in relation with experimental techniques. The second part deals with detail description		nodological
procedures of fractographic analysis. All methods are illustrated by the help of case studies realised in fractographic laboratory of the Department of the		
14DPSM1 Diploma Thesis 1	Z	10
Abstract: The diploma project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by	the project superv	isor during
common regular meetings and discussions.		
14DPSM2 Diploma Thesis 2	Z	20
Abstract: The diploma project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by	tne project superv	isor during
common regular meetings and discussions.	7.71/	4
14EM2 Elasticity 2 Abstract: The course deals with an advanced theory of elasticity - buckling of long straight columns, torsion of non-circular shafts, various plane stress	Z,ZK	4
Kirchhoff's plates, shells. The emphasis is made on methods and results relevant to general solid mechanics and materials science ap		iobieiris,
14EXME Experimental Mechanics	KZ	5
Abstract: The course represents an overview of current experimental methods and procedures in the following fields: - experimental analysis of the main n		
displacement, force, torque, pressure, etc.), - experimental dynamics (shakers, vibration transducers, damping, balancing, vibroanalysis). Every four hours	· ·	-
into theoretical and experimental. The presented methods are immediately demonstrated in the laboratory in groups of maximally three students organiz	· · · · · · · · · · · · · · · · · · ·	-
team ha a tutor at hand to guide the students through the experimental task and to solve an eventual problems. One student is designated a team leader		
proper fulfilment of the experimental task and prepares a experimental report at home and hands it back in one month time.		
14FME1 Physical Metallurgy 1	Z,ZK	5
Abstract: Basic principles of metal physics, acquired in preceding courses, are extended to the applications in the field of processing and thermo mechanisms	anical treatment of	different
structural materials. Furthermore, an introduction to degradation processes as radiation damage, oxidation and corrosion is give		
14FME2 Physical Metallurgy 2	Z,ZK	3
Abstract: The course is based on previously acquired general physical and physical metallurgical knowledge and applies this knowledge to real systems		
multicomponent Fe and Ni -based alloys, etc., which are the basis of steels and special structural materials. Since the Physical Metallurgy 2 builds on the	-	eoretically
oriented courses of Metal Physics and Physical Metallurgy 1, added emphasis is placed on applications of real systems in engine	ering.	

14FPU	Functional Surface Modifications	KZ	2
	es of surface modification according to technology and application. Surface modification and coating technologies. Process parameters rties. Coating materials, deposition technologies and application areas. Additive manufacturing and near net shape deposition. Visits to		
and coating proper	preparation and characterization of coatings.	inermai spray labs.	. Laboratory
14FRAM	Fractography and Microanalysis	Z,ZK	2
Abstract: Basic a	and accessible methods of experimental materials characterization in microvolume, their application in the study of material properties	and in the domain	of failure
	analysis. Relationships between processing technology, mechanical properties and failure processes.		
14LM1	Fracture Mechanics 1 sms and modes of fracture. Stress and strain field in the vicinity of notch or crack tip. Parameters of linear elastic fracture mechanics. To	Z,ZK	2
Abstract. Mechanis	Fracture toughness of materials and crack stability examination. Application in research and engineering practice.	nai energy balance	е арргоасп.
14LM2	Fracture Mechanics 2	Z,ZK	2
Abstract: Paramete	ers of non-linear elastic-plastic fracture mechanics. Fracture toughness of structural alloys in the case of general yielding. Fatigue of ma		tals, fatigue
	crack propagation under various conditions, application of fracture mechanics. Case studies.		_
14MIP1	Miniprojects 1 rse should complete and extend knowledge gained in theoretical courses. The students carry out two miniprojects of a larger extent or	KZ	3
	netallurgy, fracture mechanics, material preparation, mechanical characterization of materials, microscopy, non-destructive testing etc.		
	ents get the theoretical basis on the given topic, they will carry out the measurements and perform a critical analysis of the results. The submitted measurement reports.	•	
14MIP2	Miniprojects 2	KZ	3
	rse should complete and extend knowledge gained in theoretical courses. The students carry out two miniprojects of a larger extent of		
	netallurgy, fracture mechanics, material preparation, mechanical characterization of materials, microscopy, non-destructive testing etc. ents get the theoretical basis on the given topic, they will carry out the measurements and perform a critical analysis of the results. Th	-	
lecturer, the stude	the submitted measurement reports.		e based on
14MMIM	Micromechanical and Indentation Methods	KZ	2
	is to present to the students the methods of determination of materials mechanical properties in the micro-volume. The course will for all hardness tests and nanoindentation, small punch test, scratch tests, etc.). In-situ methods which enable direct observation of micro		
,	ocantilever bending, etc.) in electron microscopes forms the second topic of the course. The practical measurements are the essentia	,	
of the course, the	e students should be able to choose the appropriate technique (taking into account the advantages and limitations of individual metho properties of investigated materials/components.	ds) for characteriza	ation of the
14NDT	Nondestructive Diagnostics	Z	2
	se is devoted to acquaintance with theoretical and practical grounding and applications of nondestructive testing (NDT), evaluation (ND		
	structures. Besides the standard NDT methods, the lectures also deal with the newest NDT/NDE procedures (acoustic emission, nonl ny, etc.). The education is completed by practical laboratory training in selected methods and also by excursions into industrial compar		
14NEKM	Non-metallic Naterials	Z,ZK	2
	rse explains the structure and basic properties of important non-metallic materials, such as ceramics, glass, polymers and composites	· / /	can be used
	as single material for construction, they can form protective coatings or they may be used as components for the functionally graded		
14PLA	Plasticity	Z,ZK	3
	ction to plasticity of materials and structures in terms of classical continuum mechanics. The first part contains the general incrementa ng criterion, flow rule and corresponding physical equations including the deformation theory. Then engineering solutions of elastic-pla		
_	se of bars, beams and pressure vessels are presented. The second part is devoted to methods and knowledge useful for material scie		-
plastic deformation	n around notches and cracks, limit theorems and their applications to estimation of the plastic collapse, localization of plastic deformation	before the fracture,	, differences
	between plasticity in plane stress and strain, elastic-plastic response to cyclic load.		
14PM	Computational Mechanics and application of the finite element method in the mechanics of deformable bodies. Lectures are accompanied by model examples w	KZ	2
Abstract. Theory	basic principles of building the correct numerical models.	mon anns to demo	iistiate tile
14PP	Pre-diploma Experience Abstract: Working experience on the given subject in the laboratory.	Z	4
14SFM	Seminar Physics of materials	KZ	5
1 101 141	Abstract: Reiteration and replenishment of knowledge from the main profile subjects. Case studies.	112	
14SMT	Seminar - New Trends in Materials Engineering	Z	3
Abstract: New rese	earch findings in the field of research and development of new materials and technologies, degradation processes, experimental metho results of the students master theses.	ds etc. Presentatio	ns of partial
14UAOB	Introduction to image analysis	KZ	2
The aim of the lect	ure is an introduction to selected basic methods of image processing and analysis with an emphasis on the applications to material engi tasks built in Matlab are presented.	neering. Solutions	of particular
14UM	Fatigue of Materials	KZ	2
Abstract: Lecture	es are concerned with explanation of conditions, causes and mechanisms of fatigue damage, as well as material fatigue characteristic computational algorithms.	s, diagrams, equa	tions and
14VUSM1	Research Project 1	Z	6
Abstract: The res	Search project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guid during common regular meetings and discussions.	ed by the project s	supervisor
14VUSM2	Research Project 2	KZ	8
Abstract: The res	search project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guid	ed by the project s	supervisor

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during common regular meetings and discussions.