Study plan

Name of study plan: Biomedical Technician - full time study in English

Faculty/Institute/Others: Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Biomedical and Clinical Technology (study in english language) Type of study: Bachelor full-time Required credits: 180 Elective courses credits: 0 Sum of credits in the plan: 180 Note on the plan:

Name of the block: Compulsory courses Minimal number of credits of the block: 170 The role of the block: Z

Code of the group: 17ABB POV 17 Name of the group: Biomedical Technician AJ compulsory course 17 Requirement credits in the group: In this group you have to gain 170 credits Requirement courses in the group: In this group you have to complete 52 courses Credits in the group: 170 Note on the group:

Note on the gr	•				· · · · · · · · · · · · · · · · · · ·	
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
17ABBALP	Algorithmic and Programming Theory	KZ	4	2P+2C	Z	Z
17ABBAF1	Anatomy and Physiology I	Z,ZK	5	2P+1S+1L	Z	Z
17ABBAF2	Anatomy and Physiology II	Z,ZK	5	2P+1S+1L	_ L	Z
17ABBA3A	English Language IIIA (part 1)	KZ	2	2S	Z	Z
17ABBA3B	English III.	KZ	2	2S	L	Z
17ABBBP	Bachelor Thesis Ji í Hozman Ji í Hozman Ji í Hozman (Gar.)	Z	8	8L	L	Z
17ABOZP	Occupational Safety and Health, Fire Protection and First Aid Petr Kudrna Petr Kudrna (Gar.)	Z	0	1P	Z	Z
17ABBBCH	Biochemistry Iveta Horá ková	ΚZ	2	1P+1L	L	Z
17ABBBLS	Biological Signals Václava Piorecká	Z,ZK	4	2P+2C	L	Z
17ABBBLG	Biology	Z,ZK	4	2P+2L	Z	Z
17ABBBB	Biomechanics and Biomaterials Petr Volf, Matej Daniel Petr Volf Matej Daniel (Gar.)	Z,ZK	4	2P+2L	Z	Z
17ABBBOZP	Safety Regulations and Standards in Electrical Engineering Petr Kudrna	Z	1	1P	Z	Z
17ABBCHM	Chemistry Iveta Horá ková	Z,ZK	4	2P+1C+1L	_ L	Z
17ABBEM	Electrical Measurements Jan Vrba	Z,ZK	4	2P+2L	Z	Z
17ABBELFA	Electrophysiology	Z,ZK	2	1P+1L	Z	Z
17ABBEO	Electronic Circuits	Z,ZK	4	2P+2C	Z	Z
17ABBESL	Electronic Elements and Sensors in Medicine David Vrba	Z,ZK	4	2P+2L	L	Z
17ABBEBI	Ethics in Biomedical Engineering	KZ	2	2P	Z	Z
17ABBFY1	Physics I	Z,ZK	5	2P+1S+1L	Z	Z
17ABBFY2	Physics II	Z,ZK	5	2P+1S+1L	_ L	Z
17ABBFCH	Physical Chemistry Iveta Horá ková	Z,ZK	4	2P+1S+1L	Z	Z

17ABBISZ	Information Systems in Health Care Zoltán Szabó, David Jirsa, Michal Reimer Zoltán Szabó Zoltán Szabó (Gar.)	Z,ZK	4	2P+2C	Z	z
17ABBITT	Information Technology and Telemedicine	ZK	2	2P	Z	z
17ABBITP	Integral Calculus	Z,ZK	5	2P+2C	L	Z
17ABBKZS	Conventional Imaging Systems Ji í Hozman	Z,ZK	4	2P+2C	L	z
17ABBLT	Clinical Laboratory Instrumentation Martina Turchichová, Stanislav Gajdoš, Iveta Horá ková Iveta Horá ková Martina Turchichová (Gar.)	Z,ZK	4	2P+2L	L	z
17ABBLTR	Medical Terminology	Z	1	1P	Z	z
17ABBLPZ1	Medical Devices & Equipment Petr Kudrna, Karel Roubík Petr Kudrna Karel Roubík (Gar.)	Z,ZK	4	2P+2L	Z	Z
17ABBLPZ2	Medical Devices and Equipments (Therapeutical Devices) Lenka Horáková, Petr Kudrna Petr Kudrna	Z,ZK	4	2P+2L	L	Z
17ABBLAD	Linear Algebra and Differential Calculus	Z,ZK	4	2P+2S	Z	Z
17ABBMAZ	Management and Administration in Healthcare	KZ	1	1P	L	Z
17ABBMZT	Management of Health Care Technology Ji í Hozman	Z,ZK	2	1P+1S	L	Z
17ABBMEC	Mechanics	Z,ZK	4	2P+2L	L	Z
17ABBMVP	Research Methodology Jakub Ráfl	KZ	2	1P+1S	Z	Z
17ABBMS	Modelling and Simulation	Z,ZK	4	2P+2C	L	Z
17ABBNMP	Project Proposal and Management	ΚZ	2	1P+1C	L	Z
17ABBOIZ	Protection Against Effects of Ionizing Radiation	KZ	2	2P	L	Z
17ABBPPSA	Patient and Device Simulators and Testers Petr Kudrna	Z,ZK	4	2P+2L	Z	Z
17ABBPPM	Programming in Matlab Zoltán Szabó	KZ	2	2C	Z	Z
17ABBPNK	Design and Construction of Medical Devices/Practical Exercises Jana Mat jková, Roman Mat jka Roman Mat jka (Gar.)	KZ	2	2L	Z	Z
17ABBPMS	Probability and Mathematical Statistics	Z,ZK	4	2P+2C	Z	Z
17ABBPP	First Aid	KZ	2	1P+1C	L	Z
17ABBPSL	Psychology Ji í Hozman	KZ	2	1P+1S	Z	Z
17ABBROP	Guided Practical Training Petr Kudrna	Z	0	100XH	L	Z
17ABBSPR2	Semestral Project II. Petr Kudrna Petr Kudrna Petr Kudrna (Gar.)	KZ	4	4S	Z	Z
17ABBSEL	Power Engineering Ji í Hozman	Z,ZK	4	2P+2L	L	Z
17ABBSPT	Equipments for Anaesthesiology and Resuscitation Jakub Ráfl	Z,ZK	4	1P+1L	L	Z
17ABBTEL	Theory of Electrical Engineering	Z,ZK	4	2P+2L	L	Z
17ABBTZS	Tomographical Imaging Systems Ji í Hozman	Z,ZK	4	2P+2C	Z	Z
17ABBUSS	Introduction to Signals and Systems	Z,ZK	4	2P+2C	Z	z
17ABBZPD	Fundamentals of Pathology, Hygiene and Epidemiology	ZK	4	3P	L	Z
17ABBZLN	Legislation in Health Care and Technical Standards Ond ej Gajdoš, Vojt ch Kamenský Vojt ch Kamenský Peter Kneppo (Gar.)	KZ	2	1P+1S	Z	Z

Characteristics of the courses of this group of Study Plan: Code=17ABB POV 17 Name=Biomedical Technician AJ compulsory course 17

17ABBALP	Algorithmic and Programming Theory	KZ	4		
Algorithm, data structure	se Identifiers, data types. assignment statement, conditional statement, cycles. Arithmetical and logical operations. Digital repr	esentation of num	bers, numeration		
systems. Introduction to	structured programming in C language - building and structure of simple programs, creating of the user functions, user inpu	t and output, file r	nanagement,		
memory management.	memory management. Practical overview of programming techniques and basic algorithms in C language. Recursive and iterative methods, measuring algorithm quality. Abstract data-				
types, data sorting and	types, data sorting and searching, implementation of basic numerical algorithms. Introduction to biomedical data processing - programmers view. Introduction to software engineering.				
17ABBAF1	Anatomy and Physiology I	Z,ZK	5		
Anatomy and physiolog	y I covers functional aspects of particular organs and their systems.				
17ABBAF2	Anatomy and Physiology II	Z,ZK	5		
Anatomy and physiolog	y II links to Anatomy and Physiology I. The subject covers functional aspects of particular organs and their systems.				
17ABBA3A	English Language IIIA (part 1)	KZ	2		
The aim of the course is	s to increase students' language competence in academic English and professional vocabulary, along with common commur	nication skills - wri	ting summaries,		
preparing presentations	preparing presentations for meetings. Students should be able to work actively with academic text, understand and be able to use basic terminology, be aware of the different stylistic				
levels of English and the associated syntactic and lexical devices.					
17ABBA3B	English III.	KZ	2		
Academic and profession	emic and professional English				

17ABBBP	Bachelor Thesis	Z	8
	ts at the end of bachelor studies. Topics are selected during the 5th term from a list. Bachelor thesis is defended at the end o	1	-
	of the state exam. Bachelor thesis can be written and defended either Czech or English. Students are supervised by a tutor du		-
17ABOZP	Occupational Safety and Health, Fire Protection and First Aid	Z	0
17ABBBCH	Biochemistry	KZ	2
-	be introduced to the basics of Biochemistry. The course builds on the knowledge gained in general chemistry and extends the	1	
	nterpretation goes through the basic building structures of biological systems (amino acids, peptides, proteins, lipids, carbohy	-	
membranes and molec	ular genetics to the most important metabolic processes. Particular attention is paid to the aspects necessary for understand	ing the methods of	of work in the
biochemical and clinica	I laboratory, which are part of the follow-up chemical discipline. The laboratories are focused on broadening the topics discusse	ed in the lectures a	nd their practical
training, especially on	he determination of biomolecules and the verification of their properties. Students should become familiar with the basic labo	ratory techniques	of Biochemistry.
17ABBBLS	Biological Signals	Z,ZK	4
The subject deals with	brigins and description of the most important electric and non-electric biological signals. The principles of generation, recordin	g and basic prope	rties are studied
in all the signals. The s	udied signals involve native and evoked biosignals, including biological signals of the heart, brain, muscles, nervous system,	auditory signals,	visual system,
signals from the gastro-	intestinal system etc. Advanced methods of digital biosignal processing, spectrum analysis, modern methods of artificial intellige	ence, features extra	action, automatic
classification, graphic p	resentation of results. Adaptive segmentation, artificial neural networks for signal procesing.		
17ABBBLG	Biology	Z,ZK	4
	t the cellular level of organisms - from acelullar through prokaryotic to eukaryotic. The viruses. Prokaryotic cells. Bacteria. Bac		
-	and animal cell structure and function. Structure and conformation of biopolymers (nucleid acids and proteins). The nucleus, I		
	n: endoplasmic reticulum, the Golgi apparatus, lysosomes, vacuoles. Semiautonomic organelles: mitochondria, sites of respir		
	gin of eukaryotes: endosymbiotic hypothesis. Ribosomes. The cytoskeleton: microtubules, microfilaments. The cell cycle: mitc		
	division of cell nucleus - amitosis, mitosis, phases of mitosis, the mitotic spindle; meiosis. The cell division - cytokinesis. Cell di		
	n and modern genetics: structure, function and inheritance of genes. Includes the chemistry and structure of chromatin and chro	omosomes. Anima	tissue histology.
	s. Human genetics. Chromosomal aberrations, genetic disorders and diseases. Genetic engineering. GMO organisms.	7 71/	4
17ABBBB	Biomechanics and Biomaterials	Z,ZK	4
	ics, Biomaterials, rheological models, Mechanic characteristic of bones, ligaments, tendons, muscles and cartilages, Endoprothe		
	hanics, Kinematics and dynamics in biomechanics, Mechanical work an power of body, Stress and deformation, Finite eleme	-	ent prostneses.
17ABBBOZP	Safety Regulations and Standards in Electrical Engineering	Z	1
	s, training and examinations from the sections of the regulation No. 50/1978 Coll. and instructions concerning the laboratory e	-	
	nining electrical shock injury. Symbols and labeling in electrotechnology - safety colors importance, safety geometrical shape i ne safety tables, graphical signs on the electrical devices, letter conductor labeling, AC nominal voltages, maximum values of		
	tion, safety of the electrical devices - safety classes, periodical inspection and check of the electrical devices and hand tools,		
	ationship of the law and safety regulations. Risk analysis in the field of electrotechnology. Special qualification in electrotechnol	-	
	ectrotechnology qualification and directive "B". Lasers safety regulations.	logy logulation	
17ABBCHM	Chemistry	Z,ZK	4
	ry, categorization and properties of substances, chemical bonds, chemical reactions, elements in periodic table, organic cher	1 '	-
		nistry fundamenta	13, 11414141
substances, polymers,	analytical methods - instrumental analysis, chemical calculations, chemical equations	-	
substances, polymers, 17ABBEM	analytical methods - instrumental analysis, chemical calculations, chemical equations	Z,ZK	4
substances, polymers, 17ABBEM Measuring of electric v	analytical methods - instrumental analysis, chemical calculations, chemical equations Electrical Measurements alues, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and	Z,ZK	4 ing. Frequency
substances, polymers, 17ABBEM Measuring of electric v and shift phase measu	analytical methods - instrumental analysis, chemical calculations, chemical equations Electrical Measurements alues, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and ing. Electric work and electric power measuring: direct current, single-phase and three-phase current. Electrical resistance and	Z,ZK d potential measur d impedance mea	4 ing. Frequency suring. Magnetic
substances, polymers, 17ABBEM Measuring of electric v and shift phase measu measuring. Analogue s	analytical methods - instrumental analysis, chemical calculations, chemical equations Electrical Measurements alues, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and ing. Electric work and electric power measuring: direct current, single-phase and three-phase current. Electrical resistance and cope. Digitalization, digital signal processing, signal reconstruction. Electronic measuring devices: multimeter, digital scope. Or electronic measuring devices.	Z,ZK d potential measur d impedance mea Dptoelectronic me	4 ing. Frequency suring. Magnetic asuring device.
substances, polymers, 17ABBEM Measuring of electric v and shift phase measu measuring. Analogue s 17ABBELFA	analytical methods - instrumental analysis, chemical calculations, chemical equations Electrical Measurements alues, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and ing. Electric work and electric power measuring: direct current, single-phase and three-phase current. Electrical resistance and cope. Digitalization, digital signal processing, signal reconstruction. Electronic measuring devices: multimeter, digital scope. C Electrophysiology	Z,ZK d potential measur d impedance mea Dptoelectronic me Z,ZK	4 ing. Frequency suring. Magnetic asuring device. 2
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substances, polymers, 17ABBEM Measuring of electric v and shift phase measu measuring. Analogue s 17ABBELFA The study subject links exploitation of changes	analytical methods - instrumental analysis, chemical calculations, chemical equations Electrical Measurements alues, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and ing. Electric work and electric power measuring: direct current, single-phase and three-phase current. Electrical resistance and cope. Digitalization, digital signal processing, signal reconstruction. Electronic measuring devices: multimeter, digital scope. C Electrophysiology	Z,ZK d potential measur d impedance mea Dptoelectronic mea Z,ZK ation, measuring p nployed. From the	4 ing. Frequency suring. Magnetic asuring device. 2 possibilities and methodological
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substances, polymers, 17ABBEM Measuring of electric v and shift phase measu measuring. Analogue s 17ABBELFA The study subject links exploitation of changes point of view, measure both clinical and exper study of students are in 17ABBEO Amplifiers - basic conce DC voltage sources - r multivibrators, oscillato	analytical methods - instrumental analysis, chemical calculations, chemical equations Electrical Measurements alues, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and come come and electric power measuring: direct current, single-phase and three-phase current. Electrical resistance and cope. Digitalization, digital signal processing, signal reconstruction. Electronic measuring devices: multimeter, digital scope. Cletter physiology to Anatomy and Physiology II and is dedicated to excitable tissues (muscles and neural system) in the terms of signal generation is explained at cellular and molecular levels, different software simulations are ennents of electrical parameters are described at all levels - cells, tissues, organs. Exploitation of electrical parameters of cells, mental points. Methods to use electrical field or stimulation for medical purposes are described. Besides lectures, practical cletter corporated into the syllabus. Electronic Circuits pts. Feedback networks. Ideal operational amplifier - important networks. Practical operational amplifier - DC parameters, frequence the software regulators. DC/DC voltage converters - charge pump, inverting, buck, boost. Non-linear and regenerative rs. Combinational logic functions and logic gates. Karnaugh maps, logic tables. Sequential logic circuits. Logic integrated circuits	Z,ZK d potential measure d impedance mea Dptoelectronic mea Z,ZK ation, measuring p nployed. From the tissues and organ asses focused on Z,ZK ency response, tra e circuits - compar- uits (IC) - basic pa	4 ing. Frequency suring. Magnetic asuring device. 2 cossibilities and methodological is is treated from independent 4 nsient response. ators, flip-flops, irameters, input
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17ABBISZ Information Systems in Health Care		Z,ZK	4
Lectures are oriented on medical informatics definition and basic characteristic of the different s	specialized areas. The relations between IS and healt	th care structure,	financing and
controlling are analyzed as well. Some basic information technology, HW and SW tools are des	o		•
interpretation, data and communication standards. Different types and features of clinical and hu		alth care IS are ar	nalyzed and
discussed. Methodology of IS development, implementation and support are presented as well. 17ABBITT Information Technology and Telemedicine		ZK	2
Computer history, structure of computers, motherboard, processors, memody, graphical card, co	omputer buses, BIOS, I/O devices, server, desktop, n	1	-
mobile devices, memory card, OS, tasks and memory management, printers scanner, multimed		-	-
assembler, programming languages, power test, network, LAN, WAN, interner, TCP/IP, HTTP, F		-	
17ABBITP Integral Calculus		Z,ZK	5
The subject is an introduction to integral calculus and integral transforms. Integral calculus: anti-			
and by substitution, partial fractions), definite integral, properties, Newton-Leibnitz fundamental		-	
solving differential equations (ODEs) (1st order ODEs with separable variables, linear 1st order non-homogenous ODEs with constant coefficients),intro to multiple integrals, particularly double	.		•
transform and their application for solving nth order linear ODEs with constant coefficients. Z-tra			-
equations.		Ū	
17ABBKZS Conventional Imaging Systems		Z,ZK	4
Electromagnetic radiation spectrum and relationship to the modalities of medical diagnostic ima			
properties of imaging systems. Optical imaging systems including microscopic. Television imagi			-
pre-processing methods. Infrared imaging systems (thermal imaging/IR imaging systems). X-ray exercises provide students with an overview of the principles of image formation in medicine for			-
data sensing, digitization and subsequent processing and principles of function and properties of			Ũ
point of view of the whole course and study specialization. Knowledge, skills and competences:			
knows its layout including the principle of image formation. The student is able to assess, on the	basis of standard definition of technical parameters	that imaging syst	em meets the
physician requirements for selected modality. Such knowledge is a prerequisite to the correct pr	ocess technology selection and application of the mo	odalities as well a	s the minimum
necessary to ensure the required quality of the resulting image data. 17ABBLT Clinical Laboratory Instrumentation		Z,ZK	4
Clinical laboratory instrumentation introduces principles of bioanalytical methods used in clinical	ا الا diagnostics, Emphasis is put on optical methods (U		
spectroscopy, AAS, AES, fluorimetry), NMR and X-ray analysis, electrochemical and electromig			
imunoassays and genetic methods (ELISA, PCR) as well as on chromatography and mass spec	ctrometry. Contribution of lab automation to clinical di	iagnostics will be	also discussed.
During the laboratory course students will be introduced into the basics of work in bioanalytical	laboratory and lab data processing.		
17ABBLTR Medical Terminology		Z	1
Attendants are made acquainted with particular terms flowing from latin but also greek expression and there outline becaute a federation is combined with continuous knowledge about the section of the s		informed about te	rms of whole
diagnosis and therapeutical procedures. Education is combined with continuous knowlegde che 17ABBLPZ1 Medical Devices & Equipment		Z,ZK	4
Medical devices categories. Electrical safety of medical devices. Biopotentials amplifiers. Electric	ا cardiographs, electromyographs and electroenceph		-
blood flow and cardiac output measurement. Blood pressure measurement. Cardiac frequency r			
and electrosurgery medical devices. Therapeutic medical devices. Implantable medical devices.	Telemetry. Medical devices for audiology.		
17ABBLPZ2 Medical Devices and Equipments (Therapeutical Devic	,	Z,ZK	4
Medical devices categories. Electrical safety of medical devices. Artificial ventilation, introduction		-	
oxygenation. Hemodialysis. Drug infusion pumps (volumetric, syringe). Artificial cardiac pacema Therapeutic ultrasound. Electro-therapy. Magneto-therapy.	iker. Detibrillators (external, implantable). Cochlear in	nplant. Electro sul	gery units.
17ABBLAD Linear Algebra and Differential Calculus	I	Z,ZK	4
The course is introduction to differential calculus and linear algebra. Differential calculus - sets of	ا of numbers, sequences of real numbers, real functior		-
continuity and derivative of a function investigation of function behavior), Taylor's formula, real n	umber series. Linear algebra - vector spaces, matrice	es and determina	nts, systems of
linear algebraic equations (solvability and solution), eigenvalues and eigenvectors of matrices, a	applications.		
17ABBMAZ Management and Administration in Healthcare		KZ	1
Getting to know the structure of the health sector and financing models Health. Zoom administrative interconnection. Orientation in the specific features of health facilities and European systems of		orkplaces, their n	ecessary
17ABBMZT Management of Health Care Technology		Z,ZK	2
Models for different health care facilities. Medical devices: their selection and purchase, safety an	ا d reliable operation, decommissioning and ecological		1
based on agreements. Methodology of the internal maintenance. Safety risk assessment. Valid leg		-	
and technician-patient. Rights, duties and responsibilities of the technicians in medical health ca	are.		
17ABBMEC Mechanics		Z,ZK	4
Cross-section characteristics, body stress state (Cauchy, geometry, compatibility and physical	equations), linear elasticity theory, reaction, beam be	nding, normal and	d tangential
stresses, deformation, torsion influence.		1/7	2
17ABBMVP Research Methodology Methodical starting points of research. Methods and technology of research. Logic of scientific r	research Theoretical starting points of research. Scie	KZ	2 as a fool for
everyday work. Structure of scientific information, possibility for their acquisition, methods of pro-			
information. Description of specific systems, namely from health service. Final report.		·	U U
17ABBMS Modelling and Simulation		Z,ZK	4
Basic concepts. Aims and consequences of modeling and simulation. The methodology of mode			
experiment. Compartmental models. Physiological models. Pharmacokinetics. Continuous and o models.	discrete models of population dynamics. Epidemiolog	jical models. Vene	eral disease
17ABBNMP Project Proposal and Management		KZ	2
Project management, definition of terms project, program portfolio, project life cycle, project goa	al and benefits, triple imperative, project success ass	1	1
study, feasibility study (purpose, content, processing), SMART objective, stakeholders. Project id		-	
of time, resources, costs, budget, changes, procurement and contractual relations, personnel m			
on the project status, evaluation of the current project status. information and documentation, com	munication. Leadership and motivation of people, nego	otiation and discus	sion procedures.
Project completion, final report.		1/7	2
17ABBOIZ Protection Against Effects of Ionizing Radiation The aim of the course is to give students an overview of the issues related to protection against	tionizing radiation and dosimetry. Characteristics of t	KZ	2 zing radiation
sources of ionizing radiation and its sources, interactions of ionising radiation with matter, quanti			-
and biological effects of ionizing radiation.)	,		5

17ABBPPSA	Patient and Device Simulators and Testers	Z,ZK	4
During the course atten	tion will be given to the two large groups, i.e. patient simulators and instrumentation testers. The use of these two groups in c	linical practice wil	l also be part of
	ntial part of the teaching will be included laboratory exercises in the workplace simulated workplace intensive care unit, where		
	ces. The course has a direct relationship to future career opportunities. Great emphasis is placed on managing interdisciplina		
	ring principles). Given the organization of teaching as a 2-hour blocks 1 for 14 days is shown below, only 7 lectures (there will	l be performed sta	ndard exercises
	ction will be implemented due to the time of experiments and the limited possibilities in terms of number of students).		
17ABBPPM	Programming in Matlab	KZ	2
Basic description of MA	TLAB environment. Numerical formats. Variables and matrices. Complex numbers. Rounding numbers. Basic instructions. Ma	atrices operations.	Visualization.
	tion, exercise formulation, parameters entry). Conditional and cyclical instructions. Script creation, functions, debugging. Cont	inuous and discre	te processes.
-	raphical user interface creation. Applications in MATLAB.		
17ABBPNK	Design and Construction of Medical Devices/Practical Exercises	KZ	2
This course will introdu	se students with basics of design, construction and development process of devices which are used in medical, clinical or lab	oratory practice.	Subject will be
divided in two parts. The	oretical part will that follow these topics: basic philosophy of device design and construction, materials, components, laws and st	andards, process	of developments
from blueprints and pro	totype to "ready to sell" device. Practical part will introduce students into blueprints designs, circuit and schematics drawing, I	PCB design and d	evelopment,
-	components, signal conditioning and processing, data acquisition. Also students will develop their simple prototype device a	and create measur	ing application
in LabVIEW.			
17ABBPMS	Probability and Mathematical Statistics	Z,ZK	4
Introduction to probabil	ty theory and mathematical statistics. Determinism and chance. Axiomatic definition. Random variable and its distribution fun	ction. Discrete and	d continuous
	Random vectors. Conditioning and independence. Functions of random variables. Characteristics of random variables, weak I	•	ers. The role of
mathematical statistics,	the population and sample. Random selection. Point and interval estimates. Hypothesis testing. Goodness. Non-parametric t	ests.	
17ABBPP	First Aid	KZ	2
The course gives a brief	overview of the main principles and procedures for providing urgent first aid, with special attention to the failure of vital function	is and immediately	life-threatening
conditions. In this cours	e are also included situations of mass disability during crisis situations and emergency events including the CBRN phenome	non. After success	ful completion
of this course students	should be able to diagnose life threatening conditions and provide adequate urgent first aid.		
17ABBPSL	Psychology	KZ	2
Development, methodo	ogy and methods of psychology. Mental activities and psychic processes, psychology of personality, objects of psychology and	their formation a	nd development.
Modern psychology; its	concept and theory, psychic processes and stages. Psychological interpretation of personality. Application of knowledge in me	edical situations. R	elation between
technicians and medica	I doctors, technicians and patients, technicians and nurses. Communication as a tool for good cooperation amongst people a	and an aid to intera	actions. Basic
expression and commu	nication skills. Use of elocution and gestures in personal expression. Verbal and nonverbal communication. Dialogue; types o	f dialogue, questic	ons during
dialogue. Model situation	ns. Communication process as part of economics - components, tools and functions.		
17ABBROP	Guided Practical Training	Z	0
17ABBSPR2	Semestral Project II.	KZ	4
	nd presentation skills. Creation of presentations and written texts. Typography rules. Types, purpose and requirements of tech		•
	ited bibliographic search.		
17ABBSEL	Power Engineering	Z,ZK	4
-	, power supplies units including electrochemical supplies, rectifiers, stabilizers, common types of motors, basic distributions of e	· · ·	
	ric appliances with sight on medical purposes. The knowledge will be checked in the laboratory by mean of practical examples		
17ABBSPT	Equipments for Anaesthesiology and Resuscitation	Z,ZK	4
-	BJECT IS MERGEDE WITH F7ABBSPT AND THE ACTUAL MATERIALS ARE AVAILABLE THERE. Basic concept or resusci	· · ·	-
	ess and internal environment, their control. Equipment overview, common requirements. Specific requirements for equipment		
	esia and critical care medicine (ACCM). Blood gases, their measurement and interpretation. Modelling of the fluidic systems,		
	s and adverse effects of artificial lung ventilation (ALV). Conventional and unconventional lung ventilation, corresponding ventil	-	-
	their thermodynamic principles. Humidification of ventilatory gases. Equipment for monitoring and support of blood circulatio		
	stic and therapeutic equipment at ICU and ACCM. Design of ICU and ACCM.		
17ABBTEL	Theory of Electrical Engineering	Z,ZK	4
	AC currents. Electrical curcuits including R, L, C. Power of electric current, thermal effect of electric current. Distribution of electric		-
	t resistance and impedance, idle voltage, inner resistance and impedance of the source, mutual loading of the source and ele		
	circuits in time and frequency domain. Transient action in DC circuits, frequency characteristics of the L/C circuit. Electrical c	••	
	n of the semiconductor crossing, properties in the forward and reverse direction. Bipolar transistor - transistor effect, basic princ		
-	sistors with complementary vodivosti (CMOS). Electromagnetic effects (induction, magnetization, force effect). Electromagnetic		-
	tibility. Soft and hard magnetic materials. Transformers construction and parameters. Magnetic recording and reproduction of		-
17ABBTZS	Tomographical Imaging Systems	Z,ZK	4
	ging systems (US). Doppler systems. Computed tomography - CT (fundamental principle, system layout and arrangements, f		
	reconstruction fundamental principles). Magnetic resonance imaging (MRI). Positron emission tomography (PET) and single p		
•	Specialized - hybride imaging systems. Lectures and especially the laboratory exercises provide students with an overview of		
	phical and computed tomography based imaging systems and methods. There are described methods for image data sensin		-
-	es of function and properties of sensing image devices in context, which is especially relevant from the interdisciplinary point		-
	owledge, skills and competences: The student is able to explain the basic physical principle of the given modalities and know		
	student is able to assess, on the basis of standard definition of technical parameters that imaging system meets the physicia		• • •
-	ge is a prerequisite to the correct process technology selection and application of the modalities as well as the minimum neces		
of the resulting image d			
17ABBUSS	Introduction to Signals and Systems	Z,ZK	4
	basics of theory of signals and systems. To explain main principles on applications from biology and medicine. To become a		
	boratories by means of MATLAB.		
17ABBZPD	Fundamentals of Pathology, Hygiene and Epidemiology	ZK	4
	brief, clear and integral concept of medical branches, particularly internal medicine. The purpose of the subject is to acquaint	I I I I I I I I I I I I I I I I I I I	
	prevention of internal diseases and to define terms associated with the consideration of the patient health condition. The stud		
	ich other methods of health examination, described procedures for the basic clinical examination and understand its principle an		
	nitoring the patient health condition.		

17ABBZLN	Legislation in Health Care and Technical Standards	KZ	2
Health Services Act. Ac	t on Professional Qualification for the Pursuit of the Medical Profession and on Further Education in Health Care (the Act on	Medical Profession	ons) and its
implementing decrees.	EU directives on medical devices. Act on Technical Requirements for Products. Government Regulation to the Act on Technic	al Requirements	for Products.
Structure of institutions	dealing with the creation of technical standards in the Czech Republic and in the world. Technical standards relating to medic	al devices. Atomic	law. Procedures
for placing new medical	devices on the market. Clinical testing of instruments. The role of testing laboratories. Some facts and experiences from abroad. I	egislation on Goo	d Manufacturing,
Laboratory and Clinical	Practice (GMP, GLP and GCP).		

Name of the block: Compulsory elective courses Minimal number of credits of the block: 10 The role of the block: S

Code of the group: 17ABB PV 2S 17

Name of the group: Biomedical Technician AJ compulsory optional course 2nd semester 17 Requirement credits in the group: In this group you have to gain at least 2 credits (at most 8) Requirement courses in the group: In this group you have to complete at least 1 course (at most 4) Credits in the group: 2

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
17ABBBUI	Biological Effects of Ionizing Radiation	KZ	2	2P	L	S
17ABBEZP	Economics of Health Services	KZ	2	1P+1S	L	S
17ABBMAT	Marketing of Medical Technology	KZ	2	2P	L	S
17ABBPPP	Programming Tools	KZ	2	2C	L	S

Characteristics of the courses of this group of Study Plan: Code=17ABB PV 2S 17 Name=Biomedical Technician AJ compulsory optional course 2nd semester 17

17ABBBUI	Biological Effects of Ionizing Radiation	KZ	2		
The lectures will give an	overview of basic radiation biology. Students will become familiar with the biological effects of ionizing radiation: the physical	and chemical pro	cesses by which		
radiation causes damag	e to the biological material; mechanisms of radiation action on the DNA and other constituents of the cell; types of damage a	and their repair; so	ubcellular and		
cellular sensitivity and radiation response; physical, chemical and biological modifiers of radiation action; theories and models of cellular survival; and radiation biology of normal and					
neoplastic tissues.					
17ABBEZP	Economics of Health Services	KZ	2		
Introduction to Economi	cs of medical facilities, main terms. Investments in healthcare - economic balance. Investment planning and management, inter	connection betwe	en maintenance		
and investments, contra	cts. Costs incurred by legislation and mere operation of the technology. Return on investments, risk analysis. Commodity know	wledge of consum	ables and spare		
parts. Prices of medical	devices consumables and tools.				
17ABBMAT	Marketing of Medical Technology	KZ	2		
Marketing fundamentals	s, products management, basic knowledge concerning export activities in the field of marketing and commercial health care t	echnology. Practi	cal cases are		
presented including hea	Ith care technology companies from the Czech Republic. Discussion and analysis of the real products are included in the exi	ercises.			
17ABBPPP	Programming Tools	KZ	2		
Introduction to software tools on MS Windows platform and GNU/Linux platform. Problem of portability of data-files, standardized exchange formats - HTML, XML, PDF, ODF, PNG					
etc. Introduction to administartion and configuration of MS Windows and GNU/Linux, programming of scripts, connectivity and comaptibility of major operating systems. Multiplatform					
applications - WWW bro	wsers, e-mail clients, Office toolboxes, Graphical and CAD programs.				
L					

Code of the group: 17ABB PV 3S 17

Name of the group: Biomedical Technician AJ compulsory optional course 3rd semester 17 Requirement credits in the group: In this group you have to gain at least 2 credits (at most 8) Requirement courses in the group: In this group you have to complete at least 1 course (at most 4) Credits in the group: 2

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
17ABBBFT	Biophotonics	KZ	2	2P	Z	S
17ABBFVP	Multivariable Calculus	KZ	2	1P+1C	Z	S
17ABBMFJ	Physical Phenomena Modeling in COMSOL Multiphysics David Vrba	KZ	2	1P+1C	Z	S
17ABBPMP1A	Devices, Methods and Procedures in Clinical Practice I	KZ	2	1P+1L	Z	S

Characteristics of the courses of this group of Study Plan: Code=17ABB PV 3S 17 Name=Biomedical Technician AJ compulsory optional course 3rd semester 17

17ABBBFT	Biophotonics	KZ	2		
Overview of principles a	nd applications in the interdisciplinary sphere, connecting physics, optics and biology. Interaction of laser radiation with matt	er, interaction of r	adiation with		
	notobiology, bioimaging, basics of lasers, laser safety, optical biosensors, photodynamical therapy, optical manipulation with cells				
biomaterials for photoni	CS.				
17ABBFVP	Multivariable Calculus	KZ	2		
The course is focused a	t elements of calculus in two and more variables. Calculus in two variables: notion of a limit and continuity, partial derivative,	differential and its	applications.		
Derivative of a composed function, derivative of an implicit function. Higher order derivatives, local extremes. Constrained extremes, least squares method. Double and triple integrals,					
geometrical interpretation, Fubini theorem. Integration by substitution in double and triple integral.					
17ABBMFJ	Physical Phenomena Modeling in COMSOL Multiphysics	KZ	2		
Numerical simulations a	re increasingly being used to develop new and optimize existing products and devices. Numerical simulations can greatly re-	duce the number	of prototypes		
needed and thus signific	cantly accelerate and reduce development costs. Another sector where numerical simulations are used is a sector where it is	difficult to verify	ongoing physical		
processes (eg, heating	the biological tissue under electrodes for direct brain simulation). Last but not least, based on numerical simulations, we can	plan treatment wi	nere, based on		
knowledge of material p	roperties, we can define the amount of power delivered to the device (eg radiofrequency ablation in oncology or cardiac surg	ery). Computer m	odeling involves		
the creation of geometry	r, setting of material properties and boundary conditions and, last but not least, the choice of differential equations, the method	of discretization	of the computing		
area and the processing	g of results. The accuracy of the results obtained, the length of calculations and the computational power requirements are ve	ery dependent on	the numerical		
model setting. The lectu	res cover the most common problems in electrical engineering, thermics, mechanics, chemistry, acoustics and fluid dynamic	s. The acquired k	nowledge will be		
tested by the students v	hen designing individual parts of devices and devices.				
17ABBPMP1A	Devices, Methods and Procedures in Clinical Practice I	KZ	2		
Hospital intro, Cardio U	Hospital intro, Cardio US, department of anesthesiology and resuscitation, ICIP, Department of Anesthesiology - Adult Part, Emergency department, Pneumatic Post, Laboratories,				
Imunology, Technical department, Clinic of Imaging Methods, Central Operating Theatres - Paediatric Part (Neurosurgery, Stomatosurgery, Otorinolaryngology and head and neck					
surgery), EFA (database	e records of medical devices and their parameters), Neurophysiological laboratory, Technical Safety Check (ECG, Patient moni	tor) and Laser, ma	arking of surgical		
tools.					

Code of the group: 17ABB PV 4S 17

Name of the group: Biomedical Technician AJ compulsory optional course 4th semester 17 Requirement credits in the group: In this group you have to gain at least 2 credits (at most 10) Requirement courses in the group: In this group you have to complete at least 1 course (at most 5) Credits in the group: 2

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
17ABBDIZ	Detectors of Ionizing Radiation	КZ	2	2P	L	S
17ABBFY3	Physics III	KZ	2	1P+1L	L	S
17ABBMDT	Microwave Diagnostics and Therapy David Vrba	KZ	2	1P+1C	L	S
17ABBPMP2A	Devices, Methods and Procedures in Clinical Practise II <i>Ji í Hozman</i>	KZ	2	1P+1L	L	S
17ABBSPR1	Semestral Project I. Petr Kudrna	KZ	2	2S	L	S

Characteristics of the courses of this group of Study Plan: Code=17ABB PV 4S 17 Name=Biomedical Technician AJ compulsory optional course 4th semester 17

Types of gas filled detectors, DC mode of IC, pulse mode of IC, proportional counters, pulse shape of proportional counter, neutron detection and spectrometry by means of nucleosity preactions, principle of Geiger-Mueller counters, corona counter, preliminary of the scintillation detectors, exploitation of organic (solid and/or liquid) scintillators, Cerenkov detect semiconductor detectors, Li compensated Ge detectors and HPGe detectors as photon detector. 17ABBFY3 Physics III					
semiconductor detectors, Li compensated Ge detectors and HPGe detectors as photon detector.	tor,				
17ABBEY3 Physics III KZ 2					
The course extends the previous courses Physics I. and Physics II. In this set of courses the main emphasis is placed on the understanding of priciples and the ability to solve sta	andard				
physical examples. In Physics III. course we study waves, optics and lasers. We concentrate on practical examples and experiments.					
17ABBMDT Microwave Diagnostics and Therapy KZ 2					
Interaction of the EM field with biological tissues and its use in diagnostics and therapy. Numerical methods suitable for modeling these interactions. Basics of microwave imagin	ıg				
(MWI). Perspective application of microwave techniques in medical diagnostics: non-invasive monitoring of blood glucose concentration, microwave detection and classification	of				
cerebral vascular events and early detection of breast cancer. Therapeutic systems and applicators for microwave and RF local and regional hyperthermia. Planning treatment. [Design				
and testing of applicators.					
17ABBPMP2A Devices, Methods and Procedures in Clinical Practise II KZ 2					
In this course will be applied focus on the following issues: operation and documentation of the results of imaging methods, the relationship between imaging methods and syste	ems to				
the HIS, basic concepts and methods in various fields of diagnostic imaging, basic imaging systems from the perspective of interpretation and description of images, from the fi	eld of				
diagnostic imaging practice (radiology, ultrasonography, magnetic resonance imaging, nuclear medicine, endoscopy, PET, SPECT).					
17ABBSPR1 Semestral Project I. KZ 2					
Basic communication and presentation skills, including team work, team heading and project management. Creation of presentations and written texts. Typography rules. Types,	,				
purpose and requirements of technical presentations and technical texts. Writing a commented bibliographic search.					

Code of the group: 17ABB PV 5S 17

Name of the group: Biomedical Technician AJ compulsory optional course 5th semester 17 Requirement credits in the group: In this group you have to gain at least 2 credits (at most 8) Requirement courses in the group: In this group you have to complete at least 1 course (at most 4)

Credits in the group: 2 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
17ABBAZD	Biomedical Data Analysis and Processing	KZ	2	1P+1C	Z	S
17ABBMTB	Microprocessors in Biomedicine	KZ	2	1P+1L	Z	S
17ABBVBI	Virtual Bioinstrumentation Roman Mat jka	KZ	2	1P+1L	Z	S
17ABBZOD	Image Data Processing Zoltán Szabó	KZ	2	1P+1L	Z	S

Characteristics of the courses of this group of Study Plan: Code=17ABB PV 5S 17 Name=Biomedical Technician AJ compulsory optional course 5th semester 17

17ABBAZD Biomedica	Data Analysis and Processing	KZ	2			
Time series analysis, trends, mutual dependency, stationarity. Correlation function and covariance function. Algorithms of correlation function estimation. Impact of removing trends to						
autocorrelation function. Periodogram - relationship between corellogram and periodogram. Frequency spectrum, spectrum of random signals. Linear frequency filtering. AR, ARMA,						
and MA processes. Spectral analysis.	FT algorithm. Non-parametric methods of the frequency spectrum estimation. Positives and negatives of the	specteal analysis	. Repeated			
measurements and analysis of their pr	operties. AR a ARMA model parameter identification. Prediction. Bivariance analysis of time series - cross-corr	relation and cross	-covariance and			
their estimation. Bispectrum.						
17ABBMTB Microproce	ssors in Biomedicine	ΚZ	2			
Introduction to embedded microproces	sor systems in medicine, principles and structure of microcontrolers, logical circuits. Interconnection with com	mon peripheral de	evices: AD and			
DA converters, serial communication, V	/IFI, Bluetooth a GPRS communication. Examples of embedded systems on architectures 8051, AVR, PIC and	ARM. Introduction	to multiplatform			
software development fo embedded sy	stems.					
17ABBVBI Virtual Bio	nstrumentation	KZ	2			
This subject deals with process of deve	elopment of application in LabVIEW using Virtual Instrumentation concept. During the course will be explained	basic concepts of	of programming			
like variables, data structures, cluster,	oops, conditionals, typedefs, advanced coding concepts like event driven programming, multi-threaded application	ation developmen	it, data queues			
and FIFOs, synchronisation, process of	f deployment, executable building, installer and upgrades. The students are able also to obtain the CLAD (Cer	tificate LabVIEW	Associate			
Developer) certificate. This certificate i	s first step in knowledge of VI.					
17ABBZOD Image Dat	a Processing	KZ	2			
Continuous image representation, linea	ar 2D systems, 2D spectrum, Digital representation of images, Basic image characteristics: brightness, contrast	t, resolution, noise	e, look up tables,			
histogram, Discrete Fourier transform, discrete cosine transform, image enhancement, geometric operations, image filtering, morphological operations, image restoration, image						
segmentation, basic principles of imag	e compression.					

Code of the group: 17ABB PV 6S 17

Name of the group: Biomedical Technician AJ compulsory optional course 6th semester 17 Requirement credits in the group: In this group you have to gain at least 2 credits (at most 8) Requirement courses in the group: In this group you have to complete at least 1 course (at most 4) Credits in the group: 2

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
17ABBAZC	Algorithms for Biosignal Processing in the C Language	KZ	2	1P+1C	L	s
17ABBEMP	Electromagnetic Fields of Living Organisms Jan Vrba, Peter Kneppo Jan Vrba Peter Kneppo (Gar.)	KZ	2	1P+1S	L	S
17ABBRI	Rehabilitation Engineering Jií Hozman Jií Hozman	KZ	2	1P+1L	L	S
17ABBRBL	Robotics in Medicine	KZ	2	1P+1L	L	S

Characteristics of the courses of this group of Study Plan: Code=17ABB PV 6S 17 Name=Biomedical Technician AJ compulsory optional course 6th semester 17

17ABBAZC	Algorithms for Biosignal Processing in the C Language	KZ	2		
Algorithms for preprocessing and intelligent segmentation of the biological time-series in C and C++. Algorithms of FFT, SFFT and Wavelet Transform. Calculation of the cross-correlation					
and autocorrelation fund	tions. Method of moving window, extraction of attributes. Example implementations of the fuzzy rules and neural network. Alg	porithms for desig	n and realisation		
of the FIR a IIR filters. M	lethods of biosignal visualisation.				
17ABBEMP	Electromagnetic Fields of Living Organisms	KZ	2		
Fundamental physical k	nowledge and electrostatic and magnetic field equations. Anatomical and physiological fundamentals of bioelectromagnetism. I	Bioelectric source	s and conductive		
environment. Electrodyr	amics of bioelectrical fields, electrodynamic aspects of mathematical modeling of the electrocardiography and electroencepha	alography. Topogra	aphical concepts		
of bioelectrical and bion	nagnetical measurement. Measurement methods. Stimulation.				
17ABBRI	Rehabilitation Engineering	KZ	2		
Physiotherapy, especially physical therapy, orthotics and prosthesis, selected parts of biomechanics and ergonomy. Physical therapeutic methods, technology in therapy (ultrasound					
apparatuses and technology for radiotherapy). Replacement by sensors and possibilities of communication with computer. Artificial organs and relevant circulatory confirmatory devices.					
Implantable medical dev	vices - pacemakers, defibrilators, cardioverters.				

17ABBRBL	Robotics in Medicine	KZ	2		
Principles of robotics in	medicine and laboratory technics - what kind of task is solving, synthesis of kinematics according to the task processed by r	obot - operational	(surgical room),		
handling (laboratory), kinematics a dynamics of robot arm - computing methodology, verification of obtained models in Matlab environment, sensors and drives used by robots applicable					
in medicine, possible ro	bot control paradigms - according human (operator) task.				

List of courses of this pass:

Code	Name of the course	Completion	Credits
17ABBA3A	English Language IIIA (part 1)	KZ	2
	rse is to increase students' language competence in academic English and professional vocabulary, along with common communication		
preparing presenta	tions for meetings. Students should be able to work actively with academic text, understand and be able to use basic terminology, be levels of English and the associated syntactic and lexical devices.		-
17ABBA3B	English III.	KZ	2
	Academic and professional English		
17ABBAF1	Anatomy and Physiology I	Z,ZK	5
	Anatomy and physiology I covers functional aspects of particular organs and their systems.	Z,ZK	F
17ABBAF2	Anatomy and Physiology II Anatomy and physiology II links to Anatomy and Physiology I. The subject covers functional aspects of particular organs and their	· ·	5
17ABBALP	Algorithmic and Programming Theory	KZ	4
	ctures. Identifiers, data types. assignment statement, conditional statement, cycles. Arithmetical and logical operations. Digital represer		
	tion to structured programming in C language - building and structure of simple programs, creating of the user functions, user input a		
	ent. Practical overview of programming techniques and basic algorithms in C language. Recursive and iterative methods, measuring a and searching, implementation of basic numerical algorithms. Introduction to biomedical data processing - programmers view. Introdu		
17ABBAZC	Algorithms for Biosignal Processing in the C Language	KZ	2
	ocessing and intelligent segmentation of the biological time-series in C and C++. Algorithms of FFT, SFFT and Wavelet Transform. Calc		
	functions. Method of moving window, extraction of attributes. Example implementations of the fuzzy rules and neural network. Algorit		
	of the FIR a IIR filters. Methods of biosignal visualisation.	-	
17ABBAZD	Biomedical Data Analysis and Processing	KZ	2
Time series analys	is, trends, mutual dependency, stationarity. Correlation function and covariance function. Algorithms of correlation function estimation	. Impact of removi	ng trends to
	ction. Periodogram - relationship between corellogram and periodogram. Frequency spectrum, spectrum of random signals. Linear fr		
	es. Spectral analysis. FFT algorithm. Non-parametric methods of the frequency spectrum estimation. Positives and negatives of the s		•
measurements and	analysis of their properties. AR a ARMA model parameter identification. Prediction. Bivariance analysis of time series - cross-correla	tion and cross-cov	ariance and
1740000	their estimation. Bispectrum.	7 71/	4
17ABBBB	Biomechanics and Biomaterials hanics, Biomaterials, rheological models, Mechanic characteristic of bones, ligaments, tendons, muscles and cartilages, Endoprothesis a	Z,ZK	
	mechanics, Kinematics and dynamics in biomechanics, Mechanical work an power of body, Stress and deformation, Finite element n		
17ABBBCH	Biochemistry	KZ	2
	will be introduced to the basics of Biochemistry. The course builds on the knowledge gained in general chemistry and extends this k	1	-
	The interpretation goes through the basic building structures of biological systems (amino acids, peptides, proteins, lipids, carbohydra	-	
membranes and	molecular genetics to the most important metabolic processes. Particular attention is paid to the aspects necessary for understanding	g the methods of v	vork in the
	nical laboratory, which are part of the follow-up chemical discipline. The laboratories are focused on broadening the topics discussed in		-
	on the determination of biomolecules and the verification of their properties. Students should become familiar with the basic laborato		-
17ABBBFT	Biophotonics	KZ	2
	iples and applications in the interdisciplinary sphere, connecting physics, optics and biology. Interaction of laser radiation with matter s, photobiology, bioimaging, basics of lasers, laser safety, optical biosensors, photodynamical therapy, optical manipulation with cells, na		
lissue, biology basic	biomaterials for photonics.	inotechnology for b	iopriotoriics,
17ABBBLG	Biology	Z.ZK	4
	about the cellular level of organisms - from acelullar through prokaryotic to eukaryotic. The viruses. Prokaryotic cells. Bacteria. Bacter	, ,	
	ant and animal cell structure and function. Structure and conformation of biopolymers (nucleid acids and proteins). The nucleus, plas		
Endomembrane s	system: endoplasmic reticulum, the Golgi apparatus, lysosomes, vacuoles. Semiautonomic organelles: mitochondria, sites of respirati	ion and chloroplas	ts, sites of
	e origin of eukaryotes: endosymbiotic hypothesis. Ribosomes. The cytoskeleton: microtubules, microfilaments. The cell cycle: mitotic (
	The division of cell nucleus - amitosis, mitosis, phases of mitosis, the mitotic spindle; meiosis. The cell division - cytokinesis. Cell different division - cytokinesis. Cell different division - cytokinesis.		
and necrosis. Mend	elian and modern genetics: structure, function and inheritance of genes. Includes the chemistry and structure of chromatin and chromos		ue histology.
	Animal cells and tissues. Human genetics. Chromosomal aberrations, genetic disorders and diseases. Genetic engineering. GMO o	<u> </u>	4
17ABBBLS	Biological Signals vith origins and description of the most important electric and non-electric biological signals. The principles of generation, recording ar	Z,ZK	4
-	The studied signals involve native and evoked biosignals, including biological signals of the heart, brain, muscles, nervous system, au		
U U	stro-intestinal system etc. Advanced methods of digital biosignal processing, spectrum analysis, modern methods of artificial intelligence	, ,	, , , , , , , , , , , , , , , , , , ,
	classification, graphic presentation of results. Adaptive segmentation, artificial neural networks for signal procesing.		
17ABBBOZP	Safety Regulations and Standards in Electrical Engineering	Z	1
	tions, training and examinations from the sections of the regulation No. 50/1978 Coll. and instructions concerning the laboratory experi-	riments based on t	he electrical
	termining electrical shock injury. Symbols and labeling in electrotechnology - safety colors importance, safety geometrical shape importance in the safety second state of the safety s	-	-
	of the safety tables, graphical signs on the electrical devices, letter conductor labeling, AC nominal voltages, maximum values of the		
	otection, safety of the electrical devices - safety classes, periodical inspection and check of the electrical devices and hand tools, imp Relationship of the law and safety regulations. Risk analysis in the field of electrotechnology. Special qualification in electrotechnology		
or electrical shock.	Validity based on the electrotechnology qualification and directive "B". Lasers safety regulations.	, regulation 140. 5	o, 1970 OUII.

17ABBBP	Bachelor Thesis	Z	8
	rojects at the end of bachelor studies. Topics are selected during the 5th term from a list. Bachelor thesis is defended at the end of the	examination peric	
thesis defence is a	part of the state exam. Bachelor thesis can be written and defended either Czech or English. Students are supervised by a tutor during	the above mention	ed process.
17ABBBUI	Biological Effects of Ionizing Radiation	KZ	2
The lectures will give	e an overview of basic radiation biology. Students will become familiar with the biological effects of ionizing radiation: the physical and	chemical process	es by which
radiation causes of	damage to the biological material; mechanisms of radiation action on the DNA and other constituents of the cell; types of damage and	d their repair; subc	ellular and
cellular sensitivity a	and radiation response; physical, chemical and biological modifiers of radiation action; theories and models of cellular survival; and ra	adiation biology of	normal and
	neoplastic tissues.		
17ABBCHM	Chemistry	Z,ZK	4
Introduction to c	hemistry, categorization and properties of substances, chemical bonds, chemical reactions, elements in periodic table, organic chem	istry fundamentals	s, natural
(2) 00012	substances, polymers, analytical methods - instrumental analysis, chemical calculations, chemical equations		-
17ABBDIZ	Detectors of Ionizing Radiation	KZ	2
	detectors, DC mode of IC, pulse mode of IC, proportional counters, pulse shape of proportional counter, neutron detection and spec		
reactions, princip	le of Geiger-Mueller counters, corona counter, preliminary of the scintillation detectors, exploitation of organic (solid and/or liquid) sci semiconductor detectors, Li compensated Ge detectors and HPGe detectors as photon detector.	nullators, Cerenkov	v delector,
17ABBEBI		KZ	2
	Ethics in Biomedical Engineering uces students to basic ethical issues in applied ethics due to a future career orientation. It develops students' ability to think in ethical	1 1	
	defend their views in ethical dilemma situations which brings medical environment.		argue ana
17ABBELFA	Electrophysiology	Z.ZK	2
1	links to Anatomy and Physiology II and is dedicated to excitable tissues (muscles and neural system) in the terms of signal generatio	1 ' 1	
	nges in electrical parameters. Signal generation is explained at cellular and molecular levels, different software simulations are emplo		
	urements of electrical parameters are described at all levels - cells, tissues, organs. Exploitation of electrical parameters of cells, tissues, organs.	-	-
both clinical and e	experimental points. Methods to use electrical field or stimulation for medical purposes are described. Besides lectures, practical class	ses focused on inc	dependent
	study of students are incorporated into the syllabus.		
17ABBEM	Electrical Measurements	Z,ZK	4
-	ric values, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and po	-	
	asuring. Electric work and electric power measuring: direct current, single-phase and three-phase current. Electrical resistance and im	-	
	ue scope. Digitalization, digital signal processing, signal reconstruction. Electronic measuring devices: multimeter, digital scope. Opto	[]	-
17ABBEMP	Electromagnetic Fields of Living Organisms	KZ	2
	cal knowledge and electrostatic and magnetic field equations. Anatomical and physiological fundamentals of bioelectromagnetism. Bioe		
environment. Electr	odynamics of bioelectrical fields, electrodynamic aspects of mathematical modeling of the electrocardiography and electroencephalog of bioelectrical and biomagnetical measurement. Measurement methods. Stimulation.	Jrapny. Topographic	cal concepts
17ABBEO	Electronic Circuits	Z.ZK	1
	pncepts. Feedback networks. Ideal operational amplifier - important networks. Practical operational amplifier - DC parameters, frequency	1 ' 1	4
-	is - rectifiers and voltage regulators. DC/DC voltage converters - charge pump, inverting, buck, boost. Non-linear and regenerative cir		-
-	Ilators. Combinational logic functions and logic gates. Karnaugh maps, logic tables. Sequential logic circuits. Logic integrated circuits		
and output characte	eristics, logic circuit families. Semiconductor memories. Digital signal processing - sampling theorem, quantization, number represent	ation. A/D and D/A	converters.
17ABBESL	Electronic Elements and Sensors in Medicine	Z,ZK	4
This subject provid	des information about basic electronic devices - sensors, describes their operation principle, basic circuit configuration and applicatio	n. The stress is aid	I mainly on
	rinciples and practical utilization. Integral part of this course is basic information about sensors of non-electric quantities and their rea	-	
sensors (force, pres	ssure, torque, vibration, displacement, acceleration etc.) magnetic field sensors, temperature sensors, chemical sensors, optical sensor	ors and biosensors	. The stress
12100520	is aid on miniaturization, integration and application in biomedicine.		•
17ABBEZP	Economics of Health Services	KZ	2
	nomics of medical facilities, main terms. Investments in healthcare - economic balance. Investment planning and management, intercor ontracts. Costs incurred by legislation and mere operation of the technology. Return on investments, risk analysis. Commodity knowled		
and investments, co	parts. Prices of medical devices consumables and tools.		s and spare
17ABBFCH	Physical Chemistry	Z,ZK	4
	pounds. Vapour and vaporisation. Electrodes. Electrochemical potential, electrodes. Referent and measuring electrodes, ECG, EEG a		
-	strodes. Membranes. Osmotic pressure. Ion-sensitive electrodes. Acidity. Measurement of pH, pO2, pCO2. Electrolysis and its application of the strong		
	of implants. Other amalytical methods based on principles of physical chemistry.		•
17ABBFVP	Multivariable Calculus	KZ	2
	used at elements of calculus in two and more variables. Calculus in two variables: notion of a limit and continuity, partial derivative, di	fferential and its ap	
Derivative of a com	posed function, derivative of an implicit function. Higher order derivatives, local extremes. Constrained extremes, least squares methods	od. Double and trip	le integrals,
	geometrical interpretation, Fubini theorem. Integration by substitution in double and triple integral.		
17ABBFY1	Physics I	Z,ZK	5
	I allow students to acquire and strengthen knowledge in these branches of physics: mechanics, thermodynamics and solid state physic		
bases, but indeper	ndent work in student labs as well as solving practical examples are also important parts of the course. Through the course we also to	ouch the limits of th	ne classical
	Physics.		_
17ABBFY2	Physics II	Z,ZK	5
	course introduces fundamentals and applications of electromagnetic fields. The covered topics include electromagnetic interaction, el	-	
electromagnetic f	ield, Maxwell's equations, electromagnetic radiation, fundamentals of quantum physics, atomic nucleus and elementary particles, an matter.	a micraction of rad	iation with
17ABBFY3	Physics III	КZ	2
	ringsics III s the previous courses Physics I. and Physics II. In this set of courses the main emphasis is placed on the understanding of priciples a	1 1	
	physical examples. In Physics III. course we study waves, optics and lasers. We concentrate on practical examples and experim	-	. s standard
17ABBISZ	Information Systems in Health Care	Z,ZK	4
	nted on medical informatics definition and basic characteristic of the different specialized areas. The relations between IS and health		
	alyzed as well. Some basic information technology, HW and SW tools are described in relation to IS design. A special attention is pai		-
-	ata and communication standards. Different types and features of clinical and hospital IS, decision support systems and regional heal		-
	discussed. Methodology of IS development, implementation and support are presented as well.		

17ABBITP	Integral Calculus	Z,ZK	5
	ntroduction to integral calculus and integral transforms. Integral calculus: anti-derivative, indefinite integral, properties and methods of in		
-	I, partial fractions), definite integral, properties, Newton-Leibnitz fundamental theorem, simple applications of both indefinite and defin I equations (ODEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous ODEs, 2nd of I equations (ODEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous ODEs, 2nd of I equations (IDEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous ODEs, 2nd of I equations (IDEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous ODEs, 2nd of I equations (IDEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous ODEs, 2nd of I equations (IDEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous ODEs, 2nd of I equations (IDEs) (1st order ODEs) (1st order IDEs) (1st order homogenous as well as non-homogenous ODEs) (1st order homogenous (1st order homogenous as well as non-homogenous (1st order homogenous as well as non-homogenous (1st order homogenous as well as non-homogenous (1st order homogenous (1st		-
-	ODEs with constant coefficients), intro to multiple integrals, particularly double integral and applications. Integral transforms: Laplace t	-	
-	r application for solving nth order linear ODEs with constant coefficients. Z-transform and inverse Z-transform, their application for solv		-
	equations.		
17ABBITT	Information Technology and Telemedicine	ZK	2
	structure of computers, motherboard, processors, memody, graphical card, computer buses, BIOS, I/O devices, server, desktop, note	book, pocket PC, da	ata storage,
mobile devices,	memory card, OS, tasks and memory management, printers scanner, multimedial devices, mass data storage, multitasking, multiproc	cessoring, set of in	struction,
assembler, p	programming languages, power test, network, LAN, WAN, interner, TCP/IP, HTTP, FTP etc., client-server, gate, router, using IT in med	licine and telemed	icine.
17ABBKZS	Conventional Imaging Systems	Z,ZK	4
-	radiation spectrum and relationship to the modalities of medical diagnostic imaging systems. Fundamentals of imaging theory. Applic		
	naging systems. Optical imaging systems including microscopic. Television imaging systems (including video endoscopic imaging sys		-
	ethods. Infrared imaging systems (thermal imaging/IR imaging systems). X-ray imaging systems. Gamma imaging systems. Lectures students with an overview of the principles of image formation in medicine for conventional imaging systems and methods. There are		
	zation and subsequent processing and principles of function and properties of sensing image devices in context, which is especially rel		-
	e whole course and study specialization. Knowledge, skills and competences: The student is able to explain the basic physical princip		
· ·	ncluding the principle of image formation. The student is able to assess, on the basis of standard definition of technical parameters th	e	
physician requirer	nents for selected modality. Such knowledge is a prerequisite to the correct process technology selection and application of the moda	alities as well as the	e minimum
	necessary to ensure the required quality of the resulting image data.		
17ABBLAD	Linear Algebra and Differential Calculus	Z,ZK	4
	troduction to differential calculus and linear algebra. Differential calculus - sets of numbers, sequences of real numbers, real functions		
continuity and der	ivative of a function investigation of function behavior), Taylor's formula, real number series. Linear algebra - vector spaces, matrices a	and determinants,	systems of
(7455) 57(linear algebraic equations (solvability and solution), eigenvalues and eigenvectors of matrices, applications.		
17ABBLPZ1	Medical Devices & Equipment	Z,ZK	4
	categories. Electrical safety of medical devices. Biopotentials amplifiers. Electrocardiographs, electromyographs and electroencephale diac output measurement. Blood pressure measurement. Cardiac frequency measurement. Phonocardiography. Pulse oximetry. Medic		
biolog now and card	and electrosurgery medical devices. Therapeutic medical devices. Implantable medical devices. Telemetry. Medical devices for au		USUITIUIAUUT
17ABBLPZ2	Medical Devices and Equipments (Therapeutical Devices)	Z,ZK	4
	s categories. Electrical safety of medical devices. Artificial ventilation, introduction. Conventional ventilation. High frequency ventilation	· ·	
	emodialysis. Drug infusion pumps (volumetric, syringe). Artificial cardiac pacemaker. Defibrillators (external, implantable). Cochlear im	•	
	Therapeutic ultrasound. Electro-therapy. Magneto-therapy.		
17ABBLT	Clinical Laboratory Instrumentation	Z,ZK	4
Clinical laborato	ry instrumentation introduces principles of bioanalytical methods used in clinical diagnostics. Emphasis is put on optical methods (UV	-VIS spectrophoto	metry, IR
	AS, AES, fluorimetry), NMR and X-ray analysis, electrochemical and electromigration methods (ion electrodes, biosensors, electrophy	oresis, isoelectric f	ocusing),
imunoassays and	genetic methods (ELISA, PCR) as well as on chromatography and mass spectrometry. Contribution of lab automation to clinical diagr	nostics will be also	
	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces	nostics will be also sing.	
17ABBLTR	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology	nostics will be also sing. Z	discussed.
17ABBLTR	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology ade acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously inf	nostics will be also sing. Z ormed about terms	discussed.
17ABBLTR Attendants are m	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology ade acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously inf diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tes	nostics will be also sing. Z ormed about terms ts.	discussed. 1 s of whole
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17ABBLTR Attendants are m 17ABBMAT Marketing fundar	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology nade acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously inf diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tes Marketing of Medical Technology nentals, products management, basic knowledge concerning export activities in the field of marketing and commercial health care tec	nostics will be also sing. Z ormed about terms ts. KZ chnology. Practical	discussed. 1 s of whole 2
17ABBLTR Attendants are m 17ABBMAT Marketing fundar	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology nade acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously inf diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tes Marketing of Medical Technology	nostics will be also sing. Z ormed about terms ts. KZ chnology. Practical	discussed. 1 s of whole 2
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17ABBLTR Attendants are m 17ABBMAT Marketing fundar prese 17ABBMAZ Getting to know 17ABBMDT Interaction of the (MWI). Perspecti cerebral vascular e 17ABBMEC Cross-section ch 17ABBMES Numerical simula needed and thus s	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology made acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously inf diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tes Marketing of Medical Technology mentals, products management, basic knowledge concerning export activities in the field of marketing and commercial health care tech inted including health care technology companies from the Czech Republic. Discussion and analysis of the real products are included Management and Administration in Healthcare w the structure of the health sector and financing models Health. Zoom administrative management issues various types of medical w interconnection. Orientation in the specific features of health facilities and European systems of health care workplaces. Microwave Diagnostics and Therapy e EM field with biological tissues and its use in diagnostics ron-invasive monitoring of blood glucose concentration, microwave de wents and early detection of breast cancer. Therapeutic systems and applicators for microwave and RF local and regional hypertherm and testing of applicators. Mechanics haracteristics, body stress state (Cauchy, geometry, compatibility and physical equations), linear elasticity theory, reaction, beam ben stresses, deformation, torsion influence. Physical Phenomena Modeling in COMSOL Multiphysics tions are increasingly being used to develop new and optimize existing products and devices. Numerical simulations can greatly redu	nostics will be also sing. Z ormed about terms ts. KZ chnology. Practical in the exercises. KZ orkplaces, their ne KZ assics of microwave etection and classif ia. Planning treatm Z,ZK ding, normal and t KZ ce the number of p icult to verify ongo	discussed. 1 s of whole 2 cases are 1 cessary 2 e imaging fication of nent. Design 4 angential 2 prototypes ing physical
17ABBLTR Attendants are m 17ABBMAT Marketing fundar prese 17ABBMAZ Getting to know 17ABBMDT Interaction of the (MWI). Perspecti cerebral vascular e 17ABBMEC Cross-section ct 17ABBMES Numerical simula needed and thus s processes (eg, he knowledge of mate	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology ade acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously inf diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tes Marketing of Medical Technology mentals, products management, basic knowledge concerning export activities in the field of marketing and commercial health care tech Management and Administration in Healthcare whe structure of the health sector and financing models Health. Zoom administrative management issues various types of medical w interconnection. Orientation in the specific features of health facilities and European systems of health care workplaces. Microwave Diagnostics and Therapy EM field with biological tissues and its use in diagnostics: non-invasive monitoring of blood glucose concentration, microwave devents and early detection of breast cancer. Therapeutic systems and applicators. Mechanics maracteristics, body stress state (Cauchy, geometry, compatibility and physical equations), linear elasticity theory, reaction, beam been stresses, deformation, torsion influence. Physical Phenomena Modeling in COMSOL Multiphysics tions are increasingly being used to develop ment and optimize existing products and ecuice simulations can greatly redu ginficantly accelerate and reduce development costs. Another sector where numerical simulations are used is a sector where it is differently accelerate and reduce development costs. Another sector where numerical simulations are used is a sector where it is differently accelerate and reduce development costs. Another sector where numerical simulations are used is a sector where it is differently accelerate and reduce development costs. Another sector where numerical simulations in oncology or cardiac surgery end of microwave telectures for direct brain simulation). L	nostics will be also sing. Z ormed about terms ts. KZ chnology. Practical in the exercises. KZ orkplaces, their ne KZ assics of microwave etection and classif ia. Planning treatm Z,ZK ding, normal and t KZ ce the number of p icult to verify ongo in treatment where). Computer model	discussed. 1 s of whole 2 cases are 1 cessary 2 e imaging fication of nent. Design 4 angential 2 porototypes ing physical b, based on ing involves
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17ABBLTR Attendants are m 17ABBMAT Marketing fundar prese 17ABBMAZ Getting to know 17ABBMDT Interaction of the (MWI). Perspecti cerebral vascular e 17ABBMEC Cross-section ch 17ABBMFJ Numerical simula needed and thus s processes (eg, he knowledge of mate the creation of geo area and the proc model setting. The 17ABBMS Basic concepts.	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology Made acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously inf diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tes Marketing of Medical Technology mentals, products management, basic knowledge concerning export activities in the field of marketing and commercial health care technology companies from the Czech Republic. Discussion and analysis of the real products are included whe structure of the health sector and financing models Health. Zoom administrative management issues various types of medical with the structure of the health sector and financing models Health. Zoom administrative management issues various types of medical with biological tissues and its use in diagnostics: non-invasive monitoring of blood glucose concentration, microwave dowents and early detection of breast cancer. Therapeutic systems and applicators for microwave and RF local and regional hypertherm and testing of applicators. Mechanics Physical Phenomena Modeling in COMSOL Multiphysics tions are increasingly being used to develop new and optimize existing products and envices. Numerical simulations can greatly redu ignificantly accelerate and reduce development costs. Another sector where numerical simulations are used is a sector where it is difficating the biological tissue under electrodes for diverted to the device (eg radiofrequency ablation in oncology or cardias surgering the reduce evelopment costs. Another sector where numerical simulations are used is a sector where it is difficating the biological tissue under electrodes for diverte trans minulation). Last but not least, the choice of differential equations, the method of sessing of material properties and boundary conditions and, last but not least, the choice of differential equations,	Action of the second se	discussed. 1 s of whole 2 cases are 1 cessary 2 e imaging fication of nent. Design 4 angential 2 prototypes ing physical a, based on ing involves e computing numerical edge will be 4 dditional
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17ABBLTR Attendants are m 17ABBMAT Marketing fundar prese 17ABBMAZ Getting to know 17ABBMDT Interaction of the (MWI). Perspecti cerebral vascular e 17ABBMEC Cross-section ch 17ABBMFJ Numerical simula needed and thus s processes (eg, he knowledge of mate the creation of geo area and the proc model setting. The 17ABBMS Basic concepts. experiment. Cor 17ABBMTB Introduction to em	During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces Medical Terminology Tade acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously int diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tes Marketing of Medical Technology Tentals, products management, basic knowledge concerning export activities in the field of marketing and commercial health care teen inted including health care technology companies from the Czech Republic. Discussion and analysis of the real products are included Management and Administration in Healthcare The structure of the health sector and financing models Health. Zoom administrative management issues various types of medical w interconnection. Orientation in the specific features of health facilities and European systems of health care workplaces. Microwave Diagnostics and Therapy EM field with biological tissues and its use in diagnostics: non-invasive monitoring of blood glucose concentration, microwave divents and early detection of breast cancer. Therapeutic systems and applicators for microwave and RF local and regional hypertherm and testing of applicators. Mechanics Therapeutics, body stress state (Cauchy, geometry, compatibility and physical equations), linear elasticity theory, reaction, beam been stresses, deformation, torsion influence. Physical Phenomena Modeling in COMSOL Multiphysics tions are increasingly being used to develop new and optimize existing products and devices. Numerical simulations can greatly reduing in problems use defined with biological tissue and boundary conditions and, last but not least, the choice of differential equations, the method of subsers or the results obtained, the length of calculations and the copulational power requirements are very lectures cover the most common problems in electrical engineering, thermics, echnistry, acoust	Action of the second se	discussed. 1 s of whole 2 cases are 1 cessary 2 e imaging fication of hent. Design 4 angential 2 prototypes ing physical based on ing involves e computing numerical edge will be 4 idditional I disease 2 es: AD and

17ABBMVP	Research Methodology	KZ	2
	ng points of research. Methods and technology of research. Logic of scientific research. Theoretical starting points of research. Scien		
everyday work. Stru	icture of scientific information, possibility for their acquisition, methods of processing and application in practice. Description of princi	ples for searching f	for scientific
	information. Description of specific systems, namely from health service. Final report.		
17ABBMZT	Management of Health Care Technology	Z,ZK	2
	health care facilities. Medical devices: their selection and purchase, safety and reliable operation, decommissioning and ecological liques and the selection and purchase is a selection of the		
based on agreemer	ts. Methodology of the internal maintenance. Safety risk assessment. Valid legislation and technical norms. Relationships technician-m	edical doctor, techr	nician-nurse
	and technician-patient. Rights, duties and responsibilities of the technicians in medical health care.	1/7	0
17ABBNMP	Project Proposal and Management nt, definition of terms project, program portfolio, project life cycle, project goal and benefits, triple imperative, project success assess	KZ	2
	dy (purpose, content, processing), SMART objective, stakeholders. Project identification list, logical framework. Design of project stru		
	costs, budget, changes, procurement and contractual relations, personnel management. Risk analysis and risk management, metho		
on the project status	s, evaluation of the current project status. information and documentation, communication. Leadership and motivation of people, negotiat	ion and discussion	procedures.
	Project completion, final report.		
17ABBOIZ	Protection Against Effects of Ionizing Radiation	KZ	2
The aim of the co	urse is to give students an overview of the issues related to protection against ionizing radiation and dosimetry. Characteristics of bas	sic types of ionizing	g radiation
sources of ionizing	radiation and its sources, interactions of lonising radiation with matter, quantities and units used in dosimetry and radiation protection	, detection of ionizi	ng radiation
	and biological effects of ionizing radiation.)		
17ABBPMP1A	Devices, Methods and Procedures in Clinical Practice I	KZ	2
	dio US, department of anesthesiology and resuscitation, ICIP, Department of Anesthesiology - Adult Part, Emergency department, P		
	ical department, Clinic of Imaging Methods, Central Operating Theatres - Paediatric Part (Neurosurgery, Stomatosurgery, Otorinolary base records of medical devices and their parameters), Neurophysiological laboratory, Technical Safety Check (ECG, Patient monitor)		
Surgery), LTA (uata			y or surgical
17ABBPMP2A	Devices, Methods and Procedures in Clinical Practise II	KZ	2
	e applied focus on the following issues: operation and documentation of the results of imaging methods, the relationship between imaging		—
	cepts and methods in various fields of diagnostic imaging, basic imaging systems from the perspective of interpretation and descripti		
	diagnostic imaging practice (radiology, ultrasonography, magnetic resonance imaging, nuclear medicine, endoscopy, PET, SPE	CT).	
17ABBPMS	Probability and Mathematical Statistics	Z,ZK	4
Introduction to pro	bability theory and mathematical statistics. Determinism and chance. Axiomatic definition. Random variable and its distribution funct	ion. Discrete and c	ontinuous
distributions. Quint	iles. Random vectors. Conditioning and independence. Functions of random variables. Characteristics of random variables, weak law	of large numbers.	The role of
	ematical statistics, the population and sample. Random selection. Point and interval estimates. Hypothesis testing. Goodness. Non-p	arametric tests.	
17ABBPNK	Design and Construction of Medical Devices/Practical Exercises	KZ	2
	roduce students with basics of design, construction and development process of devices which are used in medical, clinical or labor		
	Theoretical part will that follow these topics: basic philosophy of device design and construction, materials, components, laws and stand	-	
	nd prototype to "ready to sell" device. Practical part will introduce students into blueprints designs, circuit and schematics drawing, PC SMT components, signal conditioning and processing, data acquisition. Also students will develop their simple prototype device and	-	-
Solucing IIII and	in LabVIEW.	create measuring	application
17ABBPP	First Aid	KZ	2
	brief overview of the main principles and procedures for providing urgent first aid, with special attention to the failure of vital functions a	I I	
-	course are also included situations of mass disability during crisis situations and emergency events including the CBRN phenomenor	-	-
	of this course students should be able to diagnose life threatening conditions and provide adequate urgent first aid.		
17ABBPPM	Programming in Matlab	KZ	2
Basic description	of MATLAB environment. Numerical formats. Variables and matrices. Complex numbers. Rounding numbers. Basic instructions. Matri	ces operations. Vis	ualization.
Simulink (basic de	scription, exercise formulation, parameters entry). Conditional and cyclical instructions. Script creation, functions, debugging. Continu	uous and discrete p	processes.
	Symbolical solutions. Graphical user interface creation. Applications in MATLAB.		
17ABBPPP	Programming Tools	KZ	2
	tware tools on MS Windows platform and GNU/Linux platform. Problem of portability of data-files, standardized exchange formats - I		JDF, PNG
etc. Introduction to	administartion and configuration of MS Windows and GNU/Linux, programming of scripts, connectivity and comaptibility of major op		I the I and a sume
	applications - W/W/W browsers, e-mail clients, Office toolboxes, Graphical and CAD programs	erating systems. M	ultiplatform
17ABBDDCA	applications - WWW browsers, e-mail clients, Office toolboxes, Graphical and CAD programs.		
17ABBPPSA	Patient and Device Simulators and Testers	Z,ZK	4
During the course a	Patient and Device Simulators and Testers attention will be given to the two large groups, i.e. patient simulators and instrumentation testers. The use of these two groups in clinic	Z,ZK cal practice will also	4 o be part of
During the course a the course. As an	Patient and Device Simulators and Testers	Z,ZK cal practice will also Il the samples are	4 o be part of carried out
During the course a the course. As an with two groups o	Patient and Device Simulators and Testers attention will be given to the two large groups, i.e. patient simulators and instrumentation testers. The use of these two groups in clini essential part of the teaching will be included laboratory exercises in the workplace simulated workplace intensive care unit, where a	Z,ZK cal practice will als Il the samples are v teaching (especia	4 o be part of carried out illy linking
During the course a the course. As an with two groups o	Patient and Device Simulators and Testers attention will be given to the two large groups, i.e. patient simulators and instrumentation testers. The use of these two groups in clini- essential part of the teaching will be included laboratory exercises in the workplace simulated workplace intensive care unit, where a of devices. The course has a direct relationship to future career opportunities. Great emphasis is placed on managing interdisciplinary	Z,ZK cal practice will als Il the samples are v teaching (especia performed standar	4 o be part of carried out illy linking
During the course a the course. As an with two groups o	Patient and Device Simulators and Testers attention will be given to the two large groups, i.e. patient simulators and instrumentation testers. The use of these two groups in clinic essential part of the teaching will be included laboratory exercises in the workplace simulated workplace intensive care unit, where a of devices. The course has a direct relationship to future career opportunities. Great emphasis is placed on managing interdisciplinary ineering principles). Given the organization of teaching as a 2-hour blocks 1 for 14 days is shown below, only 7 lectures (there will be	Z,ZK cal practice will als Il the samples are v teaching (especia performed standar	4 o be part of carried out illy linking
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17ABBSEL	Power Engineering	Z,ZK	4
Basic power electro	onics, power supplies units including electrochemical supplies, rectifiers, stabilizers, common types of motors, basic distributions of elect	ricity, types of elec	tric systems
and connecting of	electric appliances with sight on medical purposes. The knowledge will be checked in the laboratory by mean of practical examples du	ing the work in the	e laboratory.
17ABBSPR1	Semestral Project I.	KZ	2
Basic communi	cation and presentation skills, including team work, team heading and project management. Creation of presentations and written text	s. Typography rule	s. Types,
	purpose and requirements of technical presentations and technical texts. Writing a commented bibliographic search.		
17ABBSPR2		KZ	4
Basic communicat	tion and presentation skills. Creation of presentations and written texts. Typography rules. Types, purpose and requirements of technica	al presentations ar	nd technical
	texts. Writing a commented bibliographic search.		
17ABBSPT	Equipments for Anaesthesiology and Resuscitation	Z,ZK	. 4
	E SUBJECT IS MERGEDE WITH F7ABBSPT AND THE ACTUAL MATERIALS ARE AVAILABLE THERE. Basic concept or resuscitation		
	iousness and internal environment, their control. Equipment overview, common requirements. Specific requirements for equipment at i aesthesia and critical care medicine (ACCM). Blood gases, their measurement and interpretation. Modelling of the fluidic systems, par		. ,
•	nciples and adverse effects of artificial lung ventilation (ALV). Conventional and unconventional lung ventilation, corresponding ventilation		
	orisers, their thermodynamic principles. Humidification of ventilatory gases. Equipment for monitoring and support of blood circulation.		
	monitors. Other diagnostic and therapeutic equipment at ICU and ACCM. Design of ICU and ACCM.		
17ABBTEL	Theory of Electrical Engineering	Z,ZK	4
	C and AC currents. Electrical curcuits including R, L, C. Power of electric current, thermal effect of electric current. Distribution of electric	,	ection of the
electrical system	ns. Input resistance and impedance, idle voltage, inner resistance and impedance of the source, mutual loading of the source and elec	trical appliance, in	npedance
matching. Proper	ties of circuits in time and frequency domain. Transient action in DC circuits, frequency characteristics of the L/C circuit. Electrical curr	ent in semiconduc	tor, type of
the conductivity, cre	eation of the semiconductor crossing, properties in the forward and reverse direction. Bipolar transistor - transistor effect, basic principle	in elementary circ	uit. Unipolar
	r transistors with complementary vodivosti (CMOS). Electromagnetic effects (induction, magnetization, force effect). Electromagnetic v		
	ompatibility. Soft and hard magnetic materials. Transformers construction and parameters. Magnetic recording and reproduction of sign		
17ABBTZS	Tomographical Imaging Systems	Z,ZK	4
	cal imaging systems (US). Doppler systems. Computed tomography - CT (fundamental principle, system layout and arrangements, fur		
	ersions, reconstruction fundamental principles). Magnetic resonance imaging (MRI). Positron emission tomography (PET) and single particulate the loberatory everying provide students with an everying of the		
	CT). Specialized - hybride imaging systems. Lectures and especially the laboratory exercises provide students with an overview of the pmographical and computed tomography based imaging systems and methods. There are described methods for image data sensing,		
	rinciples of function and properties of sensing image devices in context, which is especially relevant from the interdisciplinary point of	•	
	on. Knowledge, skills and competences: The student is able to explain the basic physical principle of the given modalities and knows its		
	tion. The student is able to assess, on the basis of standard definition of technical parameters that imaging system meets the physicial		
modality. Such kno	wledge is a prerequisite to the correct process technology selection and application of the modalities as well as the minimum necessary	to ensure the requ	uired quality
	of the resulting image data.		
17ABBUSS	Introduction to Signals and Systems	Z,ZK	4
To introduce stu	idents to basics of theory of signals and systems. To explain main principles on applications from biology and medicine. To become ac	quainted with basi	c mutual
	relations in computer laboratories by means of MATLAB.		
17ABBVBI	Virtual Bioinstrumentation	KZ	2
•	s with process of development of application in LabVIEW using Virtual Instrumentation concept. During the course will be explained ba		° °
	a structures, cluster, loops, conditionals, typedefs, advanced coding concepts like event driven programming, multi-threaded application	-	
and FIFOs, syn	chronisation, process of deployment, executable building, installer and upgrades. The students are able also to obtain the CLAD (Cert	ificate LabVIEW A	ssociate
	Developer) certificate. This certificate is first step in knowledge of VI.		
17ABBZLN	Legislation in Health Care and Technical Standards	KZ	2
	Act. Act on Professional Qualification for the Pursuit of the Medical Profession and on Further Education in Health Care (the Act on N		'
	crees. EU directives on medical devices. Act on Technical Requirements for Products. Government Regulation to the Act on Technical tions dealing with the creation of technical standards in the Czech Republic and in the world. Technical standards relating to medical de	-	
	dical devices on the market. Clinical testing of instruments. The role of testing laboratories. Some facts and experiences from abroad. Legis		
for placing new met	Laboratory and Clinical Practice (GMP, GLP and GCP).		indiaotaning,
17ABBZOD	Image Data Processing	KZ	2
	representation, linear 2D systems, 2D spectrum, Digital representation of images, Basic image characteristics: brightness, contrast, re		
-	rete Fourier transform, discrete cosine transform, image enhancement, geometric operations, image filtering, morphological operation		-
0 •• , ••••	segmentation, basic principles of image compression.		
17ABBZPD	Fundamentals of Pathology, Hygiene and Epidemiology	ZK	4
	les a brief, clear and integral concept of medical branches, particularly internal medicine. The purpose of the subject is to acquaint the		
	ondary prevention of internal diseases and to define terms associated with the consideration of the patient health condition. The studen		
and differentiate fro	om each other methods of health examination, described procedures for the basic clinical examination and understand its principle and in	portance. He/she	is supposed
	to know methods of monitoring the patient health condition.		
17ABOZP	Occupational Safety and Health, Fire Protection and First Aid	Z	0
	information see http://bilakniha.cvut.cz/en/FE.html		

For updated information see <u>http://bilakniha.cvut.cz/en/FF.html</u> Generated: day 2024-05-19, time 01:34.