Study plan

Name of study plan: Biomedical Technology

Faculty/Institute/Others: Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Biomedical Technology 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: F7PBB POV 20 Name of the group: Biomedical Technology compulsory course 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 56 courses Credits in the group: 170 Note on the group:

Note on the gr	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their members)	Completion	Credits	Scope	Semester	Role
	Tutors, authors and guarantors (gar.)					
F7PBBALP	Algorithmic and Programming Theory Pavel Smr ka, Tomáš Veselý, Lenka Hanáková, Christiane Malá Pavel Smr ka Pavel Smr ka (Gar.)	КZ	4	2P+2C	z	z
F7PBBAF1	Anatomy and Physiology I. Roman Má alík, Jakub Tlapák Jakub Tlapák Jakub Tlapák (Gar.)	Z,ZK	4	2P+1C+1L	z	Z
F7PBBAF2	Anatomy and Physiology II. Jakub Tlapák Jakub Tlapák Jakub Tlapák (Gar.)	Z,ZK	4	2P+1C+1L	- L	Z
F7PBBA3A	English Language IIIA (part 1) Eva Moty ková Eva Moty ková Eva Moty ková (Gar.)	KZ	2	2C	Z	Z
F7PBBA3B	English Language IIIB (part 2) Eva Moty ková Eva Moty ková Eva Moty ková (Gar.)	KZ	2	2C	L	Z
F7PBBBP	Bachelor Thesis Ji í Hozman Ji í Hozman Ji í Hozman (Gar.)	Z	6	8C	L	Z
17BOZP	Occupational Safety and Health, Fire Protection and First Aid Petr Kudrna Petr Kudrna (Gar.)	Z	0	1P	Z	Z
F7PBBBCH	Biochemistry Martina Turchichová, Anna Ludvíková, Kate ina Dunovská Anna Ludvíková Martina Turchichová (Gar.)	Z,ZK	2	1P+1L	Z	Z
F7PBBBLS	Biological Signals Marek Piorecký, Václava Piorecká Václava Piorecká (Gar.)	Z,ZK	4	2P+2L	L	Z
F7PBBBLG	Biology Veronika Vym talová, Aneta Buchtelová Veronika Vym talová Veronika Vym talová (Gar.)	Z,ZK	4	2P+2L	z	Z
F7PBBBB	Biomechanics and Biomaterials Matej Daniel Petr Volf Matej Daniel (Gar.)	Z,ZK	4	2P+2L	Z	Z
F7PBBBOZP	Safety Regulations and Standards in Electrical Engineering Petr Kudrna, Jan Remsa Petr Kudrna Petr Kudrna (Gar.)	Z	1	1P	Z	Z
F7PBBCHM	Chemistry Iveta Horá ková, Miriam Hošková Iveta Horá ková Miriam Hošková (Gar.)	Z,ZK	4	2P+1C+1L	. L	Z
F7PBBEM	Electrical Measurements Roman Mat jka, Jan Vrba Jan Vrba Jan Vrba (Gar.)	Z,ZK	4	2P+2C	Z	Z
F7PBBELF	Electrophysiology Anastasia Sedova, Ksenia Sedova, Pavel Ku era Anastasia Sedova Ksenia Sedova (Gar.)	Z,ZK	2	1P+1L	z	Z
F7PBBEO	Electronic Circuits Jan Uhlí Tomáš D íž al Jan Uhlí (Gar.)	Z,ZK	4	2P+2C	Z	Z

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F7PBBEBI	Ethics in Biomedical Engineering Martina Dingová Šliková Martina Dingová Šliková Martina Dingová Šliková (Gar.)	ZK	2	2P	L	Z
F7PBBESP	Management of Health Care Technology Ji í Petrá ek Ji í Petrá ek Ji í Petrá ek (Gar.)	Z,ZK	2	1P+1C	L	z
F7PBBFY1	Physics I. Jan Mikšovský, Eva Urbánková, Petr Písa ík Petr Písa ík Jan Mikšovský (Gar.)	Z,ZK	4	2P+1C+1L	Z	z
F7PBBFY2	Physics II. Jan Mikšovský, Eva Urbánková, Petr Písa ík, Jana Urzová Petr Písa ík Jan Mikšovský (Gar.)	Z,ZK	6	2P+2C+2L	L	z
F7PBBFCH	Physical Chemistry Karel Roubík, Martina Turchichová, Iveta Horá ková Iveta Horá ková Karel Roubík (Gar.)	Z,ZK	4	2P+1C+1L	Z	z
F7PBBHE	Hygiene and Epidemiology Lucie Lidická, Emil Pavlík Lucie Lidická Emil Pavlík (Gar.)	ZK	1	1P	L	z
F7PBBISZ	Information Systems in Health Care Zoltán Szabó, Dagmar Brechlerová, David Jirsa, Anna Hor áková, Petr Šmíd, Tomáš Kraj a Anna Hor áková Zoltán Szabó (Gar.)	Z,ZK	4	2P+2C	Z	z
F7PBBITP	Integral Calculus Ji (Neustupa, Tomáš Parkman Tomáš Parkman (Gar.)	Z,ZK	4	2P+2C	L	z
F7PBBKT	Communication Technology Tomáš Veselý, Aneta Buchtelová, Karel Hána, Tomáš Funda, Martin Vít zník, Markéta Janatová, Kate ina Pilátová Tomáš Funda Karel Hána (Gar.)	Z,ZK	2	1P+1C	Z	z
F7PBBKZS	Conventional Imaging Systems Ji í Hozman, Tomáš D íž al, Martin Rožánek, Martin apek Tomáš D íž al Ji í Hozman (Gar.)	Z,ZK	4	2P+1C+1L	L	z
F7PBBLT	Clinical Laboratory Instrumentation Martina Turchichová Martina Turchichová (Gar.)	Z,ZK	4	2P+2L	L	Z
F7PBBLPZ1	Management of Health Care Technology Petr Kudrna, Martin Rožánek Petr Kudrna Martin Rožánek (Gar.)	Z,ZK	4	2P+2L	Z	Z
F7PBBLPZ2	Medical Devices and Equipment II. (Therapeutical Devices)	Z,ZK	2	1P+1L	L	z
F7PBBLAD	Petr Kudrna, Václav Ort, Karel Roubík Petr Kudrna Petr Kudrna (Gar.) Linear Algebra and Differential Calculus Jana Urzová, Ji í Neustupa, Tomáš Parkman, Lukáš Liebzeit Tomáš Parkman Tomáš Parkman (Gar.)	Z,ZK	6	2P+4C	Z	Z
F7PBBMAZ	Management and Admininistration in Health Care Ji í erný Ji í erný Ji í erný (Gar.)	KZ	1	1P	Z	Z
F7PBBMEC	Mechanics Matej Daniel Matej Daniel Matej Daniel (Gar.)	Z,ZK	4	2P+2L	L	z
F7PBBMT	Medica Terminology Dana Rebeka Ralbovská Dana Rebeka Ralbovská Dana Rebeka Ralbovská (Gar.)	Z	1	1C	Z	z
F7PBBMVP	Research Methodology Jakub Ráfi, Marek Novák Jakub Ráfi Jakub Ráfi (Gar.)	KZ	2	1P+1C	Z	Z
F7PBBMS	Modelling and Simulation	Z,ZK	4	2P+2C	L	z
F7PBBNMP	Jan Kauler Jan Kauler Jan Kauler (Gar.) Project Proposal and Management	KZ	2	1P+1C	L	z
F7PBBOIZ	Ji í Petrá ek, Pavlína Pokošová Ji í Petrá ek Ji í Petrá ek (Gar.) Protection Against Ionizing Radiation	ZK	2	2P	L	z
F7PBBPPS	František Podzimek František Podzimek František Podzimek (Gar.) Pacient and Device Simulators and Testers Petr Kudrna, Martin Rožánek, Lenka Horáková Petr Kudrna Petr Kudrna	Z,ZK	2	1P+1L	Z	z
	(Gar.) Programming in Matlab I.	_,				
F7PBBPPM1	Christiane Malá, Radim Krupi ka, Lucie Horáková Radim Krupi ka Radim Krupi ka (Gar.)	ΚZ	1	1C	Z	z
F7PBBPPM2	Programming in Matlab II. Christiane Malá, Adéla Mádlová Radim Krupi ka Radim Krupi ka (Gar.)	KZ	2	2C	L	Z
F7PBBPNK	Design and Construction of Medical Devices/Practical Exercises Roman Mat jka, Jana Mat jková Roman Mat jka Roman Mat jka (Gar.)	KZ	4	4L	Z	z
F7PBBPMS	Probability and Mathematical Statistics Marek Piorecký, Jan Štrobl, Michaela Mrázková, Tomáš Nagy Michaela Mrázková Marek Piorecký (Gar.)	Z,ZK	4	2P+2C	Z	z
F7PBBPP	First Aid Pavel Böhm Pavel Böhm	KZ	2	1P+1C	L	Z
F7PBBPSL	Psychology Jaroslava Jirásková, Martina Kusáková Martina Kusáková Martina Kusáková (Gar.)	KZ	2	1P+1C	Z	Z
F7PBBROP	Guided Practical Training Petr Kudrna Petr Kudrna Petr Kudrna (Gar.)	Z	2	80XH	L	Z
F7PBBSPR1	Semestral Project I. Petr Kudrna, Marek Piorecký Petr Kudrna Petr Kudrna (Gar.)	KZ	1	1C	L	Z
					7	
F7PBBSPR2	Semestral Project II. Petr Kudrna Petr Kudrna Petr Kudrna (Gar.)	KZ	4	4C	Z	Z

	Sensors in Medicine David Vrba, Miroslav Husák David Vrba Miroslav Husák (Gar.)	Z,ZK	4	2P+2L	L	z
F7PBBSEL	Power Engineering Ji í Hozman, David Vrba, Ji í Petrá ek David Vrba David Vrba (Gar.)	Z,ZK	5	2P+3L	L	z
F7PBBSPT	Research Methodology Václav Ort, Karel Roubík, Jakub Ráfl, Šimon Walzel Jakub Ráfl Václav Ort (Gar.)	Z,ZK	4	2P+2L	L	z
F7PBBTEL	Theory of Electrical Engineering Tomáš D íž al, Jan Uhlí, Marek Novák, Pavel Máša Tomáš D íž al Jan Uhlí (Gar.)	Z,ZK	4	2P+2C	L	z
F7PBBTZS	Tomographical Imaging Systems Ji í Hozman, Tomáš D íž al, Martin Rožánek, Evgenila Karnoub Martin Rožánek Ji í Hozman (Gar.)	Z,ZK	4	2P+1C+1L	Z	Z
F7PBBUSS	Introduction to Signals and Systems Jan Kauler Jan Kauler (Gar.)	Z,ZK	4	2P+2C	Z	Z
F7PBBZP	Basics of Pathology Miloš Sokol Miloš Sokol Miloš Sokol (Gar.)	ZK	2	2P	L	Z
F7PBBZLN	Legislation in Health Care and Technical Standards Peter Kneppo, Vojt ch Kamenský, Ond ej Gajdoš Vojt ch Kamenský Peter Kneppo (Gar.)	ΚZ	2	1P+1C	Z	z
Characteristics of	the courses of this group of Study Plan: Code=F7PBB POV 20 Na	ne=Biomed	ical Tech	noloav co	ompulso	rv course
F7PBBALP	Algorithmic and Programming Theory				κz	4
	es. Identifiers, data types. assignment statement, conditional statement, cycles. Arithmetical a	nd logical operation	tions Diaita			-
	structured programming in C language - building and structure of simple programs, creating					
-		-			-	-
	Practical overview of programming techniques and basic algorithms in C language. Recursive					
types, data sorting and	searching, implementation of basic numerical algorithms. Introduction to biomedical data pro	ocessing - progr	ammers vie	w. Introductio	n to softwar	e engineerin
F7PBBAF1	Anatomy and Physiology I.			Z	.ZK	4
Entry requirements of t	he course: Output knowledge, skills, abilities and competences: The course serves to unc	erstand the rela	tionships be	etween the st	, ructure and	functions of
	aching follows modern pedagogical trends consisting in a direct connection between the mo		-			
	ics of lectures and connected with practical exercises. It focuses significantly on problems o			• •		•
					-	
	nodern multimedia programs (eg ADAM and others) is a matter of course. From a theoretica	i and practical p	oint of view	, the main em	ipnasis will i	be on the
morphology and function	n of vital organs and systems.					
F7PBBAF2	Anatomy and Physiology II.			Z	,ZK	4
F7PBBA3A	English Language IIIA (part 1)				κz	2
-	s to increase students' language competence in academic English and professional vocabul	arv along with c	ommon cor	1		_
	h academic text, understand and be able to use basic terminology, and be aware of the diffe					
lexical devices.	in academic text, understand and be able to use basic terminology, and be aware of the dire	erent stylistic lev			Socialed Syl	
					/7	<u> </u>
-	English Language IIIB (part 2)			1	κz	2
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Teaching in the summe		0 0	01	nence in the w	orld. The sy	/stem is bas
Teaching in the summe on the independent cre	semester is based on a modern, non-frontal, project-based, and interdisciplinary way of tea	biomedical en	gineering, a	nence in the wind make it av	orld. The sy ailable to th	/stem is bas eir colleagu
Teaching in the summe on the independent cre in the form of a project.	r semester is based on a modern, non-frontal, project-based, and interdisciplinary way of tea ative work of students who are asked to develop an interesting topic in their field of study, i.e	biomedical en	gineering, a	nence in the wind make it av	orld. The sy ailable to th	/stem is bas eir colleagu
on the independent cre in the form of a project. library.	r semester is based on a modern, non-frontal, project-based, and interdisciplinary way of tea ative work of students who are asked to develop an interesting topic in their field of study, i.e Another activity of the students in the summer semester is a discussion with the tutor over a	biomedical en	gineering, a	nence in the wind make it av	vorld. The sy ailable to th available fi	vstem is bas eir colleague rom the facu
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F7PBBBB	Biomechanics and Biomaterials	Z,ZK	4
	for all students who need to supplement their knowledge and have a general knowledge about biomechanics and its applicat		-
	to be sufficient to understand athe issues in related subjects, especially the subject of Mechanics and Robotics in Medicine. If		
-	had the opportunity to complete these basic knowledge, they will be exposed to the risk of misunderstanding the subsequent is	ssues in related st	JDJects, in which
	count the basic knowledge.	7	4
F7PBBBOZP	Safety Regulations and Standards in Electrical Engineering		l a: alactria abaak:
	ction during work; the role of the biomedical technician in clinical practice; risk-determining effects; patient environment; medic tems; protection classes; electrical inspections; regulations and standards; work with lasers	ai isolaleu system	I, EIECUIC SHOCK,
F7PBBCHM		Z,ZK	4
		,	
F7PBBEM	Electrical Measurements	Z,ZK	4
-	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		
F7PBBELF		Z,ZK	2
	Electrophysiology lectrical phenomena at the cell, organ and organism level, to the possibilities of measuring an	,	
-	ble students to experimentally verify the knowledge. This course builds on Anatomy and Physiology I and II and requires a bas	-	
	(physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The cou	•	
	us, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the phys		-
different levels: cell, tiss			
F7PBBEO	Electronic Circuits	Z,ZK	4
The course provides a	basic orientation in the principles of electronic circuits used in electronic laboratory and medical devices. It provides a prerequ	uisite for the skille	d operation of
analogue and digital ins	strumentation. technology. Course entry requirements: Successful completion of Theoretical Electrical Engineering. Exit Know	rledge, Skills, Abili	ities and
Competencies: Student	s will become familiar with functional electronic blocks that are used in the design of laboratory and medical instruments. The	course will prepa	re them to
competently assess the	basic properties and parameters of electronic devices.		
F7PBBEBI	Ethics in Biomedical Engineering	ZK	2
Prerequisites: Knowled	ge of school humanities objects (philosophy, history, psychology) Target knowledge and skills: basic concepts and controvers	ial topics in biome	dical theoretical
and applied ethics; be a	able to think critically in ethical contexts; argue and defend opinions in ethical dilemma situations; ability development of profes	ssional literature a	nd development
of empathy.			
F7PBBESP	Management of Health Care Technology	Z,ZK	2
F7PBBFY1	Physics I.	Z,ZK	4
Course Physics 1 is use	d to repeat and expand the basic knowledge of physics in the field of classical mechanics, thermals and optics, which is need	ed for further stud	y at FBME CTU.
Students will gain theor	etical knowledge, the ability to solve numerical problems and practical skills associated with working in laboratories.		
F7PBBFY2	Physics II.	Z,ZK	6
The course Physics 2 for	illows the course Physics 1 and expands the acquired knowledge in the field of electromagnetism and the basics of atomic an	d nuclear physics	and condensed
matter physics.			
F7PBBFCH	Physical Chemistry	Z,ZK	4
The course is aimed at	clarifying the physicochemical principles of topics related to the profession of biomedical engineer and technician in clinical p	ractice or researc	h. The goal of
-	students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices, in clinic	cal research, or di	rectly in clinical
practice. The course de	monstrates the direct application of theoretical principles in practice.		
F7PBBHE	Hygiene and Epidemiology	ZK	1
F7PBBISZ	Information Systems in Health Care	Z,ZK	4
Lectures are focused or	n the definition and clarification of individual subfields of medical informatics, the links of information systems to the organizat	ion of health care	, payments and
-	n of IS users and their roles. The course includes the necessary overview of information technology and technical and SW re		-
	iples of coding and interpretation of medical data, data standards and communications. The individual types and properties of	-	
	al medical and medical IS are analyzed. The course also provides detailed information on the methodology of development, in	nplementation and	d support of
large-scale information			
F7PBBITP	Integral Calculus	Z,ZK	4
-	uction to integral calculus and integral transforms. Integral calculus: primitive function, indefinite integral, properties and meth	-	
	n, partial fractions), definite integral, properties, Newton-Leibnitz fundamental theorem, simple applications of both indefinite	•	
	tial equations (ODEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous OE DDEs with constant coefficients),intro to multiple integrals, particularly double integral and applications. Integral transforms: L		Ū.
-	their application for solving nth order linear ODEs with constant coefficients.		
F7PBBKT	Communication Technology	Z,ZK	2
	klady nasazení informa ních a komunika ních technologií ve zdravotnictví. Historie, základní struktura a rozd lení po íta , r		
	ra ní pam , klasické a SSD pevné disky, pam ové karty, zvukové karty, grafické karty, monitory, klávesnice, myši, tiskárny a		
	SB-C, HDMI, DisplayPort, Thunderbolt, HDMI, S/PDIF), RS232 jako virtuální COM port a jeho použití v praxi, modemy, nej a	-	
	rových systémech (IIC, SPI), nej ast jší sb rnice pro komunikaci p ístroj a systém ve zdravotnictví, standardizace, opera	-	
	ní a p enos dat, rozhraní Bluetooth, NFC, poíta ové sít, LAN, WAN, vrstvový referen ní model OSI, základní technické prost		
praktická realizace), Int	ernet - prohlíže e, používané standardy a jazyky, úvod do architektury TCP/IP, protokoly a adresování, propojování lokálních	sítí, brány a sm r	ova e, pojem
server, architektura klie	nt-server, nej ast ji používané protokoly sí ové architektury TCP/IP: HTTP, FTP, DNS, DHCP, VPN.		
F7PBBKZS	Conventional Imaging Systems	Z,ZK	4
F7PBBLT	Clinical Laboratory Instrumentation	Z,ZK	4
F7PBBLPZ1	Management of Health Care Technology	Z,ZK	4
	ation of medical (diagnostic devices) according to international directives (EU directives), including correct terminology. The elec		dical equipment
-	nology in clinical practice; Construction of diagnostic apparatus; Biosignal amplifiers, sensing electrodes, recording systems;		
activity (ECG) - electroo	cardiographs, vector cardiographs; Blood pressure monitors - NIBP; Blood pressure measuring instruments - IBP, PCWP; Dilu	ution measuremen	it of cardiac
output, Swan-Ganz cath	neter; SpO2 pulse oximetry; Vital signs monitors, central monitoring systems. Special monitors for clinical practice - cardiotocogra	phs, NIRS, BIS; El	ectroimpedance
	tice - a measurement of respiration by impedance method, EIT; Measurement of brain bioelectrical activity (EEG); Measurem	ent of muscle bio	electric activity
	amination of the auditory system; Simulators and testers of diagnostic equipment.		
F7PBBLPZ2	Medical Devices and Equipment II. (Therapeutical Devices)	Z,ZK	2
F7PBBLAD	Linear Algebra and Differential Calculus	Z,ZK	6
	sists of: sequences and their limits. Functions of one real variable, their limits, continuity, derivatives. Local and absolute extra	ema of a function	of one variable,
investigations of function	ns. Taylor-polynomial.		

F7PBBMAZ	Management and Admininistration in Health Care	KZ	1
F7PBBMEC	Mechanics	Z,ZK	4
Students will get acquai	nted with the following areas of mechanics: General physical equations, Newton's laws, statics and dynamics. Force and mo	ment effect - decc	mposition,
replacement. Equilibriun	n of a force system in a plane and space - equation of equilibrium, systems into equilibrium. Reactions on statically determin	ed systems - moti	on restrictions,
spatial and planar const	aints, solution of reactions. Static moment, center of gravity and center of area. Spatial moment of inertia - kinetic energy of re	otational motion, p	product moment,
momentum, law of cons	ervation of momentum. Second moment of area - product moment, polar moment, Mohr circle, main moments of inertia, ellip	se of inertia. Inter	nal static effects
- beam, system of plates	s, course of internal static effects, kinematic method, statically indeterminate problems. Mechanical properties of materials -	tests of mechanic	al properties,
stresses and deformatio	ns, Hooke's law. Stress and strain - uniaxial and biaxial stress state, simple bending, bending curve, torsional stress, cross-s	section design, thi	n-walled
cross-sections, combine	d stress, nonlinear models. Buckling strength - critical load, stability of members, calculation of cross section. Tests of hardness,	, adhesion, toughn	ess, tribological.
	Medical Terminology	Z	1
	quainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously i	I I	ms of whole
	ical procedures. Education is combined with continuous knowlegde check up through the use of tests.	mormed about ter	
		1/7	
	Research Methodology	KZ	2
	tudents to the basic methods of research work and the requirements for scientific communication. The course also introduce	s students to the	principles of
writing and presenting o			
	Modelling and Simulation	Z,ZK	4
Basic concepts and cons	equences of modeling and simulation. Be able to use modeling and simulation methodologies. Emphasis is placed on a thoroug	h understanding o	f compartmental
models, physiological m	odels, pharmacokinetics. Furthermore, continuous and discrete models of population dynamics, epidemiological models, mo	dels of venereal o	liseases.
F7PBBNMP	Project Proposal and Management	KZ	2
	tudents will become familiar with topics such as project management (PM) according to IPMA, the certification process, pro		tfolio, phases,
	, as well as project initiation. They will learn about the feasibility study, project initiation, project identification document, and		
	p project planning, scheduling, risk and risk analysis, project implementation, behavioral competencies in PM, project closur	•	•
	ts from a hospital environment. During the exercises, students will master the following concepts and topics and develop rele		
	ment, logical framework, WBS (Work Breakdown Structure a hierarchical structure of tasks or activities), scheduling, risk ana		
-	s course, students have the opportunity to obtain the IPMA Level D certification, which is intended for aspiring project mana		
	ification is valid for five years.	gers, project coon	unators, and
		71/	
	Protection Against Ionizing Radiation	ZK	2
F7PBBPPS	Pacient and Device Simulators and Testers	Z,ZK	2
Patient and instrument s	imulators and testers. Basic principles of implementation, connections with other disciplines. Detailed description and impler	nentation of a sel	ected model of
a subsystem. Design an	d implementation of patient and instrument simulator sub-blocks. Examples of circuit implementations of simulators and teste	rs. Environment, s	cenario creation
and other related proced	lures in manikin control, basic concepts and principles of anesthesiology. Other types of simulators and phantoms. Possibilit	ies of use in clinic	al practice.
-	Connection of the simulator with other medical equipment. Simulators and testers. Implementation of an established simula		-
	s. Collaboration between HPS and anaesthesia machine.		0,
	Programming in Matlab I.	KZ	1
	o use Matlab, get knowledge of data structures and with data and working with data and their display. During the semester, th	I I	•
	basics for their use in the processing of biomedical data.	ley will gain known	edge of creating
		1/7	
	Programming in Matlab II.	KZ	2
	to understand the topic of scripting languages and their applications, to understand their advantages and disadvantages and		
	become familiar with regular expressions and tools for word processing. The course focuses on the scripting languages with	nin the Unix opera	ting system and
the scripting languages			
F7PBBPNK	Design and Construction of Medical Devices/Practical Exercises	KZ	4
The aim of the practical	y oriented course is to acquaint students with the design process of the measuring part of the device, ie basic problem analy	sis, determinatior	n of functional
blocks and their design,	selection of suitable components and their values with emphasis on working with catalog sheets and application recommen-	dations, preparati	on of electrical
documentation and boar	d design. printed circuit board, its mounting, soldering and revitalization. During the course, students will implement a function	onal device (mour	tina. solderina.
	mometer, which will consist of two functional units - analog part for temperature measurement and signal conditioning (equi		
	be bargraph (equipped with SMT components). For both products, students will implement the design of the diagram and PCE		
	part of the device, an application for digitizing data from the analog device using NI-DAQ cards and a cheap solution with the he		
-	rvice intervention in the device (monitor of vital functions) with emphasis on safe handling and measurement of test points.		oc implemented.
		7 71/	4
	Probability and Mathematical Statistics	Z,ZK	4
	students with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirem		•
	bra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Kn	-	
	ent is acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The	,	
to practical problems that	tt arise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the ba	sic methods of ind	ductive statistics
and can choose a suitat	le method for standard statistical problems.		
F7PBBPP	First Aid	KZ	2
F7PBBPSL	Psychology	KZ	2
	bgy and methods of psychology. Mental activities and psychic processes, psychology of personality, objects of psychology and	I I	
-	concept and theory, psychic processes and stages. Psychological interpretation of personality. Application of knowledge in me		-
	doctors, technicians and patients, technicians and nurses. Communication as a tool for good cooperation amongst people a		
	ication skills. Use of elocution and gestures in personal expression. Verbal and nonverbal communication. Dialogue; types o		
		i ulalogue, questi	
	ns. Communication process as part of economics - components, tools and functions.	-	2
	Guided Practical Training	Z	2
	ts with the organization and provision of professional internships at the clinical workplace. Provision of contractual documen	-	
	sional practice). The ROP will then enable the acquired practical skills and habits to be applied in the key subjects of the 3rd	-	
overview of the current t	echnical level of hospital equipment; an overview of the organization of the work of biomedical technicians and engineers; ca	an apply legal req	uirements to
ensure the safe operation	n of medical equipment. He can communicate with technicians, but also medical staff. He is able to work in a team.		
F7PBBSPR1	Semestral Project I.	KZ	1
	er project (SPR1) must be in the field of biomedical engineering and must be related to the study field of the same name Bior	I I	
	academic year in the database projects.fbmi.cvut.cz Note: It is not possible to implement economic-managerial topics, topic		
	ming, topics purely in the field of biology, etc. The application must always be part of the work in accordance with the focus		
	(medical devices, or the scope of work of a Biomedical Technician in clinical practice)! Entries that do not fall into the above		

FYPBESPR2 Semestral Project III. KZ 4 The main lobe is to start work on a project management. Creation of presentations and written lesks. Typography rules. Types, purpose and equiprements of technical presentations and twitten lesks. Typography rules. Types, purpose and equiprements of technical presentations and twitten lesks. Typesgraphy rules. Types the type resentation is and written lesks. Typesgraphy rules. Typesgraphy rules. The student obstv being to project. The student obstv being to project. The student obstv being to project solved in the PROLECTS database - http://project.thm.icvut.cz.During the technical tests. Typesgraphy rules. The student obstv being the student obstv. The student obstv being the studestastard the student obstv being the student obstv bein				
skilk, notuking teamwork and project management. Creation of presentations and vertime tests. Typography rules. Types, purpose and requirements of technical presentations and technical presentations and technical presentations. The southor solves topic (project) from the selection of the PROJECTS database - http://projects.thmit.ovit.cl.uning the term, there are dedicated 2 hours every week for work under teacher supervision. F7PBBSPB Bachelor Thesis Seminar O The Second and the course is to accombate the realized outcomes of the projects solved in the 4th, 6th and fits semestes - http://projects.thmite.course fortamer requirements of professional teports and communitations, they are profession the orientation in the professional televisits for the densities and the interast communities. Course periations requirements for the requirements of professional teports and communications, they are profession and test professional teports and communications, they are profession and provides information about basic description devices - sensors, describes their operation principle, basic circuit configuration and application. The stress is all mainty on clarifying of base principles and protectal utilization. Integrate part of the source is basic information about sensors of non-decirify againtities and their read out circuits as at an analyty on clarifying of base principles and protectal utilization. Integrate part of the source is basic information about sensors of non-decirify againtities and their read out circuits as a stand methy on clarifying of base principles and protectal utilization. Integrate part of the source is basic information about sensors of the one-decirify againts and their read/out circuits as a stand methy on a device to subgration. Source as a stand methy on decirifying again and their read out circuits as a stand and their read out circuits as a stand methy on a device target and concentral againance with haloward as caused standows and concentres againance with haloward and concentres agai	F7PBBSPR2	Semestral Project II.	KZ	4
Type Base Description Z 1 Construction				
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Prerequisite F7PBBKVF Ext Knowledge, Skills, Abilities and Competencies: Students are fully aware of the requirements of professional reports and communications, they are profiles in the orientation in the professional literature. The students are able to interpret the results. F7PBBSM Sensors in Medicine Quere Students are able to interpret the results. F7PBBKM Sensors in Medicine Quere Students are able to interpret the results. F7PBBKM Sensors in Medicine Quere Students are able to interpret the results. F7PBBKM Sensors in the derivation about basic electronic devices - sensors, describes their operation principle, basic circuit configuration and application. The stress is all on any on clarifying of basic principles and practical utilization. Integral part of this course is basic information about sensors. Chemical sensors, optical sensors. The stress is all on miniaturation, integration metabolic as and concerning applicance with a focus on medical use. Emphasis is placed primarily on the physical nature of the problem and its understanding. Involved ge will be writted on practical warphes and in the liaboratory. F7PBBST Research Methodology ZZK 4 The man objective of the course is to introduce students to the basic equipment of intensive care units (ICU) and anesthesial on grantments of hospitals. These are deviced is used using of the basic equipment of intensive care units (ICU) and anesthesial on spatiance with a folgolite. These are deviced is used using of the deviced and static deviced and static of the course is to introduce students to the basic equipment of functional systems. F7PBBSTE T0 Course C Clarific C				-
they are proficient in the orientation in the protescional literature. The students are able to understand the literature and literature on a given topic, apply scientific research methods to specific assignments. They present their proposed solutions and results, are able to interpret the results. FTPBBSM Sensors in Medicine Z,ZK 4 This subject provides information about basic electronic divices - sensors, describes their operation principle, basic circuit configuration and application. The stress is aid nainly on adhetic provides information about basic encourse is basic information about basic conductive to spacin assignment of the provide information. Integral part of this course is basic information about basic encourses and biosensors. The stress is aid on miniaturaturio, integralment and their reacts and prove distribution. Types of alectrical examples are supplies, including electrochemical sources, rectifiers, stabilizers, the most commonly used types of motors, basics of power distribution, types of electrical examples and in the laboratory. Z,ZK 5 F7PBBSPT Research Methodology Z,ZK 4 The man objective of the course is to introduce students to the basic equipment of intensive care units (ICU) and anesthesiology and resultation departments of hospitals. These are divices to supplices and skills of students from the field's olicice (sepecial) physics, chemistry and physiology and engineering (modeling, circuit theory, pneumatic elements, etc.) in the analysis of clinical technology and in the leador clinical systems. Z,ZK 4 F7PBBTEL Theory of Electrical Engineering Z,ZK <td></td> <td></td> <td></td> <td>-</td>				-
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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: F7PBB PV 2S 20

Name of the group: Biomedical Technology compulsory optional course

Requirement credits in the group: In this group you have to gain at least 2 credits (at most 6)

Requirement courses in the group: In this group you have to complete at least 1 course (at most 3) 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
F7PBBEZP	Economics of Health Services	KZ	2	1P+1C	L	s
F7PBBMAT	Marketing of Medical Technology Tomáš Kolá Tomáš Kolá Tomáš Kolá (Gar.)	KZ	2	2P	L	S

F7PBBPPP	Programming Tools Pavel Smr ka, Tomáš Funda, Radim Kliment Pavel Smr ka Pavel Smr ka	KZ	2	2C	L	S
	(Gar.)		_		_	Ŭ.

Characteristics of the courses of this group of Study Plan: Code=F7PBB PV 2S 20 Name=Biomedical Technology compulsory optional course

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F7PBBEZP	Economics of Health Services	KZ	2			
Methodology of managi	ng the economics of healthcare operations. The role of management and administration. Healthcare legislation and law, appl	ication of laws in	a real hospital.			
The role of managemen	he role of management control and its role in the medical technology market, Planning strategies, analysis and research of consumer and organisational markets, market development					
and positioning. Aim: ec	onomics of healthcare operations, which is the goal and guarantee of success and level of healthcare delivery. The course TI	ne course provide	s a knowledge			
base for the PBB2ESP	course. Course entry requirements: Exit knowledge, skills, abilities and competencies: the student will be able to calculate inte	rest, inflation, ann	uity. The student			
will therefore be able to	be able to produce the economic part of a feasibility study.					
F7PBBMAT	Marketing of Medical Technology	KZ	2			
F7PBBPPP	Programming Tools	KZ	2			
The aim of the course is	to provide an overview of basic application software for GNU / Linux and MS Windows with examples and examples of use, incl	uding a comparise	on of parameters			
of individual programs.	The areas of focus of individual program resources are selected with regard to the usability of FBMI students in other subject	s and also in the	preparation of			
qualification works and	in subsequent professional employment in the field. The entry requirements of the course are knowledge of computer contro	I at the secondary	/ school level.			
After completing the cou	urse, students will gain the following output knowledge, skills, abilities and competencies: Routine control of common user pr	ograms in MS Wir	ndows and GNU			
/ Linux, measured in the	following areas: creation of technical documentation, processing of 2D graphics, audio, video, secure information sharing and	I network commur	nication, creation			
and publication of perso	nal web pages, processing and visualization of biomedical data, basics of scripting.					

Code of the group: F7PBB PV 3S 20

Name of the group: Biomedical Technology compulsory optional course Requirement credits in the group: In this group you have to gain at least 2 credits (at most 6) Requirement courses in the group: In this group you have to complete at least 1 course (at most 3) 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
F7PBBBFT	Biophotonics Jan Remsa, Jan Mikšovský, Petr Písa ík Petr Písa ík Petr Písa ík (Gar.)	KZ	2	2P	Z	S
F7PBBFVP	Multivariable Calculus Jana Urzová Jana Urzová Jana Urzová (Gar.)	KZ	2	1P+1C	Z	S
F7PBBMFJ	Physical Phenomena Modeling in COMSOL MULTIPHYSICS David Vrba David Vrba David Vrba (Gar.)	KZ	2	1P+1C	Z	S

Characteristics of the courses of this group of Study Plan: Code=F7PBB PV 3S 20 Name=Biomedical Technology compulsory optional course

F7PBBBFT	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					
tissue, biology basics, pl	notobiology, bioimaging, basics of lasers, laser safety, optical biosensors, photodynamical therapy, optical manipulation with cells	s, nanotechnology	for biophotonics,					
biomaterials for photoni	biomaterials for photonics.							
F7PBBFVP	Multivariable Calculus	KZ	2					
The course is focused a	t elements of calculus in two and more variables and at real, complex and functional series. Calculus in two variables: notior	of a limit and cor	ntinuity, partial					
derivative, differential ar	nd its applications. Derivative of a composed function, derivative of an implicit function. Higher order derivatives, local extrem	es. Constrained e	xtremes, least					
squares method. Double	and triple integrals, geometrical interpretation, Fubini theorem. Integration by substitution in double and triple integral. Comp	lex sequences, se	eries of numbers.					
Convergence of comple	x series. Functional series and their convergence, power series. Taylor series							
F7PBBMFJ	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 signifi	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 wh	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	gery). Computer m	nodeling 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	d 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 w	when designing individual parts of devices and devices.							

Code of the group: F7PBB PV 4S 20

Name of the group: Biomedical Technology compulsory optional course

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
F7PBBDIZ	Detectors of Ionizing Radiation Ladislav Pína Ladislav Pína Ladislav Pína (Gar.)	KZ	2	2P	L	S
F7PBBMDT	Microwave Diagnostics and Therapy Ond ej Fišer, Jan Vrba, David Vrba, Tomáš Pokorný Ond ej Fišer Jan Vrba (Gar.)	KZ	2	1P+1L	L	S
F7PBBPTI	Principles and Practice in Tissue Engineering Roman Mat jka, Jana Mat jková Roman Mat jka Roman Mat jka (Gar.)	KZ	2	0P+2C	L	S
F7PBBSJ	Scripting Languages Tomáš Kraj a Radim Krupi ka Radim Krupi ka (Gar.)	KZ	2	2C	L	S
F7PBBVBI	Virtual Bioinstrumentation Roman Mat jka	KZ	2	1P+1L	L	S

Characteristics of the courses of this group of Study Plan: Code=F7PBB PV 4S 20 Name=Biomedical Technology compulsory optional course

course			
F7PBBDIZ	Detectors of Ionizing Radiation	KZ	2
F7PBBMDT	Microwave Diagnostics and Therapy	KZ	2
Interaction of the EM fi	eld with biological tissues and its use in diagnostics and therapy. Numerical methods suitable for modeling these interactions.	Basics of microwa	ave imaging
(MWI). Perspective app	plication of microwave techniques in medical diagnostics: non-invasive monitoring of blood glucose concentration, microwave of	detection and clas	sification of
cerebral vascular even	is and early detection of breast cancer. Therapeutic systems and applicators for microwave and RF local and regional hyperthe	ermia. Planning tr	eatment. Design
and testing of applicate	rs.		
F7PBBPTI	Principles and Practice in Tissue Engineering	KZ	2
F7PBBSJ	Scripting Languages	KZ	2
The aim of the course i	s to understand the topic of scripting languages and their applications, to understand their advantages and disadvantages and	d their compleme	ntarity to system
languages. The course	focuses on scripting languages in the Unix operating system and Python scripting languages.		
F7PBBVBI	Virtual Bioinstrumentation	KZ	2
This subject deals with	process of development of application in LabVIEW using Virtual Instrumentation concept. During the course will be explained	basic concepts of	of programming
like variables, data stru	ctures, cluster, loops, conditionals, typedefs, advanced coding concepts like event driven programming, multi-threaded applic	ation developmen	it, data queues
and FIFOs, synchronis	ation, process of deployment, executable building, installer and upgrades. The students are able also to obtain the CLAD (Cer	tificate LabVIEW	Associate
Developer) certificate.	This certificate is first step in knowledge of VI.		

Code of the group: F7PBB PV 5S 20

Name of the group: Biomedical Technology compulsory optional course 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
F7PBBAZD	Biomedical Data Analysis and Processing Jan Kauler, Lucie Horáková Jan Kauler Jan Kauler (Gar.)	KZ	2	1P+1C	Z	S
F7PBBMTB	Microprocessors in Biomedicine Pavel Smr ka, Karel Hána Pavel Smr ka Pavel Smr ka (Gar.)	KZ	2	1P+1L	Z	S
F7PBBTA	Technical Audiology Oliver Profant, Zbyn k Bureš Oliver Profant Oliver Profant (Gar.)	KZ	2	1P+1L	Z	S
F7PBBZOD	Image Data Processing Zoltán Szabó, Pavla Suchánková Zoltán Szabó Zoltán Szabó (Gar.)	KZ	2	1P+1C	Z	S

Characteristics of the courses of this group of Study Plan: Code=F7PBB PV 5S 20 Name=Biomedical Technology compulsory optional course

F7PBBAZD	Biomedical Data Analysis and Processing	KZ	2
F7PBBMTB	Microprocessors in Biomedicine	KZ	2
We will explain the princ	piple and building elements of a microprocessor system, the structure of a microprocessor, the connection of basic periphera	ls, the programmi	ng model of a
microcomputer system	in the form of a practically oriented explanation and demonstration tasks. Provide a basic overview of ATMega and ARM Cor	tex M architecture	s with practical
examples of their progra	amming with examples of use in biomedicine. Prerequisites and co-requisites: basic knowledge of digital technology and sign	al processing, ba	sics of ISO C.
Output knowledge, skill	s, abilities and competencies: The student is familiar with the selection and design of microprocessor system solutions for use	e in biomedicine.	t manages the
configuration and progra	am control of these building blocks of the microprocessor system: digital inputs and outputs, A / D and D / A converters, seria	I and parallel con	nmunication,
counters and timers, int	errupt controller. Understands the basics of communication of microcomputers with the environment: interfaces for LCD displ	ays, keyboards, F	S232, Ethernet,
WIFI, Bluetooth, XBee a	and mobile 3G / 4G communication, GPS / GLONAS localization.		

F7PBBTA	Technical Audiology	KZ	2
The aim of the course i	to give students a basic overview of audiology, i.e. basic knowledge of biology, medicine and technology in relation to norma	al and impaired he	earing, and all
this in an interrelated c	ontext with emphasis on technical aspects. Motivation to work in clinical practice in audiology is also an integral part of this go	al. workplace. Co	urse entry
requirements: These re	quirements are expressed as prerequisites and a detailed breakdown of the requirements is as follows: - nervous system - org	anisation and fund	ction of the CNS,
internal environment of	the CNS (blood-brain barrier, cerebrospinal formation, transport and function), neuroglia, motor nervous system, spinal cord	(structure, reflexe	s), - nervous
system - motor system,	brainstem (structure, reflexes), cerebellum (structure, reflexes), basal ganglia (structure, reflexes), cerebral cortex (structure, r	exlexes), physiolo	ogy of movement
control, - sensory nervo	us system - receptors, skin sensation, movement and position perception, vision, hearing, taste, smell, pain, autonomic nervous	system, brain sten	n, hypothalamus,
peripheral compartmen	ts: sympathetic and parasympathetic, - waves, types of waves, successive waves, interference, standing waves, sound, - types	of signals, basic s	ignal operations,
signal decomposition, -	harmonic analysis, Fourier transform for continuous and discrete signals, DFT, FFT, - convolution, - technical and biological s	systems, systems	and their
description, linear and r	on-linear system, - external description of continuous and discrete linear system - differential/differential equations, transfer fu	nctions, frequency	y characteristics,
distribution of zeros and	I poles, time characteristics, - coupling of systems, feedback loops, - Characteristics of basic biosignals EEG, ECG, EOG, EF	P, EMG, artefacts,	origin, sources,
diagnostic applications	frequency range and bands, - Biological data acquisition and preprocessing, basic computer conversion chain, A/D converte	ers, problems sign	al sampling and
quantization, Nyquist th	eorem, conversion errors, signal conditioning, aliasing, filtering, trends, sensing options. Output knowledge, skills, abilities an	d competences: S	Students will
acquire a basic underst	anding of acoustics, measurement and diagnosis of auditory functions, including technical principles. instrumentation and so	ftware, and hearir	ng aids and
replacements. The stuc	ents will be able to orient themselves. They will be able to learn about these issues, learn about other areas of medical instru	mentation and me	ethods used in
clinical practice, as wel	as motivated and ready to enter the field of audiology upon graduation and to add to this knowledge and advanced skills wit	hin the framework	of the so-called
certified course, which,	according to Act 96/2004 Coll., allows for the acquisition of the so-called "certificate of audiology". Special professional comp	etence Technical	audiologist after
graduation, i.e. after ob	aining the so-called professional competence Biomedical technician under the Act.		
F7PBBZOD	Image Data Processing	KZ	2
The aim of the course i	to provide basic knowledge about the principles of the digital image processing process (algorithms - implementation and re	ealization). This g	oal also includes
the issue of digitization	and basic methods of image data analysis.		

Code of the group: F7PBB PV 6S 20

Name of the group: Biomedical Technology compulsory optional course Requirement credits in the group: In this group you have to gain at least 2 credits (at most 6) Requirement courses in the group: In this group you have to complete at least 1 course (at most 3) 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
F7PBBAZC	Algorithms for Biosignals in the C Language Pavel Smr ka Pavel Smr ka Pavel Smr ka (Gar.)	KZ	2	1P+1C	L	S
F7PBBEMP	Electromagnetic Fields of Living Organisms Ond ej Fišer, Jan Vrba Ond ej Fišer Jan Vrba (Gar.)	KZ	2	1P+1L	L	S
F7PBBRBL	Robotics in Medicine Jan Kauler Jan Kauler (Gar.)	KZ	2	1P+1C	L	S

Characteristics of the courses of this group of Study Plan: Code=F7PBB PV 6S 20 Name=Biomedical Technology compulsory optional course

F7PBBAZC Algo	prithms for Biosignals in the C Language	KZ	2
Explain the principle and imple	ementation of the most used algorithms for biosignal processing and their specific functional (and time and memory eff	icient) implement	ation in C and C
++ in the form of practically or	iented interpretation and demonstration tasks. Graduates will be acquainted with specific solutions to basic algorithmic	problems in biosi	gnal processing:
with segmentation, analysis in	the time and frequency domain, with the design of linear digital filters (FIR and IIR) and with the visualization of result	s. Prerequisites a	nd co-requisites:
basic knowledge of systems a	nd signal processing, basics of ISO C. Output knowledge, skills, abilities and competences: The student is familiar with	algorithms for pro	eprocessing and
intelligent segmentation of biol	ogical time series in C and C++, eg: FFT algorithm, SFFT and wavelet transforms, algorithm for calculating autocorrelation	on and cross-corre	elation functions,
convolution, etc. Can impleme	ent in C language the floating time window method for feature extraction and basic algorithms for the design and impler	nentation of digita	I FIR and IIR
filters. Understands and can ir	nplement in C language the basic ways of visualization of biological data and the results of their processing.		
F7PBBEMP Elec	ctromagnetic Fields of Living Organisms	KZ	2
Static and quasi-static electric	and magnetic fields, electromagnetic fields. Electrical and magnetic properties of biological tissues. Electrical, magnetic	c and electromag	netic stimulation
in medicine. Anatomical and p	hysiological bases of bioelectromagnetism. Bioelectric sources and conductive environment. Integral relations of electr	odynamics of bio	electric fields,
electrodynamic aspects of ma	thematical modeling of electrocardiography and electroencephalography. Topographic concept of bioelectrical and bion	nagnetic measure	ments. Methods
and techniques of measureme	ent. Human-robotic limb replacement interface.		
F7PBBRBL Rob	otics in Medicine	KZ	2
Application of robotic principle	s of medicine, ie medicine and laboratory technology. Description of the kinematic chain of robots with regard to their use	e. Explains their ki	nematic analysis
and synthesis. Thus, the inves	tigation of the relationships between the position, speed and acceleration of individual kinematic pairs relative to the fr	ame of the chain.	And also the
action of the prescribed move	ment (trajectory) of the end point of the chain. It introduces the methods of investigating the dynamics of kinematic cha	ins of surgical an	d manipulative
arms. Above all, it is a matter of	of finding such force effects in the drives of the kinematic pairs so that the end point of the chain performs the desired mo	ovement. Furtherr	nore, the course
explains the most commonly u	used paradigms of control of these arms. Especially in connection with the role of inverse kinematics and inverse dynar	nics. Due to the ir	nstallation, the
most frequently used sensors	and actuators are listed, ie design and function. Finally, specific examples of the application of robotic principles of me	dicine will be give	n

List of courses of this pass:

Code	Name of the course	Completion	Credits
17BOZP	Occupational Safety and Health, Fire Protection and First Aid	Z	0
F7PBBA3A	English Language IIIA (part 1)	KZ	2
	rse is to increase students' language competence in academic English and professional vocabulary, along with common communica ely with academic text, understand and be able to use basic terminology, and be aware of the different stylistic levels of English and lexical devices.		
F7PBBA3B	English Language IIIB (part 2)	KZ	2
-	mer semester is based on a modern, non-frontal, project-based, and interdisciplinary way of teaching that is gaining prominence in t		
	creative work of students who are asked to develop an interesting topic in their field of study, i.e. biomedical engineering, and make ect. Another activity of the students in the summer semester is a discussion with the tutor over an article from the New Scientist maga		-
	library.		,
F7PBBAF1	Anatomy and Physiology I.	Z,ZK	4
	s of the course: Output knowledge, skills, abilities and competences: The course serves to understand the relationships between t		
	e teaching follows modern pedagogical trends consisting in a direct connection between the morphology and the functions of organ e topics of lectures and connected with practical exercises. It focuses significantly on problems of program and uses activation metho		
-	se of modern multimedia programs (eg ADAM and others) is a matter of course. From a theoretical and practical point of view, the m	-	
	morphology and function of vital organs and systems.	·	
F7PBBAF2	Anatomy and Physiology II.	Z,ZK	4
F7PBBALP	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	1 /	0 ,
	and searching, implementation of basic numerical algorithms. Introduction to biomedical data processing - programmers view. Introdu		
F7PBBAZC	Algorithms for Biosignals in the C Language	KZ	2
	e and implementation of the most used algorithms for biosignal processing and their specific functional (and time and memory efficie	, ,	
	actically oriented interpretation and demonstration tasks. Graduates will be acquainted with specific solutions to basic algorithmic pro		
•	analysis in the time and frequency domain, with the design of linear digital filters (FIR and IIR) and with the visualization of results. P systems and signal processing, basics of ISO C. Output knowledge, skills, abilities and competences: The student is familiar with alg		
-	tion of biological time series in C and C ++, eg: FFT algorithm, SFFT and wavelet transforms, algorithm for calculating autocorrelation a		-
convolution, etc. C	an implement in C language the floating time window method for feature extraction and basic algorithms for the design and implement	•	IR and IIR
	filters. Understands and can implement in C language the basic ways of visualization of biological data and the results of their pro	-	
F7PBBAZD	Biomedical Data Analysis and Processing	KZ	2
F7PBBBB	Biomechanics and Biomaterials ded for all students who need to supplement their knowledge and have a general knowledge about biomechanics and its application	Z,ZK	4
	sen to be sufficient to understand athe issues in related subjects, especially the subject of Mechanics and Robotics in Medicine. If the		-
subject and has new	rer had the opportunity to complete these basic knowledge, they will be exposed to the risk of misunderstanding the subsequent issue	es in related subje	cts, in which
	this is not taken into account the basic knowledge.		
F7PBBBCH	Biochemistry	Z,ZK	2
	ecome familiar with the basic areas of Biochemistry and understand the interrelationships between these areas. The learner will be a Ily in the context of clinical biochemistry. The student will learn to work in the laboratory according to good laboratory practice, learn	-	
	biological material and acquire good work habits. He/she will be able to process, interpret and discuss the results correctly	-	g
F7PBBBFT	Biophotonics	KZ	2
-	iples and applications in the interdisciplinary sphere, connecting physics, optics and biology. Interaction of laser radiation with matter		
tissue, biology basic	s, photobiology, bioimaging, basics of lasers, laser safety, optical biosensors, photodynamical therapy, optical manipulation with cells, na biomaterials for photonics.	notechnology for b	iophotonics,
F7PBBBLG	Biology	Z,ZK	4
	n clear knowledge of general and cell biology, through the formation of cells and organelles (endosymbiotic theory) and basic chemic		
-	ic substances, carbohydrates, fats, amino acids, biopolymers - NK and proteins), construction of non-cellular forms (especially viruse		
	aryotic (plant, animal and fungal cells), they will get acquainted with cell metabolism (anabolism and catabolism), growth and cell diffe		
• ,	echanisms) until apoptosis and necrosis. They will get acquainted with the basics of microbiology (viral and bacterial diseases of mar He will gain detailed knowledge about the internal structure of a eukaryotic cell, its endomembrane system and semiautonomous orga	, ,,	
	Following in the field of molecular biology, they will get acquainted with the basic processes that are necessary for the implementati	-	
processes of repli	cation, transcription, translation (ie proteosynthesis) and gene expression, the genetic code. In general genetics, with basic genetic to	erminology and pro	ocesses of
	prmation from parents to offspring according to Mendel's and Morgan's laws, changing genetic information in the form of mutations a		•
-	s (clinical genetics) includes basic examination methods and human genetic diseases (autosomal dominant, recessive, gonosomal dom wing the great development of molecular biology and biochemistry techniques, the student is acquainted with genetic engineering ar		
,	and their preparation, tissue cultures and biotechnologies. Applied biology in technical and medical fields describes the use of biologic	•	
in moderr	technology and medicine. The conclusion consists of issues related to the field of animal cells and tissues, their histology and issue	s of biocompatibili	ty.
F7PBBBLS	Biological Signals	Z,ZK	4
-	ith origins and description of the most important electric and non-electric biological signals. The principles of generation, recording ar		
-	he studied signals involve native and evoked biosignals, including biological signals of the heart, brain, muscles, nervous system, au tro-intestinal system etc. Advanced methods of digital biosignal processing,spectrum analysis, modern methods of artificial intelligence		-
- gristo in ornano gao	classification, graphic presentation of results. Adaptive segmentation, artificial neural networks for signal processing.	,	.,
F7PBBBOZP	Safety Regulations and Standards in Electrical Engineering	Z	1
Safety and Health p	rotection during work; the role of the biomedical technician in clinical practice; risk-determining effects; patient environment; medical is	solated system; ele	ectric shock;
	types of distribution systems; protection classes; electrical inspections; regulations and standards; work with lasers		

	Bachelor Thesis	Z	6
	under the guidance of a supervisor and possible consultant on a given BP topic, especially in the laboratory, using knowledge and ski	- 1	-
l in the time allotted.	Course entry requirements: Prerequisite F7ABBMVP Research Methodology - This course is essential because it prepares students	-	
	nethodically. Outcome knowledge, skills, abilities and competencies: The student is able to work on a given topic in a defined form, in		
	dance of a BP supervisor and also in a team. The student is able to use knowledge, skills and knowledge from previous courses to sol		
is a Bachelor's thes	is, which is defended in front of the HSS committee. This thesis is assessed by the supervisor and the opponent according to the ECTS	6 grading scale. Su	bsequently,
	these evaluations and the result of the state final examination in the subject areas are included in one final evaluation.		
F7PBBCHM	Chemistry	Z,ZK	4
F7PBBDIZ	Detectors of Ionizing Radiation	KZ	2
F7PBBEBI	Ethics in Biomedical Engineering	ZK	2
	wledge of school humanities objects (philosophy, history, psychology) Target knowledge and skills: basic concepts and controversial to	I	_
	be able to think critically in ethical contexts; argue and defend opinions in ethical dilemma situations; ability development of profession	-	
	of empathy.		
F7PBBELF	Electrophysiology	Z,ZK	2
	introduce students to the theory of electrical phenomena at the cell, organ and organism level, to the possibilities of measuring and u		
-	o enable students to experimentally verify the knowledge. This course builds on Anatomy and Physiology I and II and requires a basic	-	
(anatomy) and fu	nction (physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The cours	e deals with the pr	oblems of
excitable tissues (nervous, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the physiolo	ogy of electrical pro	ocesses at
	different levels: cell, tissue, organ, organism.		
F7PBBEM	Electrical Measurements	Z,ZK	4
Measuring of elect	ric values, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and po	· · ·	Frequency
and shift phase me	asuring. Electric work and electric power measuring: direct current, single-phase and three-phase current. Electrical resistance and imp	pedance measurin	g. Magnetic
measuring. Analog	ue scope. Digitalization, digital signal processing, signal reconstruction. Electronic measuring devices: multimeter, digital scope. Opto	electronic measur	ing device.
F7PBBEMP	Electromagnetic Fields of Living Organisms	KZ	2
	tic electric and magnetic fields, electromagnetic fields. Electrical and magnetic properties of biological tissues. Electrical, magnetica	nd electromagnetic	stimulation
	prical and physiological bases of bioelectromagnetism. Bioelectric sources and conductive environment. Integral relations of electrod		
	pects of mathematical modeling of electrocardiography and electroencephalography. Topographic concept of bioelectrical and biomagr	-	
	and techniques of measurement. Human-robotic limb replacement interface.		
F7PBBEO	Electronic Circuits	Z,ZK	4
	les a basic orientation in the principles of electronic circuits used in electronic laboratory and medical devices. It provides a prerequisi	· .	-
	ligital instrumentation. technology. Course entry requirements: Successful completion of Theoretical Electrical Engineering. Exit Know		
-	Students will become familiar with functional electronic blocks that are used in the design of laboratory and medical instruments. The o	-	
	competently assess the basic properties and parameters of electronic devices.		
F7PBBESP	Management of Health Care Technology	Z,ZK	2
F7PBBEZP	Economics of Health Services	KZ	2
	anaging the economics of healthcare operations. The role of management and administration. Healthcare legislation and law, applicat	I	al hospital.
	ment control and its role in the medical technology market, Planning strategies, analysis and research of consumer and organisational		-
-	im: economics of healthcare operations, which is the goal and guarantee of success and level of healthcare delivery. The course The c		
base for the PBB2E	SP course. Course entry requirements: Exit knowledge, skills, abilities and competencies: the student will be able to calculate interest,	, inflation, annuity.	The student
	will therefore be able to be able to produce the economic part of a feasibility study.		
F7PBBFCH			
	Physical Chemistry	Z,ZK	4
	Physical Chemistry ed at clarifying the physicochemical principles of topics related to the profession of biomedical engineer and technician in clinical prac	, ,	-
The course is aim		ctice or research. T	he goal of
The course is aim	ed at clarifying the physicochemical principles of topics related to the profession of biomedical engineer and technician in clinical prac	ctice or research. T	he goal of
The course is aim	ed at clarifying the physicochemical principles of topics related to the profession of biomedical engineer and technician in clinical practice of the profession of biomedical engineer and technician in clinical practice of the students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices, in clinical related to the profession of a students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices, in clinical related to the profession of the students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices, in clinical related to the profession of the students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices, in clinical related to the students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices, in clinical related to the students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices, in clinical related to the students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices in clinical related to the students of the students	ctice or research. T	he goal of
The course is aim the course is to pro F7PBBFVP	ed at clarifying the physicochemical principles of topics related to the profession of biomedical engineer and technician in clinical practice students with the fundamentals of physical chemistry as they occur and are applied in the design of medical devices, in clinical related to the profession of theoretical principles in practice.	ctice or research. T research, or direct	The goal of ly in clinical
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periferií v mikroprocesorových systémech (IIC, SPI), nej ast jší sb rnice pro komunikaci p ístroj a systém ve zdravotnictví, standardizace, opera ní systémy, mobilní platforma pro snímání, vyhodnocování a p enos dat, rozhraní Bluetooth, NFC, po íta ové sít , LAN, WAN, vrstvový referen ní model OSI, základní technické prost edky LAN (Ethernet, WiFi a jejich praktická realizace), Internet - prohlíže e, používané standardy a jazyky, úvod do architektury TCP/IP, protokoly a adresování, propojování lokálních sítí, brány a sm rova e, pojem server architektura klient-server nej ast ji používané protokoly sí ové architektury TCP/IP. HTTP, ETP, DNS, DHCP, VPN

	server, architektura klient-server, nej ast ji pouzivane protokoly si ove architektury TCP/IP: HTTP, FTP, DNS, DHCP, VPN.		
F7PBBKZS	Conventional Imaging Systems	Z,ZK	4
F7PBBLAD	Linear Algebra and Differential Calculus	Z,ZK	6
Differential calculus	s consists of: sequences and their limits. Functions of one real variable, their limits, continuity, derivatives. Local and absolute extremation	a of a function of o	ne variable,
	investigations of functions. Taylor-polynomial.		
F7PBBLPZ1	Management of Health Care Technology	Z,ZK	4
-	porization of medical (diagnostic devices) according to international directives (EU directives), including correct terminology. The electric	-	
	technology in clinical practice; Construction of diagnostic apparatus; Biosignal amplifiers, sensing electrodes, recording systems; Mea		
	Iectrocardiographs, vector cardiographs; Blood pressure monitors - NIBP; Blood pressure measuring instruments - IBP, PCWP; Diluti catheter; SpO2 pulse oximetry; Vital signs monitors, central monitoring systems. Special monitors for clinical practice - cardiotocographs		
-	practice - a measurement of respiration by impedance method, EIT; Measurement of brain bioelectrical activity (EEG); Measuremen		-
	(EMG); Spirometry; Examination of the auditory system; Simulators and testers of diagnostic equipment.		
F7PBBLPZ2	Medical Devices and Equipment II. (Therapeutical Devices)	Z,ZK	2
F7PBBLT	Clinical Laboratory Instrumentation	Z,ZK	4
F7PBBMAT	Marketing of Medical Technology	KZ	2
F7PBBMAZ	Management and Admininistration in Health Care	KZ	1
F7PBBMDT	Microwave Diagnostics and Therapy	KZ	2
	EM field with biological tissues and its use in diagnostics and therapy. Numerical methods suitable for modeling these interactions. B		
	e application of microwave techniques in medical diagnostics: non-invasive monitoring of blood glucose concentration, microwave de		
	vents and early detection of breast cancer. Therapeutic systems and applicators for microwave and RF local and regional hypertherm		
	and testing of applicators.		
F7PBBMEC	Mechanics	Z,ZK	4
Students will get	acquainted with the following areas of mechanics: General physical equations, Newton's laws, statics and dynamics. Force and mon	nent effect - decom	position,
	ibrium of a force system in a plane and space - equation of equilibrium, systems into equilibrium. Reactions on statically determined	-	
	constraints, solution of reactions. Static moment, center of gravity and center of area. Spatial moment of inertia - kinetic energy of rotation of the state of t		
	conservation of momentum. Second moment of area - product moment, polar moment, Mohr circle, main moments of inertia, ellipse of plates, course of internal static effects, kinematic method, statically indeterminate problems. Mechanical properties of materials - tee		
-	plates, course of internal static enects, kinematic method, statically indeterminate problems. Mechanical properties of materials - tes promotions, Hooke's law. Stress and strain - uniaxial and biaxial stress state, simple bending, bending curve, torsional stress, cross-		-
	bined stress, nonlinear models. Buckling strength - critical load, stability of members, calculation of cross section. Tests of hardness, ad	0,	
F7PBBMFJ	Physical Phenomena Modeling in COMSOL MULTIPHYSICS	KZ	2
Numerical simulat	tions are increasingly being used to develop new and optimize existing products and devices. Numerical simulations can greatly redu	ce the number of p	prototypes
needed and thus sig	gnificantly accelerate and reduce development costs. Another sector where numerical simulations are used is a sector where it is diff	icult to verify ongo	ing physical
	ating the biological tissue under electrodes for direct brain simulation). Last but not least, based on numerical simulations, we can pla		
-	rial properties, we can define the amount of power delivered to the device (eg radiofrequency ablation in oncology or cardiac surgery)	-	-
-	netry, setting of material properties and boundary conditions and, last but not least, the choice of differential equations, the method of e essing of results. The accuracy of the results obtained, the length of calculations and the computational power requirements are very		
	ectures cover the most common problems in electrical engineering, thermics, mechanics, chemistry, acoustics and fluid dynamics. T	-	
ineder county ine i	tested by the students when designing individual parts of devices and devices.		ougo nii so
F7PBBMS	Modelling and Simulation	Z.ZK	4
Basic concepts and	consequences of modeling and simulation. Be able to use modeling and simulation methodologies. Emphasis is placed on a thorough ur	derstanding of cor	npartmental
models, physiol	ogical models, pharmacokinetics. Furthermore, continuous and discrete models of population dynamics, epidemiological models, mo	dels of venereal di	iseases.
F7PBBMT	Medical Terminology	Z	1
Attendants are ma	ade acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously inf	ormed about terms	s of whole
	diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of test		
F7PBBMTB	Microprocessors in Biomedicine	KZ	2
-	e principle and building elements of a microprocessor system, the structure of a microprocessor, the connection of basic peripherals,		
	tem in the form of a practically oriented explanation and demonstration tasks. Provide a basic overview of ATMega and ARM Cortex programming with examples of use in biomedicine. Prerequisites and co-requisites: basic knowledge of digital technology and signal		
	, skills, abilities and competencies: The student is familiar with the selection and design of microprocessor system solutions for use in		
	program control of these building blocks of the microprocessor system: digital inputs and outputs, A / D and D / A converters, serial		•
counters and timers	s, interrupt controller. Understands the basics of communication of microcomputers with the environment: interfaces for LCD displays	keyboards, RS23	2, Ethernet,
	WIFI, Bluetooth, XBee and mobile 3G / 4G communication, GPS / GLONAS localization.		
F7PBBMVP	Research Methodology	KZ	2
The course introd	luces students to the basic methods of research work and the requirements for scientific communication. The course also introduces	students to the pri	nciples of
	writing and presenting of bachelor's thesis.		-
F7PBBNMP	Project Proposal and Management	KZ	2
	ures, students will become familiar with topics such as project management (PM) according to IPMA, the certification process, projec e cycle, as well as project initiation. They will learn about the feasibility study, project initiation, project identification document, and log		-
	ction to project planning, scheduling, risk and risk analysis, project implementation, behavioral competencies in PM, project closure,		-
	nsights from a hospital environment. During the exercises, students will master the following concepts and topics and develop relevan		
•	document, logical framework, WBS (Work Breakdown Structure a hierarchical structure of tasks or activities), scheduling, risk analysi	•	
a final test. As par	t of this course, students have the opportunity to obtain the IPMA Level D certification, which is intended for aspiring project manage	rs, project coordin	ators, and
	team members. The certification is valid for five years.		
F7PBBOIZ	Protection Against Ionizing Radiation	ZK	2
F7PBBPMS	Probability and Mathematical Statistics	Z,ZK	4
	iarize students with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirement		
mathematics (lin	ear algebra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Kno	wledge, skills, abi	lities and

to practical problems that arise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of inductive statistics

F F	and can choose a suitable method for standard statistical problems.		
F7PBBPNK	Design and Construction of Medical Devices/Practical Exercises	KZ	4
-	ctically oriented course is to acquaint students with the design process of the measuring part of the device, ie basic problem analysi		
	sign, selection of suitable components and their values with emphasis on working with catalog sheets and application recommendation		
	l board design. printed circuit board, its mounting, soldering and revitalization. During the course, students will implement a functiona c thermometer, which will consist of two functional units - analog part for temperature measurement and signal conditioning (equippe		-
	a diode bargraph (equipped with SMT components). For both products, students will implement the design of the diagram and PCB in		
	alog part of the device, an application for digitizing data from the analog device using NI-DAQ cards and a cheap solution with the help of		
	he last part will be a service intervention in the device (monitor of vital functions) with emphasis on safe handling and measurement of		
F7PBBPP	First Aid	KZ	2
F7PBBPPM1	Programming in Matlab I.	KZ	1
Students will learn h	now to use Matlab, get knowledge of data structures and with data and working with data and their display. During the semester, they	will gain knowledge	e of creating
	scripts in Matlab and the basics for their use in the processing of biomedical data.		-
F7PBBPPM2	Programming in Matlab II.	KZ	2
	se is to understand the topic of scripting languages and their applications, to understand their advantages and disadvantages and thei s will become familiar with regular expressions and tools for word processing. The course focuses on the scripting languages within the second s		-
languages. Oluueni	the scripting languages Python.	the Onix operating	System and
F7PBBPPP	Programming Tools	ΚZ	2
1	se is to provide an overview of basic application software for GNU / Linux and MS Windows with examples and examples of use, includin		_
of individual progra	ams. The areas of focus of individual program resources are selected with regard to the usability of FBMI students in other subjects a	and also in the pre	paration of
	s and in subsequent professional employment in the field. The entry requirements of the course are knowledge of computer control a	-	
	e course, students will gain the following output knowledge, skills, abilities and competencies: Routine control of common user progra		
/ Linux, measured ir	the following areas: creation of technical documentation, processing of 2D graphics, audio, video, secure information sharing and ne and publication of personal web pages, processing and visualization of biomedical data, basics of scripting.	work communicati	on, creation
F7PBBPPS	Pacient and Device Simulators and Testers	Z,ZK	2
1	nent simulators and testers. Basic principles of implementation, connections with other disciplines. Detailed description and implement	·	
	n and implementation of patient and instrument simulator sub-blocks. Examples of circuit implementations of simulators and testers.		
and other related	procedures in manikin control, basic concepts and principles of anesthesiology. Other types of simulators and phantoms. Possibilitie	es of use in clinical	practice.
Practical demonst	ration. Connection of the simulator with other medical equipment. Simulators and testers. Implementation of an established simulation	n scenario, scenar	io testing,
	creation of new scenarios. Collaboration between HPS and anaesthesia machine.		-
F7PBBPSL	Psychology	KZ	2
-	odology and methods of psychology. Mental activities and psychic processes, psychology of personality, objects of psychology and the ; its concept and theory, psychic processes and stages. Psychological interpretation of personality. Application of knowledge in medic		-
	edical doctors, technicians and patients, technicians and nurses. Communication as a tool for good cooperation amongst people and		
expression and o	communication skills. Use of elocution and gestures in personal expression. Verbal and nonverbal communication. Dialogue; types of	dialogue, question	is during
	dialogue. Model situations. Communication process as part of economics - components, tools and functions.		
F7PBBPTI	Principles and Practice in Tissue Engineering	KZ	2
F7PBBRBL	Robotics in Medicine	KZ	2
	c principles of medicine, ie medicine and laboratory technology. Description of the kinematic chain of robots with regard to their use. Ex us, the investigation of the relationships between the position, speed and acceleration of individual kinematic pairs relative to the frar	-	-
	ribed movement (trajectory) of the end point of the chain. It introduces the methods of investigating the dynamics of kinematic chains		
	a matter of finding such force effects in the drives of the kinematic pairs so that the end point of the chain performs the desired move	0	
explains the most	commonly used paradigms of control of these arms. Especially in connection with the role of inverse kinematics and inverse dynamic	cs. Due to the insta	llation, the
	ntly used sensors and actuators are listed, ie design and function. Finally, specific examples of the application of robotic principles of	-	
F7PBBROP	Guided Practical Training	Z	2
	students with the organization and provision of professional internships at the clinical workplace. Provision of contractual documents professional practice). The ROP will then enable the acquired practical skills and habits to be applied in the key subjects of the 3rd y	•	
	irrent technical level of hospital equipment; an overview of the organization of the work of biomedical technicians and engineers; car		
	ensure the safe operation of medical equipment. He can communicate with technicians, but also medical staff. He is able to work in		
F7PBBSBP	Bachelor Thesis Seminar	Z	1
Objective(s): The	aim of the course is to accentuate the realized outcomes of the projects solved in the 4th, 5th and 6th semesters of the Biomedical Te	echnology Bacheld	r's degree
, , ,	aim of the course is also to prepare students for the defense of their bachelor thesis infront of the final state examination committee. C		
	MVP Exit Knowledge, Skills, Abilities and Competencies: Students are fully aware of the requirements for the requirements of professional in the orientation in the professional literature. The students are able to understand the literature and literature on a given topic, appl		
they are proncient	to specific assignments. They present their proposed solutions and results, are able to interpret the results.	y scientific researc	ii metrious
F7PBBSEL	Power Engineering	Z,ZK	5
1	ectronics, power supplies, including electrochemical sources, rectifiers, stabilizers, the most commonly used types of motors, basics	·	
electrical systems	and connecting appliances with a focus on medical use. Emphasis is placed primarily on the physical nature of the problem and its u	Inderstanding. kno	wledge will
	be verified on practical examples and in the laboratory.		
F7PBBSJ	Scripting Languages	KZ	2
The aim of the cour	se is to understand the topic of scripting languages and their applications, to understand their advantages and disadvantages and the	eir complementari	y to system
F7PBBSM	languages. The course focuses on scripting languages in the Unix operating system and Python scripting languages. Sensors in Medicine	Z,ZK	4
1	les information about basic electronic devices - sensors, describes their operation principle, basic circuit configuration and applicatio		
	rinciples and practical utilization. Integral part of this course is basic information about sensors of non-electric quantities and their rea		-
	sure, torque, vibration, displacement, acceleration etc.) magnetic field sensors, temperature sensors, chemical sensors, optical sensor	-	
	is aid on miniaturization, integration		
F7PBBSPR1	Semestral Project I.	KZ	1
The topic of the sen	nester project (SPR1) must be in the field of biomedical engineering and must be related to the study field of the same name Biomec	iical lechnician Th	e topics are

The topic of the semester project (SPR1) must be in the field of biomedical engineering and must be related to the study field of the same name Biomedical Technician. The topics are available for the relevant academic year in the database projects.fbmi.cvut.cz Note: It is not possible to implement economic-managerial topics, topics based mainly on the creation of

research, clean programming, topics purely in the field of biology, etc. The application must always be part of the work in accordance with the focus of the research of the research of the technology (medical devices of the application of the research of		-
be related to technology (medical devices, or the scope of work of a Biomedical Technician in clinical practice)! Entries that do not fall into the above F7PBBSPR2 Semestral Project II.	KZ	pprovea. 4
F7PBBSPR2 Semestral Project II. The main idea is to start work on a project which can be improved in time and finish as a Bachelor thesis. In the course will be discussed topic as basic co		-
skills, including teamwork and project management. Creation of presentations and written texts. Typography rules. Types, purpose and requirements of		
technical texts. Writing a commented bibliographic search. The student solves topic (project) from the selection of the PROJECTS database - http://pro	jects.fbmi.cvut.cz	During the
term, there are dedicated 2 hours every week for work under teacher supervising.		1
F7PBBSPT Research Methodology	Z,ZK	4
The main objective of the course is to introduce students to the basic equipment of intensive care units (ICU) and anesthesiology and resuscitation deployed the intensive care the students and their particular and their	-	
are devices to support vital functions, especially lung ventilation, as well as patient monitors, anesthesia machines and their parts and other equipment. A is to integrate knowledge and skills of students from the fields of science (especially physics, chemistry and physiology) and engineering (modeling, circu		
etc.) in the analysis of clinical technology and in the design and implementation of functional technical systems.	in theory, pheamat	io cicinento,
F7PBBTA Technical Audiology	KZ	2
The aim of the course is to give students a basic overview of audiology, i.e. basic knowledge of biology, medicine and technology in relation to normal		1
this in an interrelated context with emphasis on technical aspects. Motivation to work in clinical practice in audiology is also an integral part of this go	al. workplace. Cou	rse entry
requirements: These requirements are expressed as prerequisites and a detailed breakdown of the requirements is as follows: - nervous system - organis		
internal environment of the CNS (blood-brain barrier, cerebrospinal formation, transport and function), neuroglia, motor nervous system, spinal cord (s		
system - motor system, brainstem (structure, reflexes), cerebellum (structure, reflexes), basal ganglia (structure, reflexes), cerebral cortex (structure, rexle control, - sensory nervous system - receptors, skin sensation, movement and position perception, vision, hearing, taste, smell, pain, autonomic nervous system		
peripheral compartments: sympathetic and parasympathetic, - waves, types of waves, successive waves, interference, standing waves, sound, - types of s		
signal decomposition, - harmonic analysis, Fourier transform for continuous and discrete signals, DFT, FFT, - convolution, - technical and biological s		•
description, linear and non-linear system, - external description of continuous and discrete linear system - differential/differential equations, transfer function	ons, frequency cha	aracteristics,
distribution of zeros and poles, time characteristics, - coupling of systems, feedback loops, - Characteristics of basic biosignals EEG, ECG, EOG, EP, E		
diagnostic applications, frequency range and bands, - Biological data acquisition and preprocessing, basic computer conversion chain, A/D converters,		
quantization, Nyquist theorem, conversion errors, signal conditioning, aliasing, filtering, trends, sensing options. Output knowledge, skills, abilities and acquire a basic understanding of acoustics, measurement and diagnosis of auditory functions, including technical principles, instrumentation and soft	-	
replacements. The students will be able to orient themselves. They will be able to learn about these issues, learn about other areas of medical instrumentation and solit	, 0	
clinical practice, as well as motivated and ready to enter the field of audiology upon graduation and to add to this knowledge and advanced skills within		
certified course, which, according to Act 96/2004 Coll., allows for the acquisition of the so-called "certificate of audiology". Special professional compete	nce Technical audi	ologist after
graduation, i.e. after obtaining the so-called professional competence Biomedical technician under the Act.		
F7PBBTEL Theory of Electrical Engineering	Z,ZK	4
Electric current, DC and AC currents. Electrical curcuits including R, L, C. Power of electric current, thermal effect of electric current. Distribution of elect		
electrical systems. Input resistance and impedance, idle voltage, inner resistance and impedance of the source, mutual loading of the source and electrical systems.	ctrical appliance, in	npedance
electrical systems. Input resistance and impedance, idle voltage, inner resistance and impedance of the source, mutual loading of the source and electrical systems. Input resistance and impedance, idle voltage, inner resistance and impedance of the source, mutual loading of the source and electrical systems. Input resistance and impedance domain. Transient action in DC circuits, frequency characteristics of the L/C circuit. Electrical systems.	ctrical appliance, in ent in semiconduc	npedance tor, type of
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