### Study plan

## Name of study plan: Prospectus - bakalá ský

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: 0 Elective courses credits: 0 Sum of credits in the plan: 0 Note on the plan:

Name of the block: pomocná Minimal number of credits of the block: 0 The role of the block: !

Code of the group: PRO-B-2 Name of the group: Courses that will be open if at least five students are registered Requirement credits in the group: Requirement courses in the group: Credits in the group: 0 Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
17AVAUBME	Introduction to Biomedical Engineering Ji í Hozman <b>Ji í Hozman</b> Ji í Hozman (Gar.)	Z	2	1P+1C	Z	!

# Characteristics of the courses of this group of Study Plan: Code=PRO-B-2 Name=Courses that will be open if at least five students are registered

17AVAUBMEIntroduction to Biomedical EngineeringZ2The main goal of the course is to implement an introduction to the field of study, including the relationship between the content of biomedical engineering, the study plan, the requirements<br/>of Czech legislation and clinical practice. The partial goals are motivation for the non-medical health profession, a description of the content of studies and controlled professional<br/>practice, as well as the possibilities of other professional activities of students. The course also includes a description of the disciplines of biomedical engineering and a demonstration<br/>of selected relevant instrumentation, including a simulated ICU and artificial patients. At the end of the course, the specific role of the biomedical technician (profession) in health care<br/>will be described in connection with the legislation of the Czech Republic and international relationships and possible applications, including the role of professional societies in the<br/>Czech Republic. From the organizational point of view, the subject will be taught after 2 hours and for that reason only 7 topics of lectures and 7 topics of exercises are mentioned.

#### Code of the group: PRO-B-0

Name of the group: Courses that will certainly be open

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

#### Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
F7ABBALP	Algorithmic and Programming Theory Lenka Hanáková, Pavel Smr ka, Tomáš Veselý, Christiane Malá Pavel Smr ka Pavel Smr ka (Gar.)	КZ	4	2P+2C	z	!
F7ABBAF1	Anatomy and Physiology I. Anastasiya Lahutsina, Ksenia Sedova Ksenia Sedova (Gar.)	Z,ZK	4	2P+1C+1L	. Z	!
F7ABBAF2	Anatomy and Physiology II. Anastasiya Lahutsina, Ksenia Sedova Anastasiya Lahutsina Ksenia Sedova (Gar.)	Z,ZK	4	2P+1C+1L	. L	!

F7ABBA3A	English Language IIIA (part 1)	KZ	2	2C	Z	!
F7ABBA3B	Eva Moty ková Eva Moty ková Eva Moty ková (Gar.) English Language IIIB (part 2)	KZ	2	2C		
F7ABOBP	Eva Moty ková Eva Moty kövá Evá Moty ková (Gar.)	Z	10	20 4XT		!
F7ABOBF	Bachelor Thesis Binocular Vision	Z,ZK	7	471 2P+4C	Z	!
F7ABBBCH	Biochemistry	Z,ZK	2	1P+1L	 Z	
F7ABBBFT	Martina Turchichová Martina Turchichová Martina Turchichová (Gar.) Biophotonics	KZ	2	2P	 Z	
	Jan Mikšovský, Jan Remsa Jan Remsa Jan Mikšovský (Gar.)	κz	2	28	Z	!
F7ABBBLS	Biological Signals Christiane Malá, Václava Piorecká, Marek Piorecký Václava Piorecká Václava Piorecká (Gar.)	Z,ZK	4	2P+2L	L	!
F7ABBBLG	Biology Veronika Vym talová Veronika Vym talová Veronika Vym talová (Gar.)	Z,ZK	4	2P+2L	Z	!
F7ABBBB	Biomechanics and Biomaterials Matej Daniel, Petr Volf Petr Volf Matej Daniel (Gar.)	Z,ZK	4	2P+2L	Z	!
F7ABBCHM	Chemistry Iveta Horá ková, Libor Holík Iveta Horá ková	Z,ZK	4	2P+1C+1L	L	!
F7ABOKC1	Contact Lenses I.	Z,ZK	3	2P+2C	L	!
F7ABOKC2	Contact Lenses II.	Z,ZK	5	2P+2C	Z	!
F7ABOKRV	Ji í Cendelín, Ji í Michálek, Iva Klimešová <b>Ji í Cendelín</b> Ji í Cendelín (Gar.) Correction of Refractive Errors	ZK	1	1P	L	!
17AVACC	Czech for Foreigners Eva Moty ková, Hana Rogalewiczová, Vladimír Rogalewicz Eva Moty ková Eva Moty ková (Gar.)	KZ	3	4C	Z,L	!
F7ABBEM	Electrical Measurements Jan Vrba, Roman Mat jka Jan Vrba Jan Vrba (Gar.)	Z,ZK	4	2P+2C	Z	!
F7ABBELF	Electrophysiology Ksenia Sedova Anastasia Sedova Ksenia Sedova (Gar.)	Z,ZK	2	1P+1L	Z	!
F7ABBEMP	Electromagnetic Fields of Living Organisms Jan Vrba, Ond ej Fišer Ond ej Fišer Jan Vrba (Gar.)	KZ	2	1P+1L	L	!
F7ABBEO	Electronic Circuits Ond ej Fišer, Pavel Máša, Tomáš D íž al Ond ej Fišer Pavel Máša (Gar.)	Z,ZK	4	2P+2C	Z	!
F7ABBEBI	Child ej Fiser, Faver Masa, Tohlas D 12 al Child ej Fiser Faver Masa (Gar.)           Ethics in Biomedical Engineering           Václav Navrátil Václav Navrátil Martina Dingová Šliková (Gar.)	ZK	2	2P	L	!
F7ABBESP	Management of Health Care Technology         Ji í Hozman Ji í Hozman Ji í Hozman (Gar.)	Z,ZK	2	1P+1C	L	!
F7ABOZFO	Foundations of Physiological Optics	ZK	2	2P	L	!
F7ABBFVP	Multivariable Calculus Petr Maršálek Petr Maršálek (Gar.)	KZ	2	1P+1C	Z	!
F7ABBFY1	Physics I. Jan Mikšovský, Petr Písa ík Petr Písa ík Jan Mikšovský (Gar.)	Z,ZK	4	2P+1C+1L	Z	!
F7ABBFY2	Physics II. Jan Mikšovský Petr Písa ík Jan Mikšovský (Gar.)	Z,ZK	6	2P+2C+2L	L	!
F7ABBFCH	Physical Chemistry	Z,ZK	4	2P+1C+1L	Z	!
F7ABOOGB	Libor Holík, Karel Roubík Karel Roubík Karel Roubík (Gar.) Geometric and Opthalmic Optics	Z,ZK	5	3P+2C	L	!
F7ABBHE	Hygiene and Epidemiology	ZK	1	1P	L	!
F7ABBISZ	Anastasia Sedova Anastasia Sedova Pavla Bojarová (Gar.) Information Systems in Health Care	Z,ZK	4	2P+2C	Z	!
F7ABBITP	Zoltán Szabó, David Jirsa <b>Zoltán Szabó</b> Zoltán Szabó (Gar.) Integral Calculus	Z,ZK	4	2P+2C	L	
F7ABBKT	Petr Maršálek, Tomáš Parkman <b>Tomáš Parkman</b> Petr Maršálek (Gar.) <b>Communication Technology</b> Christiane Malá, Martin Vít zník, Karel Hána, Jan Mužík, Tomáš Funda <b>Karel</b>	Z,ZK	2	1P+1C	Z	!
F7ABBKZS	Hána         Karel Hána (Gar.)           Conventional Imaging Systems         Ji í Hozman, Tomáš D íž al, Martin Rožánek, Martin apek Ji í Hozman	Z,ZK	4	2P+1C+1L	L	!
F7ABBLT	Ji í Hozman (Gar.) Clinical Laboratory Instrumentation	Z,ZK	4	2P+2L	L	!
F7ABBLPZ1	Martina Turchichová Martina Turchichová Martina Turchichová (Gar.) Medical Devices and Equipment I. (Diagnostic Devices) Karel Roubík, Martin Rožánek, Petr Kudrna Petr Kudrna Martin Rožánek	Z,ZK	4	2P+2L	Z	!
F7ABBLPZ2	(Gar.) Medical Devices and Equipment II. (Therapeutical Devices) Data Kudara (Car)	Z,ZK	2	1P+1L	L	!
F7ABBLAD	Petr Kudrna, Václav Ort, Ladislav Bís Petr Kudrna Petr Kudrna (Gar.) Linear Algebra and Differential Calculus Petr Maršálek, Ji í Neustupa, Jana Urzová Petr Maršálek Petr Maršálek	Z,ZK	6	2P+4C	Z	!
F7ABBMAZ	(Gar.) Management and Admininistration in Health Care Václav Navrátil Václav Navrátil Václav Navrátil (Gar.)	KZ	1	1P	Z	!
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F7ABBMEC	Mechanics	Z,ZK	4	2P+2L	L	!
F7ABBMT	Patrik Kutilek Patrik Kutilek Patrik Kutilek (Gar.) Medical Terminology	Z	1	1C	Z	!
F7ABBMVP	Václav Navrátil Václav Navrátil Václav Navrátil (Gar.) Research Methodology	KZ	2	1P+1C		!
F7ABBMTB	Marek Novák, Jakub Ráfl <b>Jákub Ráfl</b> Jakub Ráfl (Gar.) Microprocessors in Biomedicine Lenka Hanáková, Pavel Smr ka, Karel Hána, Jan Broulím Karel Hána Pavel	KZ	2	1P+1L	 Z	
	Smr ka (Gar.)					
F7ABBMDT	Microwave Diagnostics and Therapy Jan Vrba, David Vrba Jan Vrba Jan Vrba (Gar.)	KZ	2	1P+1L	L	!
F7ABBMS	Modelling and Simulation Václav Petrák Václav Petrák (Gar.)	Z,ZK	4	2P+2C	L	!
F7ABBMFJ	Physical Phenomena Modeling in COMSOL MULTIPHYSICS Jan Vrba, David Vrba David Vrba (Gar.)	ΚZ	2	1P+1C	Z	!
F7ABBNMP	Project Proposal and Management Václav Bláha Václav Bláha Václav Bláha (Gar.)	ΚZ	2	1P+1C	L	!
F7ABBOIZ	Protection Against Ionizing Radiation Tomáš Veselský Tomáš Veselský František Podzimek (Gar.)	ZK	2	2P	L	!
F7ABOPO	OPT Project Markéta Žáková Markéta Žáková Markéta Žáková (Gar.)	KZ	5	4C	Z	ļ
F7ABOOFP	Opthalmology Instruments Martin F s Martin F s Martin F s (Gar.)	ZK	3	3P	Z	!
F7ABBPPS	Patient and Device Simulators and Testers Ji í Hozman, Martin Rožánek, Petr Kudrna, Lenka Horáková Petr Kudrna Petr Kudrna (Gar.)	Z,ZK	2	1P+1L	Z	!
F7ABBPPP	Programming Tools Martin Vit zník	KZ	2	2C	L	!
F7ABBPPM1	Programming in Matlab I. Christiane Malá Radim Krupi ka Christiane Malá (Gar.)	KZ	1	1C	Z	!
F7ABBPPM2	Programming in Matlab II. Christiane Malá Radim Krupi ka Radim Krupi ka (Gar.)	KZ	2	2C	L	!
F7ABBPNK	Design and Construction of Medical Devices/Practical Exercises	KZ	4	4L	Z	!
F7ABBPMS	Roman Mat jka, Jana Mat jková Roman Mat jka Roman Mat jka (Gar.) Probability and Mathematical Statistics Marek Piorecký, Filip erný Filip erný Marek Piorecký (Gar.)	Z,ZK	4	2P+2C	Z	!
F7ABBPP	First Aid Martin Stan k Martin Stan k Martin Stan k (Gar.)	KZ	2	1P+1C	L	!
F7ABBPSL	Psychology Olga Shivairová Olga Shivairová Olga Shivairová (Gar.)	KZ	2	1P+1C	Z	!
F7ABBSPR1	Semestral Project I. Petr Kudrna Petr Kudrna Petr Kudrna (Gar.)	KZ	1	1C	L	!
F7ABBSPR2	Semestral Project II.	KZ	4	4C	Z	!
F7ABBSM	Petr Kudrna Petr Kudrna Petr Kudrna (Gar.) Sensors in Medicine	Z,ZK	4	2P+2L	L	!
F7ABBSEL	Tomáš Pokorný, David Vrba, Jan Rédr David Vrba         David Vrba (Gar.)           Power Engineering         Ji í Hozman, Ond ej Fišer, Marek Novák, David Vrba David Vrba David	Z,ZK	5	2P+3L	L	!
F7ABBSJ	Vrba (Gar.) Scripting Languages	KZ	2	2C	L	!
	Tomáš Kraj a Radim Krupi ka Radim Krupi ka (Gar.) Equipment for Anaesthesiology and Resuscitation					
F7ABBSPT	Karel Roubík, Václav Ort, Jakub Ráfl, Šimon Walzel <b>Jakub Ráfl</b> Jakub Ráfl (Gar.)	Z,ZK	4	2P+2L	L	!
F7ABOSUR1	Subjective Refraction I.	Z,ZK	4	2P+2C	Z	!
F7ABOSUR2	Subjective Refraction II. Theory of Electrical Engineering	Z,ZK	4	2P+4C		!
F7ABBTEL	Pavel Máša, Marek Novák <b>Pavel Máša</b> Pavel Máša (Gar.)	Z,ZK	4	2P+2C	L	!
F7ABBTZS	Tomographical Imaging Systems Ji í Hozman, Evgenila Karnoub, Tomáš D íž al, Martin Rožánek Martin Rožánek Ji í Hozman (Gar.)	Z,ZK	4	2P+1C+1L	Z	!
F7ABBUSS	Introduction to Signals and Systems Jan Kauler Jan Kauler (Gar.)	Z,ZK	4	2P+2C	Z	!
F7ABBVBI	Virtual Bioinstrumentation Roman Mat jka Roman Mat jka Roman Mat jka (Gar.)	ΚZ	2	1P+1L	L	!
17AVARP1	Research Project I. Petr Kudrna, Hana D cká Petr Kudrna Petr Kudrna (Gar.)	ΚZ	10	8D+2S	L,Z	!
17AVARP2	Research Project II. Petr Kudrna, Hana D cká Petr Kudrna Petr Kudrna (Gar.)	KZ	10	8D+2S	L,Z	!
17AVARP3	Research Project III. Petr Kudrna, Hana D cká, Martin Otáhal Petr Kudrna Petr Kudrna (Gar.)	ΚZ	10	8D+2S	L,Z	!
	Fundamentals of Pathology	ZK	2	2P	L	

F7ABBZLN	Legislation in Health Care and Technical Standards Vojt ch Kamenský, Ond ej Gajdoš, Peter Kneppo Vojt ch Kamenský Peter Kneppo (Gar.)	KZ	2	1P+1C	Z	!
F7ABBZOD	Image Data Processing Zoltán Szabó Zoltán Szabó Zoltán Szabó (Gar.)	KZ	2	1P+1C	Z	!

Characteristics of the courses of this group of Study Plan: Code=PRO-B-0 Name=Courses that will certain	y be open	
F7ABBALP Algorithmic and Programming Theory	KZ	4
Algorithm, data structures. Identifiers, data types. assignment statement, conditional statement, cycles. Arithmetical and logical operations. Digital rep	presentation of num	pers, numeration
systems. Introduction to structured programming in C language - building and structure of simple programs, creating of the user functions, user inp		-
memory management. Practical overview of programming techniques and basic algorithms in C language. Recursive and iterative methods, measu	·	-
types, data sorting and searching, implementation of basic numerical algorithms. Introduction to biomedical data processing - programmers view. In		<u> </u>
F7ABBAF1       Anatomy and Physiology I.         Anatomy and physiology I covers functional aspects of particular organs and their systems.	Z,ZK	4
F7ABBAF2 Anatomy and Physiology II. Anatomy and physiology II links to Anatomy and Physiology I. The subject covers functional aspects of particular organs and their systems.	Z,ZK	4
F7ABBA3A English Language IIIA (part 1)	KZ	2
The aim of the course is to increase students' language competence in academic English and professional vocabulary, along with common common	inication skills. Stud	lents should be
able to work actively with academic text, understand and be able to use basic terminology and be aware of the different stylistic levels of English a lexical devices.	nd the associated s	yntactic and
F7ABBA3B English Language IIIB (part 2)	KZ	2
Teaching activities in the summer semester are project-based.		
F7ABOBP Bachelor Thesis	Z	10
Work of the student under the guidance of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the student under the guidance of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous of the supervisor and possible consultant on		
Outcome knowledge, skills, abilities and competences: The student is able to work on the assigned topic in a defined format, in a defined time and		-
of the BP supervisor and also in a team. The student is able to use knowledge, skills and knowledge from previous courses to solve the assigned p which is defended in front of the HSS committee. This thesis is assessed by the supervisor and the opponent according to the ECTS grading scale		
and the result of the state final examination in the subject areas are included in one final evaluation.	. Subsequently, the	se evaluations
F7ABOBV Binocular Vision	Z,ZK	7
This course builds on courses dealing with refraction of the eye and visual functions. Topics include: theory of binocular vision and conditions of its original conditions of the eye and visual functions.		
disorders of binocular vision, practical examination of binocular vision, heterophoria and fixation disparity, relationship of accommodation and verge		
training.		
F7ABBBCH Biochemistry	Z,ZK	2
Course participants will be introduced to the basics of Biochemistry. The course builds on the knowledge gained in general chemistry and extends	this knowledge abo	ut the chemistry
of living systems. The interpretation goes through the basic building structures of biological systems (amino acids, peptides, proteins, lipids, carbol	-	· -
membranes and molecular genetics to the most important metabolic processes. Particular attention is paid to the aspects necessary for understan	-	
biochemical and clinical laboratory, which are part of the follow-up chemical discipline. The laboratories are focused on broadening the topics discuss		-
training, especially on the determination of biomolecules and the verification of their properties. Students should become familiar with the basic lab	KZ	
F7ABBBFT Biophotonics Overview of principles and applications in the interdisciplinary sphere, connecting physics, optics and biology. Interaction of laser radiation with ma	1	2 adiation with
tissue, biology basics, photobiology, bioimaging, basics of lasers, laser safety, optical biosensors, photodynamical therapy, optical manipulation with ce		
biomaterials for photonics.	, 0,	
F7ABBBLS Biological Signals	Z,ZK	4
The subject deals with origins and description of the most important electric and non-electric biological signals. The principles of generation, record	ing and basic prope	rties are studied
in all the signals. The studied signals involve native and evoked biosignals, including biological signals of the heart, brain, muscles, nervous system		
signals from the gastro-intestinal system etc. Advanced methods of digital biosignal processing, spectrum analysis, modern methods of artificial intellig	jence, features extra	action, automatic
classification, graphic presentation of results. Adaptive segmentation, artificial neural networks for signal processing.	7 71/	
F7ABBBLG Biology Basic information about the cellular level of organisms - from acelullar through prokaryotic to eukaryotic. The viruses. Prokaryotic cells. Bacteria. B.	Z,ZK	4 d their central
Eukaryotic cells. Plant and animal cell structure and function. Structure and conformation of biopolymers (nucleid acids and proteins). The nucleus		
Endomembrane system: endoplasmic reticulum, the Golgi apparatus, lysosomes, vacuoles. Semiautonomic organelles: mitochondria, sites of resp		
photosynthesis. The origin of eukaryotes: endosymbiotic hypothesis. Ribosomes. The cytoskeleton: microtubules, microfilaments. The cell cycle: mi		
S and G2 phases). The division of cell nucleus - amitosis, mitosis, phases of mitosis, the mitotic spindle; meiosis. The cell division - cytokinesis. Cell	differentiation. Cell	death. Apoptosis
and necrosis. Mendelian and modern genetics: structure, function and inheritance of genes. Includes the chemistry and structure of chromatin and ch	romosomes. Animal	tissue histology.
Animal cells and tissues. Human genetics. Chromosomal aberrations, genetic disorders and diseases. Genetic engineering. GMO organisms.		
F7ABBBB Biomechanics and Biomaterials	Z,ZK	4
The course is intended for all students who need to supplement their knowledge and have a general knowledge about biomechanics and its applic		
The content is chosen to be sufficient to understand athe issues in related subjects, especially the subject of Mechanics and Robotics in Medicine. subject and has never had the opportunity to complete these basic knowledge, they will be exposed to the risk of misunderstanding the subsequent		
this is not taken into account the basic knowledge.		
F7ABBCHM Chemistry	Z,ZK	4
Introduction to chemistry, categorization and properties of substances, chemical bonds, chemical reactions, elements in periodic table, organic che		
substances, polymers, analytical methods - instrumental analysis, chemical calculations, chemical equations		
F7ABOKC1 Contact Lenses I.	Z,ZK	3
Contact lens history and development. Contact lens terminology. Manufacturing methods. Classification of contact lenses and their materials. Mater		act lens designs.
Different methods of contact lens wearing and replacement. Contact lens care: composition and principles of action. Indications and contraindication	ons of contact lense	s. Spherical soft
and rigid lenses. Instrumentation of contact lens practice. Patient history, basic examination and contact lens selection. Instructions regarding hand	lling and contact ler	ns care. Contact
lens insertion and removal.		
F7ABOKC2   Contact Lenses II.	Z,ZK	5
Toric contact lenses, Bifocal and multifocal lenses and other methods of presbyopia correction. Contact lenses for children. Coloured, cosmetic and pr		-
use of contact lenses. Special types of contact lenses. Special uses of contact lenses (sports, demanding occupations and environments, patients interactions with contact lenses. Complications of contact lenses and their solutions. Application of soft and rigid spherical lenses. Application of co	-	
presbyopia. Basic and specific care of contact lenses. Inspection of patients with contact lenses.	anaor ienses in asil	gmanann anu

F7ABOKRV	Correction of Refractive Errors	ZK	1
	eory and practical examination of refractive errors and various possibilities of correction of refractive errors. Optical and surg fraction. Subjective methods of refraction. Correction of myopia. Correction of hypermetropia. Correction of astigmatism. Corre		
	asic techniques of surgical correction of refractive errors. Refractive surgery. Methods of laser keratorefractive surgery. Implar		
17AVACC Survival Czech	Czech for Foreigners	KZ	3
F7ABBEM	Electrical Measurements	Z,ZK	4
Measuring of electric va	lues, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and	potential measur	ing. Frequency
	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		-
F7ABBELF	Electrophysiology	Z,ZK	2
-	luce students to the theory of electrical phenomena at the cell, organ and organism level, to the possibilities of measuring an	-	
-	le 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 course the physiology of pervises the physiology of pervises the physiology of pervises the physiology of the physiology of pervises the physiology of the ph		-
different levels: cell, tiss	us, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the phys	sology of electrica	ii processes at
F7ABBEMP	Electromagnetic Fields of Living Organisms	KZ	2
	lectric and magnetic fields, electromagnetic fields. Electrical and magnetic properties of biological tissues. Electrical, magnet	I I	
-	and physiological bases of bioelectromagnetism. Bioelectric sources and conductive environment. Integral relations of electric	-	
	of mathematical modeling of electrocardiography and electroencephalography. Topographic concept of bioelectrical and bior	-	
	surement. Human-robotic limb replacement interface.	0	
F7ABBEO	Electronic Circuits	Z,ZK	4
The course provides a l	pasic orientation in the principles of electronic circuits used in electronic laboratory and medical devices. It provides a prerequi		d operation of
	trumentation. technology. Course entry requirements: Successful completion of Theoretical Electrical Engineering. Exit Know		
Competencies: Student	s will become familiar with functional electronic blocks that are used in the design of laboratory and medical instruments. The	e course will prepa	are them to
competently assess the	basic properties and parameters of electronic devices.		
F7ABBEBI	Ethics in Biomedical Engineering	ZK	2
An overview of basic eth	ical concepts and theories in the context of applied ethics with respect to the professional orientation, maintenance, and develo	pment of humanit	ies in technically
oriented students. Prere	equisites and co-requisites: Knowledge of humanities in the scope of secondary school studies (basics of philosophy, history,	psychology). Acqu	ired knowledge,
skills, abilities, and com	petencies: Knowledge of basic concepts and controversial topics in theoretical and applied ethics, the ability to critically think	k, discuss, argue a	and defend their
own views in ethical dile	mma situations, developing the ability to work with literature, enhance empathy skills.		
F7ABBESP	Management of Health Care Technology	Z,ZK	2
F7ABOZFO	Foundations of Physiological Optics	ZK	2
Fundamentals of optica	I imaging. Physiological structure of human eye, its geometric and physical properties. Visual perception. Sensitivity of eye. C	ptical system of h	uman eye. Axes
and pupils of eye. Schen	natic optical models of human eye. Photometric parameters of optical system of eye. Accommodation and aging of eye. Monoch	romatic and chron	natic aberrations
of human eve. Resolvin	g power and depth of field. Influence of aberrations on image quality. Contrast sensitivity. Ametropy. Astigmatism. Aphakia. Ar	mblyopy Physiolog	ny of eve
		noryopy. I nyololog	Jy of eye
-	eve tracking. Basic principles of binocular and stereoscopic vision.		gy of eye
-		KZ	2
movement, methods of	eye tracking. Basic principles of binocular and stereoscopic vision.		
movement, methods of F7ABBFVP F7ABBFY1 Course Physics 1 is use	eye tracking. Basic principles of binocular and stereoscopic vision. Multivariable Calculus Physics I. d to repeat and expand the basic knowledge of physics in the field of classical mechanics, thermals and optics, which is need	KZ Z,ZK	2 4
movement, methods of F7ABBFVP F7ABBFY1 Course Physics 1 is use Students will gain theor	eye tracking. Basic principles of binocular and stereoscopic vision. Multivariable Calculus Physics I. d to repeat and expand the basic knowledge of physics in the field of classical mechanics, thermals and optics, which is need etical knowledge, the ability to solve numerical problems and practical skills associated with working in laboratories.	KZ Z,ZK ed for further stud	2 4 y at FBME CTU.
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F7ABBKT	Communication Technology	Z,ZK	2
The aim of the course is	to teach the student to understand the basic principles of the function of personal computers, their peripherals and communi	cation interfaces.	They will be able
to configure the network	interface and configure and connect a peripheral type of a standard medical devices equipped with a wired or wireless inte	rface.	
F7ABBKZS	Conventional Imaging Systems	Z,ZK	4
Electromagnetic radiation	n spectrum and relationship to the modalities of medical diagnostic imaging systems. Fundamentals of imaging theory. Appl	lication of 2D FT.	ransmission
	stems. Optical imaging systems including microscopic. Television imaging systems (including video endoscopic imaging sys	, .	0
	. Infrared imaging systems (thermal imaging/IR imaging systems). X-ray imaging systems. Gamma imaging systems. Lectur		
	ts with an overview of the principles of image formation in medicine for conventional imaging systems and methods. There		-
	and subsequent processing and principles of function and properties of sensing image devices in context, which is especially	-	
	e course and study specialization. Knowledge, skills and competences: The student is able to explain the basic physical prir		
	g the principle of image formation. The student is able to assess, on the basis of standard definition of technical parameters		
	for selected modality. Such knowledge is a prerequisite to the correct process technology selection and application of the mo	odalities as well as	s the minimum
-	required quality of the resulting image data.	7 71	
F7ABBLT	Clinical Laboratory Instrumentation	Z,ZK	4
-	mentation introduces principles of bioanalytical methods used in clinical diagnostics. Emphasis is put on optical methods (U		-
	b, fluorimetry), NMR and X-ray analysis, electrochemical and electromigration methods (ion electrodes, biosensors, electrop		
	c methods (ELISA, PCR) as well as on chromatography and mass spectrometry. Contribution of lab automation to clinical d	lagnostics will be a	also discussed.
	urse students will be introduced into the basics of work in bioanalytical laboratory and lab data processing.	7 71/	4
F7ABBLPZ1	Medical Devices and Equipment I. (Diagnostic Devices)	Z,ZK	4
-	ies. Electrical safety of medical devices. Biopotentials amplifiers. Electrocardiographs, electromyographs and electroenceph		
	utput measurement. Blood pressure measurement. Cardiac frequency measurement. Phonocardiography. Pulse oximetry. M	edical monitors. E	lectrostimulation
	cal devices. Therapeutic medical devices. Implantable medical devices. Telemetry. Medical devices for audiology.		
F7ABBLPZ2	Medical Devices and Equipment II. (Therapeutical Devices)	Z,ZK	2
, s	ies. The electrical safety of therapeutical medical devices. Artificial ventilation, introduction. Conventional ventilation. High-fre		
	Hemodialysis. Drug infusion pumps (volumetric, syringe). Artificial cardiac pacemaker. Defibrillators (external, implantable).	Cochlear implant.	Electrosurgery
	bund. Electro-therapy. Magneto-therapy.	<del> </del>	[
F7ABBLAD	Linear Algebra and Differential Calculus	Z,ZK	6
	n to differential calculus and linear algebra. Differential calculus - sets of numbers, sequences of real numbers, real functior		
-	of a function investigation of function behavior), Taylor's formula, real number series. Linear algebra - vector spaces, matric	es and determina	nts, systems of
	is (solvability and solution), eigenvalues and eigenvectors of matrices, applications.		
	Management and Admininistration in Health Care	KZ	1
•	cture of the health sector and financing models Health. Zoom administrative management issues various types of medical w	orkplaces, their no	ecessary
	tion in the specific features of health facilities and European systems of health care workplaces.		(
F7ABBMAT	Marketing of Medical Technology	KZ	2
-	, products management, basic knowledge concerning export activities in the field of marketing and commercial health care		cal cases are
· -	th care technology companies from the Czech Republic. Discussion and analysis of the real products are included in the ex	1	
F7ABBMEC	Mechanics	Z,ZK	4
	nted with the following areas of mechanics: General physical equations, Newton's laws, statics and dynamics. Force and mo		-
	n of a force system in a plane and space - equation of equilibrium, systems into equilibrium. Reactions on statically determin		
	aints, solution of reactions. Static moment, center of gravity and center of area. Spatial moment of inertia - kinetic energy of r		
	ervation of momentum. Second moment of area - product moment, polar moment, Mohr circle, main moments of inertia, ellip		
	s, course of internal static effects, kinematic method, statically indeterminate problems. Mechanical properties of materials -		1 I <i>i</i>
	ns, Hooke's law. Stress and strain - uniaxial and biaxial stress state, simple bending, bending curve, torsional stress, cross-		
	d stress, nonlinear models. Buckling strength - critical load, stability of members, calculation of cross section. Tests of hardness	-	-
F7ABBMT	Medical Terminology	Z	1
	quainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously	informed about tei	ms of whole
	ical procedures. Education is combined with continuous knowlegde check up through the use of tests.		
F7ABBMVP	Research Methodology	KZ	2
	tudents to the basic methods of research work and the requirements for scientific communication. The course also introduce	es students to the	principles of
writing and presenting o			
	Microprocessors in Biomedicine	KZ	2
	principles and building blocks of a microprocessor system, the structure of a microprocessor, the connection of basic perip		-
	in the form of a practically oriented explanation and demonstration tasks. Provide a basic overview of ATMega and ARM Co		•
	mming with examples of use in biomedicine. Prerequisites and co-requisites: basic knowledge of digital technology and sigr		
	, abilities and competencies: The student is familiar with the selection and design of microprocessor system solutions for us		•
	m control of these building blocks of the microprocessor system: digital inputs and outputs, A / D and D / A converters, seria	-	
	errupt controller. Understands the basics of communication of microcomputers with the environment: interfaces for LCD disp nd mobile 3G / 4G communication, GPS / GLONAS localization.	ays, keyboards, h	SZSZ, Eulernet,
		1/7	
	Microwave Diagnostics and Therapy	KZ	2
	d with biological tissues and its use in diagnostics and therapy. Numerical methods suitable for modeling these interactions.		
	cation of microwave techniques in medical diagnostics: non-invasive monitoring of blood glucose concentration, microwave		
	and early detection of breast cancer. Therapeutic systems and applicators for microwave and RF local and regional hyperth	erma. Fianning tr	eauneni. Design
and testing of applicator		7 71/	A
F7ABBMS	Modelling and Simulation	Z,ZK	4
	d consequences of modeling and simulation. The methodology of modeling and simulation. Inverse problem. Proposal for a ntal models. Physiological models. Pharmacokinetics. Continuous and discrete models of population dynamics. Epidemiolog		
models.		jisai moueis. velle	101 0130030

F7ABBMFJ   Physical Phenomena Modeling in COMSOL MULTIPHYSICS   KZ   2
Numerical simulations are increasingly being used to develop new and optimize existing products and devices. Numerical simulations can greatly reduce the number of prototypes
needed and thus significantly accelerate and reduce development costs. Another sector where numerical simulations are used is a sector where it is difficult to verify ongoing physica
processes (eg, heating the biological tissue under electrodes for direct brain simulation). Last but not least, based on numerical simulations, we can plan treatment where, based on
knowledge of material properties, we can define the amount of power delivered to the device (eg radiofrequency ablation in oncology or cardiac surgery). Computer modeling involves
the creation of geometry, 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 of results. The accuracy of the results obtained, the length of calculations and the computational power requirements are very dependent on the numerical
model setting. The lectures cover the most common problems in electrical engineering, thermics, mechanics, chemistry, acoustics and fluid dynamics. The acquired knowledge will be
tested by the students when designing individual parts of devices and devices.
F7ABBNMP Project Proposal and Management KZ 2
Project management, definition of terms project, program portfolio, project life cycle, project goal and benefits, triple imperative, project success assessment. Project idea, opportunity
study, feasibility study (purpose, content, processing), SMART objective, stakeholders. Project identification list, logical framework. Design of project structures, stakeholders. Planning
of time, resources, costs, budget, changes, procurement and contractual relations, personnel management. Risk analysis and risk management, methods for risk analysis. Reporting
on the project status, evaluation of the current project status. information and documentation, communication. Leadership and motivation of people, negotiation and discussion procedures
Project completion, final report.
F7ABBOIZ Protection Against Ionizing Radiation ZK 2
The aim of the course is to give students an overview of the issues of protection against ionizing radiation and dosimetry in general and in a specialized medical workplace. Student
will studied properties of basic types of ionizing radiation, sources of ionizing radiation, interaction of gamma radiation with matter, interaction of charged particles with matter, photon
and electron beam passage through the matter, units used in dosimetry and radiation protection, operational units for working and environment monitoring, dose measurement, interna
contamination, shielding of simple sources. Special attention is paid to the exposure control of workers, residents and patients. In course students will give invormation about legislative
nterpretation of dosage limits. Entry requirements of the course: Structure of matter, basic types of nuclear transformations. Properties of basic types of ionizing radiation, sources of
onizing radiation. Interaction of gamma radiation with matter, interaction of charged particles with matter, passage of photon and electron beams through matter. Detection of ionizing
radiation. Output knowledge, skills, abilities and competences: Units used in dosimetry and radiation protection. Principles and goals of radiation protection. Basic principles of protection
against external ionizing radiation and protection against internal contamination. Dose limitation system, ionizing radiation in legislation of Czech Republic. Ionizing radiation use in
nealthcare.
F7ABOPO OPT Project KZ 5
The aim of the course is methodical guidance of students in scientific research or development activities in the field of Optics, Optometry or Ophthalmology. Control of continuous
activity on the topic of the project, which will lead to the final Bachelor's Thesis (BP). The secondary objective of the course is to guide students in the systematic activity of documenting
the solution of the assigned task, applying the practices of the field to the tasks or projects solved by the students, as well as deepening the communication skills of the students. Las
but not least, deepening the knowledge of typographic rules, including proofreading marks, etc.
F7ABOOFP Opthalmology Instruments ZK 3
Functional principles of different diagnostic and therapeutic ophthalmic devices will be discussed. Students will be able to test most of machines during practical lessons at clinical
department. Overview, physical principles, technical construction and parameters of following devices and methods will be studied: slit lamp, ophthalmoscope (direct and indirect,
confocal scanning), retinoscope, refractometer, tonometer, campimeter, Heidelberg retinal tomograph, optical coherence tomography, retinal nerve fibre layer analysis (GDx), specula
(endothelial) microscope, devices for subjective investigation of astigmatism, devices for investigation of ocular movements, corneal topohraphs, testing of refractive balance, eikonometer
POLA-test, ortopic machines, Hertel exophthalmometer, devices for color vision testing.
F7ABBPPS Patient and Device Simulators and Testers Z,ZK 2
F7ABBPPS   Patient and Device Simulators and Testers   2,2K   2 Patient and instrument simulators and testers. Basic principles of implementation, connections with other disciplines. Detailed description and implementation of a selected model of
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F7ABBPSL	Psychology	KZ	2
	logy and methods of psychology. Mental activities and psychic processes, psychology of personality, objects of psychology and		-
	concept and theory, psychic processes and stages. Psychological interpretation of personality. Application of knowledge in multi-		
	I doctors, technicians and patients, technicians and nurses. Communication as a tool for good cooperation amongst people a nication skills. Use of elocution and gestures in personal expression. Verbal and nonverbal communication. Dialogue; types c		
	incation skills. Use of elocation and gestales in personal expression, verbal and honverbal communication. Dialogue, types c	i dialogue, questi	uning
F7ABBSPR1	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 Bio	1	-
available for the relevan	t academic year in the database projects.fbmi.cvut.cz Note: It is not possible to implement economic-managerial topics, topi	cs based mainly o	n the creation of
research, clean prograr	nming, topics purely in the field of biology, etc. The application must always be part of the work in accordance with the focus	of the field. The to	pic must always
	y (medical devices, or the scope of work of a Biomedical Technician in clinical practice)! Entries that do not fall into the above		
F7ABBSPR2	Semestral Project II.	KZ	4
	t work on a project which can be improved in time and finish as a Bachelor thesis. In the course will be discussed topic as basi		
	rk and project management. Creation of presentations and written texts. Typography rules. Types, purpose and requirements		
-	a commented bibliographic search. The student solves topic (project) from the selection of the PROJECTS database - http://ped 2 hours every week for work under teacher supervising.	Jiojecis.ibiii.cvui.	cz During the
F7ABBSM	Sensors in Medicine	Z,ZK	4
	formation about basic electronic devices - sensors, describes their operation principle, basic circuit configuration and applica	· · ·	-
	ples and practical utilization. Integral part of this course is basic information about sensors of non-electric quantities and their		-
sensors (force, pressure	e, torque, vibration, displacement, acceleration etc.) magnetic field sensors, temperature sensors, chemical sensors, optical s	ensors and bioser	nsors. The stress
is aid on miniaturization	n, integration		
F7ABBSEL	Power Engineering	Z,ZK	5
	nics, power supplies, including electrochemical sources, rectifiers, stabilizers, the most commonly used types of motors, bas		
	connecting appliances with a focus on medical use. Emphasis is placed primarily on the physical nature of the problem and it	is understanding.	knowledge will
	examples and in the laboratory.	1/7	
F7ABBSJ	Scripting Languages	KZ	2
	to understand the topic of scripting languages and their applications, to understand their advantages and disadvantages and	-	
the scripting languages	Il become familiar with regular expressions and tools for word processing. The course focuses on the scripting languages wit		and system and
F7ABBSPT	Equipment for Anaesthesiology and Resuscitation	Z,ZK	4
-	the course is to introduce students to the basic equipment of intensive care units (ICU) and anesthesiology and resuscitation	· · ·	-
-	vital functions, especially lung ventilation, as well as patient monitors, anesthesia machines and their parts and other equipment	-	-
	e and skills of students from the fields of science (especially physics, chemistry and physiology) and engineering (modeling, of the students) and the students from the fields of science (especially physics, chemistry and physiology) and engineering (modeling, of the students) and the students from the fields of the students (the students) and the students (the students) and the students (the students) and the students) are students (the students) and the students) are students (the students) and the students) are students (the students) are st		
etc.) in the analysis of c	linical technology and in the design and implementation of functional technical systems.		
F7ABOSUR1	Subjective Refraction I.	Z,ZK	4
Basic knowledges abou	it refraction of the eye. Techniques of the subjective refraction perform testing frame or the phoropter. Techniques of the exam	ination near vision	י ז.
F7ABOSUR2	Subjective Refraction II.	Z,ZK	4
During the lectures, stu	dents deepen their theoretical knowledge and practical skills of subjective refraction with the test frames and test sets of glass	sses. Further tests	will follow on
binocular balance, prac	tice working with phoropter and other techniques.	-	
F7ABBTEL	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 e	lectrical energy. C	connection of the
	t resistance and impedance, idle voltage, inner resistance and impedance of the source, mutual loading of the source and el		
	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). Electromagne		
	tibility. Soft and hard magnetic materials. Transformers construction and parameters. Magnetization, force effect). Electromagnetic	, 1	<b>U</b> , ,
F7ABBTZS	Tomographical Imaging Systems	Z,ZK	4
	ciple, schematic arrangement system, basic physical principle, developmental generations, basic principles of reconstruction		
	PECT principle. Specialized imaging systems (hybride). Ultrasound imaging systems. Doppler systems. Subject and especial		
	into the principles of creating image data used in medicine, the principle of methods their scanning, digitization and subsequ		-
function and properties	of scanning image means in context, which is important especially in terms of interdisciplinarity of the subject and the field a	is a whole.	
F7ABBUSS	Introduction to Signals and Systems	Z,ZK	4
To introduce students to	b basics of theory of signals and systems. To explain main principles on applications from biology and medicine. To become a	acquainted with ba	sic mutual
relations in computer la	boratories by means of MATLAB.		
F7ABBVBI	Virtual Bioinstrumentation	KZ	2
	process of development of application in LabVIEW using Virtual Instrumentation concept. During the course will be explained	-	
	ctures, cluster, loops, conditionals, typedefs, advanced coding concepts like event driven programming, multi-threaded applic		-
-	ation, process of deployment, executable building, installer and upgrades. The students are able also to obtain the CLAD (Ce This certificate is first step in knowledge of VI.	rtificate Labview	Associate
17AVARP1		KZ	10
	Research Project I. puts (written text and presentations using required templates, both in English):methodology (background, SOTA, statement of		
<b>3</b> , ,	ential significance and applications, time schedule, outline of the project content, relationship between student and supervisc		
	llaboration, financing budget for project, list of references based on the ISO690 and ISO 690-2 standard) Registration and limi		
	registered by students within the student exchange programme Erasmus+ only. Formal administration: The formal assignment		
approved within the sys	tem PROJECTS is required.		
17AVARP2	Research Project II.	KZ	10
Simulation/implementat	ion study Outputs (written text and presentations using required templates, both in English): full description of the model, desc	cription of the simu	ulation steps and
· ·	sign of the electrical circuits and other components (phantoms), design of printed boards, *.stl file for 3D printing and/or SW	•	•
	p prerequisites and this course can be registered by students within the student exchange programme Erasmus+ only. Formation is the student exchange programme Erasmus+ only.	al administration: T	he formal
	ted topic in English approved within the system PROJECTS is required.		
17AVARP3	Research Project III.	KZ	10
	puts (written text and presentations using required templates, both in English): block scheme of measurement, measuremen results, data statistical processing, discussion Registration and limitations: There are no prerequisites and this course can be		
	results, data statistical processing, discussion Registration and limitations: I here are no prerequisites and this course can be ramme Erasmus+ only. Formal administration: The formal assignment of the selected topic in English approved within the sys		
programmer progra			

F7ABBZP Fundamentals of Pathology	ZK	2
The main goal of the course is represented by continuous enlargement of anatomical, physiological and multi-disciplinary consequences in human h	health and diseas	e. At the very
beginning of the course the fundamentals of cell structure disorders and metabolic paths disturbances are provided to understand pathology of organ s	systems and com	plexity of disease
origin and causes. The course provides a wide overview of morphological and functional conditions in pathology. The knowledge is then simply trans	formable to clinic	al and technical
disciplines used in examination and health monitoring of the patients. The Course Requirements: The enrolment to the course is contingent on success	ful finishing of the	course Anytomy
and Physiology II. Release and Results: The students obtain basic outline of pathological processes in the human body. Their skills comprise definition	on of disease, cor	nprehension and
description of pathological changes in organs and body structure. The theoretical basis of the course is oriented to use in technical branches of bion	nedical engineerir	ng.
F7ABBZLN Legislation in Health Care and Technical Standards	KZ	2
Aims / aims: The aim of the course Legislation in Health Care and Technical Standards is to teach students the basic requirements and regulatory of	bligations in healt	hcare, especially
in the field of medical devices. During the course, students will learn the basics of legislation process, as well as regulation related to the medical device	ces, Iso with legis	lative regulations
in the field of clinical trials and the operation of medical devices. Furthermore, students will learn the legal context of providing health care. The aim i	s to acquaint stud	dents with the
rights and obligations arising from current legislation relating to health care issues. The emphasis is not on memorizing of the text of legal regulations	s, but on acquaint	ing students with
the main points and ideas contained in the laws, regulations and standards of the Czech Republic and EU directives in the field of healthcare. Prefer	quisites and co-re	quisites: To
successfully complete the course, students should know the basics of the principles of medical devices due to the practical application of legislation	in this area. Outp	ut knowledge,
skills, abilities and competences: After completing the course, the student should have a comprehensive overview of health legislation. He should be	able to orientate h	nimself in a given
problem related to legislation without any problems and he should know where he can find individual details related to legal issues in health care.		
F7ABBZOD Image Data Processing	KZ	2
Continuous image representation, linear 2D systems, 2D spectrum, Digital representation of images, Basic image characteristics: brightness, contras	t, resolution, nois	e, look up tables,
histogram, Discrete Fourier transform, discrete cosine transform, image enhancement, geometric operations, image filtering, morphological operation	ns, image restora	ation, image
segmentation, basic principles of image compression.		

## List of courses of this pass:

Code	Name of the course	Completion	Credits
17AVACC	Czech for Foreigners	KZ	3
	Survival Czech		1
17AVARP1	Research Project I.	KZ	10
Methodology study	, Outputs (written text and presentations using required templates, both in English):methodology (background, SOTA, statement of the	project objectives -	- hypothesis
and aims, methods	s, potential significance and applications, time schedule, outline of the project content, relationship between student and supervisor, r	elevant courses (op	tional only),
internal and extern	al collaboration, financing budget for project, list of references based on the ISO690 and ISO 690-2 standard) Registration and limitati	ons: There are no p	rerequisites
and this course ca	an be registered by students within the student exchange programme Erasmus+ only. Formal administration: The formal assignment (	of the selected topi	c in English
	approved within the system PROJECTS is required.		
17AVARP2	Research Project II.	KZ	10
Simulation/implem	entation study Outputs (written text and presentations using required templates, both in English): full description of the model, descrip	tion of the simulation	n steps and
optimizations and	/or design of the electrical circuits and other components (phantoms), design of printed boards, *.stl file for 3D printing and/or SW im	plementation Regis	stration and
limitations: The	re are no prerequisites and this course can be registered by students within the student exchange programme Erasmus+ only. Forma	al administration: Th	ne formal
	assignment of the selected topic in English approved within the system PROJECTS is required.		
17AVARP3	Research Project III.	KZ	10
Experimental stud	y Outputs (written text and presentations using required templates, both in English): block scheme of measurement, measurement p	rotocol (see releva	nt template)
and/or SW verifica	tion, results, data statistical processing, discussion Registration and limitations: There are no prerequisites and this course can be re	gistered by studen	ts within the
student exchang	ge programme Erasmus+ only. Formal administration: The formal assignment of the selected topic in English approved within the sys	tem PROJECTS is	required.
17AVAUBME	Introduction to Biomedical Engineering	Z	2
The main goal of th	e course is to implement an introduction to the field of study, including the relationship between the content of biomedical engineering, t	he study plan, the re	equirements
of Czech legisla	tion and clinical practice. The partial goals are motivation for the non-medical health profession, a description of the content of studie:	s and controlled pro	ofessional
practice, as well as	s the possibilities of other professional activities of students. The course also includes a description of the disciplines of biomedical en	gineering and a de	monstration
of selected relevar	nt instrumentation, including a simulated ICU and artificial patients. At the end of the course, the specific role of the biomedical techni	cian (profession) in	health care
will be described	in connection with the legislation of the Czech Republic and international relationships and possible applications, including the role of	f professional soci	eties in the
Czech Republic.	From the organizational point of view, the subject will be taught after 2 hours and for that reason only 7 topics of lectures and 7 topics	s of exercises are r	nentioned.
F7ABBA3A	English Language IIIA (part 1)	KZ	2
The aim of the cou	urse is to increase students' language competence in academic English and professional vocabulary, along with common communica	tion skills. Student	s should be
able to work acti	vely with academic text, understand and be able to use basic terminology and be aware of the different stylistic levels of English and	the associated syn	tactic and
	lexical devices.		
F7ABBA3B	English Language IIIB (part 2)	KZ	2
	Teaching activities in the summer semester are project-based.	1	I
F7ABBAF1	Anatomy and Physiology I.	Z,ZK	4
	Anatomy and physiology I covers functional aspects of particular organs and their systems.	_,,	
F7ABBAF2	Anatomy and Physiology II.	Z,ZK	4
	Anatomy and physiology II links to Anatomy and Physiology I. The subject covers functional aspects of particular organs and their	1 '	
F7ABBALP		KZ	4
	Algorithmic and Programming Theory		I .
-	uctures. Identifiers, data types. assignment statement, conditional statement, cycles. Arithmetical and logical operations. Digital represe ction to structured programming in C language - building and structure of simple programs, creating of the user functions, user input		
-			-
	ient. 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. Introd		
F7ABBBB	Biomechanics and Biomaterials	Z,ZK	4
	nded for all students who need to supplement their knowledge and have a general knowledge about biomechanics and its application		
The content is cho	sen to be sufficient to understand athe issues in related subjects, especially the subject of Mechanics and Robotics in Medicine. If the	e student does not	cnoose the

subject and has never had the opportunity to complete these basic knowledge, they will be exposed to the risk of misunderstanding the subsequent issues in related subjects. in which

	this is not taken into account the basic knowledge.		
F7ABBBCH	Biochemistry	Z,ZK	2
Course participants	s will be introduced to the basics of Biochemistry. The course builds on the knowledge gained in general chemistry and extends this k	nowledge about th	e chemistry
of living systems.	The interpretation goes through the basic building structures of biological systems (amino acids, peptides, proteins, lipids, carbohydra	ates, nucleic acids)	, biological
	molecular genetics to the most important metabolic processes. Particular attention is paid to the aspects necessary for understanding	-	
	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		
F7ABBBFT	Biophotonics	KZ	2
-	ciples and applications in the interdisciplinary sphere, connecting physics, optics and biology. Interaction of laser radiation with matter		
lissue, biology basi	cs, photobiology, bioimaging, basics of lasers, laser safety, optical biosensors, photodynamical therapy, optical manipulation with cells, na biomaterials for photonics.	inotechnology for b	iophotonics,
F7ABBBLG	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		
-	system: endoplasmic reticulum, the Golgi apparatus, lysosomes, vacuoles. Semiautonomic organelles: mitochondria, sites of respirati		
photosynthesis. Th	e origin of eukaryotes: endosymbiotic hypothesis. Ribosomes. The cytoskeleton: microtubules, microfilaments. The cell cycle: mitotic (	M) phase and inter	rphase (G1,
S and G2 phases).	The division of cell nucleus - amitosis, mitosis, phases of mitosis, the mitotic spindle; meiosis. The cell division - cytokinesis. Cell different	entiation. Cell death	n. Apoptosis
and necrosis. Meno	lelian 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	-	
F7ABBBLS	Biological Signals	Z,ZK	4
=	vith origins and description of the most important electric and non-electric biological signals. The principles of generation, recording ar		
•	The studied signals involve native and evoked biosignals, including biological signals of the heart, brain, muscles, nervous system, au		
signals from the ga	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.	, teatures extraction	n, automatic
		Z,ZK	4
F7ABBCHM	Chemistry chemistry, categorization and properties of substances, chemical bonds, chemical reactions, elements in periodic table, organic chem	· · ·	
	substances, polymers, analytical methods - instrumental analysis, chemical calculations, chemical equations	non y fundamentale	, naturai
F7ABBEBI	Ethics in Biomedical Engineering	ZK	2
	c ethical concepts and theories in the context of applied ethics with respect to the professional orientation, maintenance, and developm		
	Prerequisites and co-requisites: Knowledge of humanities in the scope of secondary school studies (basics of philosophy, history, psyc		
	competencies: Knowledge of basic concepts and controversial topics in theoretical and applied ethics, the ability to critically think, di		-
	own views in ethical dilemma situations, developing the ability to work with literature, enhance empathy skills.		
F7ABBELF	Electrophysiology	Z,ZK	2
Aim/objectives: to	introduce students to the theory of electrical phenomena at the cell, organ and organism level, to the possibilities of measuring and	using these manife	stations. A
sub-objective is t	a anable students to synaximentally varify the knowledge. This source builds on Anotomy and Dhysiology Land Land requires a basis		
-	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 course	se deals with the p	oblems of
(anatomy) and fu	nction (physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The cours nervous, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the physiol	se deals with the p	oblems of
(anatomy) and fu excitable tissues (	nction (physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The cours nervous, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the physiol different levels: cell, tissue, organ, organism.	se deals with the proof of electrical proof	ocesses at
(anatomy) and fu excitable tissues ( F7ABBEM	nction (physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The cours nervous, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the physiol different levels: cell, tissue, organ, organism. Electrical Measurements	e deals with the proof of electrical proof electrical proof Z,ZK	roblems of ocesses at
(anatomy) and fu excitable tissues ( F7ABBEM Measuring of elect	nction (physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The course nervous, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the physiol different levels: cell, tissue, organ, organism. Electrical Measurements tric values, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and po	ee deals with the progy of electrical progy of electrical program Z,ZK	roblems of ocesses at 4 Frequency
(anatomy) and fu excitable tissues ( F7ABBEM Measuring of elect and shift phase me	nction (physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The course nervous, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the physiol different levels: cell, tissue, organ, organism. Electrical Measurements tric 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	ee deals with the progy of electrical measuring.	roblems of ocesses at 4 Frequency g. Magnetic
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(anatomy) and fu excitable tissues ( F7ABBEM Measuring of elect and shift phase me measuring. Analog F7ABBEMP	Inction (physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The course nervous, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the physiol different levels: cell, tissue, organ, organism. Electrical Measurements ric values, principles, using, and parameters. Analogue measuring converters. Electromechanical measuring devices. Current and por asuring. Electric work and electric power measuring: direct current, single-phase and three-phase current. Electrical resistance and im gue scope. Digitalization, digital signal processing, signal reconstruction. Electronic measuring devices: multimeter, digital scope. Opto Electromagnetic Fields of Living Organisms	ee deals with the progy of electrical progy of electrical protection Z,ZK standard dealers and the second dealers	A Frequency g. Magnetic ring device. 2
(anatomy) and fu excitable tissues ( F7ABBEM Measuring of elect and shift phase me measuring. Analog F7ABBEMP Static and quasi-st	nction (physiology) of the following systems (excitable tissues): nervous, musculoskeletal, circulatory (especially the heart). The cours nervous, The course deals with the physiology of nervous tissue, muscle and glandular tissue and provides knowledge of the physiol different levels: cell, tissue, organ, organism. Electrical Measurements rric 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 gue scope. Digitalization, digital signal processing, signal reconstruction. Electronic measuring devices: multimeter, digital scope. Opto	ee deals with the progy of electrical progy of electrical progy of electrical program. Z,ZK otential measuring. Delectronic measuring coelectronic measure KZ of electromagnetic delectromagnetic	A Frequency g. Magnetic ing device. 2 s stimulation
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matter physics.

F7ABBHE Hygiene and Epidemiology	ZK	1		
Students should learn theoretical basics of Epidemiology and Hygiene disciplines in depth covered by lecture topics. As result of this subject, students	should be familiar w	ith targets		
and working methods used in all disciplines of infectious and non-infectious epidemiology, environmental epidemiology and in solving of priorities an	•	c Health		
Protection. Outcoming knowledge, skills, abilities and competences: Knowledge of basic methods used in preventive medical disciplines and legislation.				
F7ABBISZ Information Systems in Health Care	Z,ZK	4		
Lectures are oriented on medical informatics definition and basic characteristic of the different specialized areas. The relations between IS and health		-		
controlling are analyzed as well. Some basic information technology, HW and SW tools are described in relation to IS design. A special attention is pai interpretation, data and communication standards. Different types and features of clinical and hospital IS, decision support systems and regional hea		-		
discussed. Methodology of IS development, implementation and support systems and regional near the discussed as well.		200 0110		
F7ABBITP Integral Calculus	Z,ZK	4		
The subject is an introduction to integral calculus and integral transforms. Integral calculus: anti-derivative, indefinite integral, properties and methods of i	1 · · · ·			
and by substitution, partial fractions), definite integral, properties, Newton-Leibnitz fundamental theorem, simple applications of both indefinite and defin	ite integrals, impror	per integral,		
solving differential equations (ODEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous ODEs, 2nd	order linear homoge	enous and		
non-homogenous ODEs with constant coefficients), intro to multiple integrals, particularly double integral and applications. Integral transforms: Laplace		-		
transform and their application for solving nth order linear ODEs with constant coefficients. Z-transform and inverse Z-transform, their application for sol	ving nth order linea	r difference		
equations.	771	<u> </u>		
F7ABBKT Communication Technology	Z,ZK	2 will be able		
The aim of the course is to teach the student to understand the basic principles of the function of personal computers, their peripherals and communicati to configure the network interface and configure and connect a peripheral type of a standard medical devices equipped with a wired or with a wired o	-			
F7ABBKZS Conventional Imaging Systems	Z,ZK	4		
Electromagnetic radiation spectrum and relationship to the modalities of medical diagnostic imaging systems. Fundamentals of imaging theory. Applic				
properties of imaging systems. Optical imaging systems including microscopic. Television imaging systems (including video endoscopic imaging systems)				
pre-processing methods. Infrared imaging systems (thermal imaging/IR imaging systems). X-ray imaging systems. Gamma imaging systems. Lectures	and especially the	laboratory		
exercises provide students with an overview of the principles of image formation in medicine for conventional imaging systems and methods. There are	described methods	s for image		
data sensing, digitization and subsequent processing and principles of function and properties of sensing image devices in context, which is especially rel		, ,		
point of view of the whole course and study specialization. Knowledge, skills and competences: The student is able to explain the basic physical princip	-			
knows its layout including the principle of image formation. The student is able to assess, on the basis of standard definition of technical parameters the physician requirements for selected modality. Such knowledge is a prerequisite to the correct process technology selection and application of the moda				
necessary to ensure the required quality of the resulting image data.	sinces as well as the	; minimum		
F7ABBLAD Linear Algebra and Differential Calculus	Z.ZK	6		
The course is introduction to differential calculus and linear algebra. Differential calculus - sets of numbers, sequences of real numbers, real functions	1 / 1			
continuity and derivative of a function investigation of function behavior), Taylor's formula, real number series. Linear algebra - vector spaces, matrices				
linear algebraic equations (solvability and solution), eigenvalues and eigenvectors of matrices, applications.				
F7ABBLPZ1 Medical Devices and Equipment I. (Diagnostic Devices)	Z,ZK	4		
Medical devices categories. Electrical safety of medical devices. Biopotentials amplifiers. Electrocardiographs, electromyographs and electroencephal	ographs. Dilution m	ethods of		
blood flow and cardiac output measurement. Blood pressure measurement. Cardiac frequency measurement. Phonocardiography. Pulse oximetry. Medic		stimulation		
and electrosurgery medical devices. Therapeutic medical devices. Implantable medical devices. Telemetry. Medical devices for au				
F7ABBLPZ2 Medical Devices and Equipment II. (Therapeutical Devices)	Z,ZK	2		
Medical devices categories. The electrical safety of therapeutical medical devices. Artificial ventilation, introduction. Conventional ventilation. High-freque membrane oxygenation. Hemodialysis. Drug infusion pumps (volumetric, syringe). Artificial cardiac pacemaker. Defibrillators (external, implantable). Co		•		
units. Therapeutic ultrasound. Electro-therapy. Magneto-therapy.	chiear implant. Liet	liosuigery		
F7ABBLT Clinical Laboratory Instrumentation	Z,ZK	4		
Clinical laboratory instrumentation introduces principles of bioanalytical methods used in clinical diagnostics. Emphasis is put on optical methods (UV				
spectroscopy, AAS, AES, fluorimetry), NMR and X-ray analysis, electrochemical and electromigration methods (ion electrodes, biosensors, electroph	oresis, isoelectric fo	ocusing),		
imunoassays and genetic methods (ELISA, PCR) as well as on chromatography and mass spectrometry. Contribution of lab automation to clinical diag	nostics will be also	discussed.		
During the laboratory course students will be introduced into the basics of work in bioanalytical laboratory and lab data proces	_			
F7ABBMAT Marketing of Medical Technology	KZ	2		
Marketing fundamentals, products management, basic knowledge concerning export activities in the field of marketing and commercial health care ter		cases are		
presented including health care technology companies from the Czech Republic. Discussion and analysis of the real products are included	I I	4		
F7ABBMAZ Management and Admininistration in Health Care	KZ	1		
Getting to know 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.	טיאטימטפט, גוופוו וופנ	Jossai y		
F7ABBMDT 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. E				
(MWI). Perspective application of microwave techniques in medical diagnostics: non-invasive monitoring of blood glucose concentration, microwave d				
cerebral vascular events and early detection of breast cancer. Therapeutic systems and applicators for microwave and RF local and regional hypertherm	ia. Planning treatm	ent. Design		
and testing of applicators.				
F7ABBMEC 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 mor		-		
replacement. Equilibrium of a force system in a plane and space - equation of equilibrium, systems into equilibrium. Reactions on statically determined	-			
spatial and planar constraints, solution of reactions. Static moment, center of gravity and center of area. Spatial moment of inertia - kinetic energy of rotat momentum, law of conservation of momentum. Second moment of area - product moment, polar moment, Mohr circle, main moments of inertia, ellipse	-			
- beam, system of plates, course of internal static effects, kinematic method, statically indeterminate problems. Mechanical properties of materials - te				
stresses and deformations, Hooke's law. Stress and strain - uniaxial and biaxial stress state, simple bending, bending curve, torsional stress, cross-	-	-		
cross-sections, combined stress, nonlinear models. Buckling strength - critical load, stability of members, calculation of cross section. Tests of hardness, ad	-			
F7ABBMFJ Physical Phenomena Modeling in COMSOL MULTIPHYSICS	KZ	2		
Numerical simulations are increasingly being used to develop new and optimize existing products and devices. Numerical simulations can greatly reduced	-			
needed and thus significantly accelerate and reduce development costs. Another sector where numerical simulations are used is a sector where it is dif				
processes (eg, heating the biological tissue under electrodes for direct brain simulation). Last but not least, based on numerical simulations, we can pla				
knowledge of material properties, we can define the amount of power delivered to the device (eg radiofrequency ablation in oncology or cardiac surgery the creation of geometry, setting of material properties and boundary conditions and, last but not least, the choice of differential equations, the method of		-		
area and the processing of results. The accuracy of the results obtained, the length of calculations and the computational power requirements are very				

model setting. The lectures cover the most common problems in electrical engineering, thermics, mechanics, chemistry, acoustics and fluid dynamics. The acquired knowledge will be

	tested by the students when designing individual parts of devices and devices.	
F7ABBMS	Modelling and Simulation Z,ZK	4
-	d consequences of modeling and simulation. The methodology of modeling and simulation. Inverse problem. Proposal for a new, respectively. tal models. Physiological models. Pharmacokinetics. Continuous and discrete models of population dynamics. Epidemiological models. Vene	
	models.	
F7ABBMT	Medical Terminology Z	1
	Jainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously informed about terr diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tests.	ns of whole
F7ABBMTB	Microprocessors in Biomedicine KZ	2
	nciples and building blocks of a microprocessor system, the structure of a microprocessor, the connection of basic peripherals, the programmer	
	the form of a practically oriented explanation and demonstration tasks. Provide a basic overview of ATMega and ARM Cortex M architectures	
	ming with examples of use in biomedicine. Prerequisites and co-requisites: basic knowledge of digital technology and signal processing, basi bilities and competencies: The student is familiar with the selection and design of microprocessor system solutions for use in biomedicine. It r	
	n control of these building blocks of the microprocessor system: digital inputs and outputs, A / D and D / A converters, serial and parallel com	•
counters and timers, interrup	pt controller. Understands the basics of communication of microcomputers with the environment: interfaces for LCD displays, keyboards, RS2	232, Ethernet,
	WIFI, Bluetooth, XBee and mobile 3G / 4G communication, GPS / GLONAS localization.	
F7ABBMVP	Research Methodology KZ Idents to the basic methods of research work and the requirements for scientific communication. The course also introduces students to the p	2
	writing and presenting of bachelor's thesis.	
F7ABBNMP	Project Proposal and Management KZ	2
	tion of terms project, program portfolio, project life cycle, project goal and benefits, triple imperative, project success assessment. Project idea	
	ose, content, processing), SMART objective, stakeholders. Project identification list, logical framework. Design of project structures, stakehold udget, changes, procurement and contractual relations, personnel management. Risk analysis and risk management, methods for risk analys	-
	ion of the current project status. information and documentation, communication. Leadership and motivation of people, negotiation and discussion	
	Project completion, final report.	
F7ABBOIZ	Protection Against Ionizing Radiation ZK	2
	give students an overview of the issues of protection against ionizing radiation and dosimetry in general and in a specialized medical workpla sic types of ionizing radiation, sources of ionizing radiation, interaction of gamma radiation with matter, interaction of charged particles with m	
	through the matter, units used in dosimetry and radiation protection, operational units for working and environment monitoring, dose measured	-
	simple sources. Special attention is paid to the exposure control of workers, residents and patients. In course students will give invormation about the sources are students will give invormation about the sources are students and patients.	
	its. Entry requirements of the course: Structure of matter, basic types of nuclear transformations. Properties of basic types of ionizing radiatio	
e e	n of gamma radiation with matter, interaction of charged particles with matter, passage of photon and electron beams through matter. Detecti , skills, abilities and competences: Units used in dosimetry and radiation protection. Principles and goals of radiation protection. Basic principles	° I
	adiation and protection against internal contamination. Dose limitation system, ionizing radiation in legislation of Czech Republic. Ionizing radi	-
	healthcare.	
F7ABBPMS	Probability and Mathematical Statistics Z,ZK	4
	·····	
	idents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: k	-
mathematics (linear algel	·····	bilities and
mathematics (linear algel competencies: The student is	udents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: k bra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Knowledge, skills, al s acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The student can apply the ise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of induc	bilities and ese definitions
mathematics (linear algel competencies: The student is to practical problems that ar	udents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: k bra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Knowledge, skills, al s acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The student can apply the rise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of induc and can choose a suitable method for standard statistical problems.	bilities and ese definitions ctive statistics
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mathematics (linear algeb competencies: The student is to practical problems that ar F7ABBPNK The aim of the practically o	udents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: k bra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Knowledge, skills, al s acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The student can apply the rise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of induc and can choose a suitable method for standard statistical problems.	bilities and ese definitions ctive statistics 4 of functional
mathematics (linear algel competencies: The student is to practical problems that ar F7ABBPNK   The aim of the practically o blocks and their design, sel documentation and board d	Idents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: K bra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Knowledge, skills, all s acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The student can apply the ise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of induce and can choose a suitable method for standard statistical problems. Design and Construction of Medical Devices/Practical Exercises KZ priented course is to acquaint students with the design process of the measuring part of the device, ie basic problem analysis, determination lection of suitable components and their values with emphasis on working with catalog sheets and application recommendations, preparation lesign, printed circuit board, its mounting, soldering and revitalization. During the course, students will implement a functional device (mountir	bilities and ese definitions ctive statistics 4 of functional of electrical ng, soldering,
mathematics (linear algel competencies: The student is to practical problems that ar F7ABBPNK   The aim of the practically of blocks and their design, sel documentation and board d recovery) electronic thermo	Indents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: A bra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Knowledge, skills, all s acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The student can apply the ise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of induce and can choose a suitable method for standard statistical problems.  Design and Construction of Medical Devices/Practical Exercises  KZ  referented course is to acquaint students with the design process of the measuring part of the device, ie basic problem analysis, determination is lection of suitable components and their values with emphasis on working with catalog sheets and application recommendations, preparation lesign. printed circuit board, its mounting, soldering and revitalization. During the course, students will implement a functional device (mountir meter, which will consist of two functional units - analog part for temperature measurement and signal conditioning (equipped with THT comp	bilities and ese definitions ctive statistics 4 of functional of electrical ng, soldering, ponents) and
mathematics (linear algel competencies: The student is to practical problems that ar F7ABBPNK   The aim of the practically of blocks and their design, sel documentation and board d recovery) electronic thermo display element with diode b	Indents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: A bra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Knowledge, skills, and s acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The student can apply the ise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of induce and can choose a suitable method for standard statistical problems.  Design and Construction of Medical Devices/Practical Exercises  KZ priented course is to acquaint students with the design process of the measuring part of the device, ie basic problem analysis, determination of lesign. printed circuit board, its mounting, soldering and revitalization. During the course, students will implement a functional device (mountir meter, which will consist of two functional units - analog part for temperature measurement and signal conditioning (equipped with THT comparison). For both products, students will implement the design of the diagram and PCB in the CAD environmeter.	bilities and ese definitions ctive statistics 4 of functional of electrical ng, soldering, conents) and ment EAGLE.
mathematics (linear algel competencies: The student is to practical problems that ar F7ABBPNK The aim of the practically of blocks and their design, sel documentation and board d recovery) electronic thermo display element with diode b In addition to the analog part	Indents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: A bra, differential and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Knowledge, skills, all s acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The student can apply the ise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of induce and can choose a suitable method for standard statistical problems.  Design and Construction of Medical Devices/Practical Exercises  KZ  referented course is to acquaint students with the design process of the measuring part of the device, ie basic problem analysis, determination is lection of suitable components and their values with emphasis on working with catalog sheets and application recommendations, preparation lesign. printed circuit board, its mounting, soldering and revitalization. During the course, students will implement a functional device (mountir meter, which will consist of two functional units - analog part for temperature measurement and signal conditioning (equipped with THT comp	bilities and ese definitions ctive statistics 4 of functional of electrical ng, soldering, conents) and ment EAGLE.
mathematics (linear algel competencies: The student is to practical problems that ar F7ABBPNK The aim of the practically of blocks and their design, sel documentation and board d recovery) electronic thermo display element with diode b In addition to the analog part The last pa F7ABBPP	Indents with the basic principles of the theory of probability and mathematical statistics. Pre-requisites and entry requirements of the course: It bits and integral calculus) in the range of F7PBBLAD and F7PBBITP courses taught in the first year of study. Knowledge, skills, and is acquainted with the probabilistic model, basic definitions of Kolmogorov theory of probability and inductive statistics. The student can apply the ise in other areas of professional work and can explain them sufficiently (e.g. doctors). The student is familiar with the basic methods of induce and can choose a suitable method for standard statistical problems.         Design and Construction of Medical Devices/Practical Exercises       KZ         oriented course is to acquaint students with the design process of the measuring part of the device, ie basic problem analysis, determination is leadin of suitable components and their values with emphasis on working with catalog sheets and application recommendations, preparation leading. printed circuit board, its mounting, soldering and revitalization. During the course, students will implement a functional device (mounting the device, an application for digitizing data from the analog device using NI-DAQ cards and a cheap solution with the help of Arduino will be i art will be a service intervention in the device (monitor of vital functions) with emphasis on safe handling and measurement of test points.	bilities and ese definitions ctive statistics 4 of functional no electrical ng, soldering, conents) and ment EAGLE. implemented. 2
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technicians and medical doctors, technicians and patients, technicians and nurses. Communication as a tool for good cooperation amongst people and an aid to interactions. Basic expression and communication skills. Use of elocution and gestures in personal expression. Verbal and nonverbal communication. Dialogue; types of dialogue, questions during

F7ABBSEL Power Engineering	Z,ZK	5
Basics of power electronics, power supplies, including electrochemical sources, rectifiers, stabilizers, the most commonly used types of motors, basics	of power distributio	n, types of
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. knov	vledge will
be verified on practical examples and in the laboratory.		
F7ABBSJ Scripting Languages	KZ	2
The aim of the course is to understand the topic of scripting languages and their applications, to understand their advantages and disadvantages and their applications, to understand their advantages and disadvantages and their applications.		
languages. Students will become familiar with regular expressions and tools for word processing. The course focuses on the scripting languages within t the scripting languages Python.	ne Unix operating	system and
	Z,ZK	4
F7ABBSM Sensors in Medicine This subject provides information about basic electronic devices - sensors, describes their operation principle, basic circuit configuration and applicatio	· · ·	-
clarifying of basic principles and practical utilization. Integral part of this course is basic information about sensors of non-electric quantities and their rea		-
sensors (force, pressure, torque, vibration, displacement, acceleration etc.) magnetic field sensors, temperature sensors, chemical sensors, optical sensor	•	
is aid on miniaturization, integration		
F7ABBSPR1 Semestral Project I.	KZ	1
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 Biomed	ical Technician. Th	e 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 b	ased 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	-	-
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	-	
F7ABBSPR2 Semestral Project II.	KZ	4
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- term, there are dedicated 2 hours every week for work under teacher supervising.	jects.ibmi.cvut.cz L	Juning the
F7ABBSPT Equipment for Anaesthesiology and Resuscitation	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 dep	· · ·	-
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.	271	,
F7ABBTEL 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	rical energy. Conne	ction of the
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, im	pedance
matching. Properties of circuits in time and frequency domain. Transient action in DC circuits, frequency characteristics of the L/C circuit. Electrical curr	ent in semiconduct	or, type of
the conductivity, creation of the semiconductor crossing, properties in the forward and reverse direction. Bipolar transistor - transistor effect, basic principle		-
transistor. Unipolar transistors with complementary vodivosti (CMOS). Electromagnetic effects (induction, magnetization, force effect). Electromagnetic vodivosti (CMOS).		
electromagnetic compatibility. Soft and hard magnetic materials. Transformers construction and parameters. Magnetic recording and reproduction of sig		
F7ABBTZS Tomographical Imaging Systems		
	Z,ZK	4
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F7ABOBP	Bachelor Thesis	Z	10		
Work of the student	t under the guidance of the supervisor and possible consultant on the assigned BP topic, using knowledge and skills from previous co	ourses and in the a	llotted time.		
Outcome knowledge, skills, abilities and competences: The student is able to work on the assigned topic in a defined format, in a defined time and is able to work under the guidance					
of the BP supervisor and also in a team. The student is able to use knowledge, skills and knowledge from previous courses to solve the assigned problem. This is a Bachelor's thesis,					
which is defended	in front of the HSS committee. This thesis is assessed by the supervisor and the opponent according to the ECTS grading scale. Sul	osequently, these e	valuations		
	and the result of the state final examination in the subject areas are included in one final evaluation.				
F7ABOBV	Binocular Vision	Z,ZK	7		
	on courses dealing with refraction of the eye and visual functions. Topics include: theory of binocular vision and conditions of its origin, de				
disorders of binocu	lar vision, practical examination of binocular vision, heterophoria and fixation disparity, relationship of accommodation and vergence, training.	vergence disorders	s and visual		
F7ABOKC1	Contact Lenses I.	Z,ZK	3		
	y and development. Contact lens terminology. Manufacturing methods. Classification of contact lenses and their materials. Material pro	operties. Contact le	ns designs.		
Different methods of	of contact lens wearing and replacement. Contact lens care: composition and principles of action. Indications and contraindications of	contact lenses. Sp	herical soft		
and rigid lenses. In	strumentation of contact lens practice. Patient history, basic examination and contact lens selection. Instructions regarding handling a	and contact lens ca	re. Contact		
	lens insertion and removal.				
F7ABOKC2	Contact Lenses II.	Z,ZK	5		
Toric contact lenses	s, Bifocal and multifocal lenses and other methods of presbyopia correction. Contact lenses for children. Coloured, cosmetic and prosthe	tic contact lenses.	Therapeutic		
use of contact lens	ses. Special types of contact lenses. Special uses of contact lenses (sports, demanding occupations and environments, patients with	general diseases,	etc.). Drug		
interactions with o	contact lenses. Complications of contact lenses and their solutions. Application of soft and rigid spherical lenses. Application of conta-	ct lenses in astigma	atism and		
	presbyopia. Basic and specific care of contact lenses. Inspection of patients with contact lenses.				
F7ABOKRV	Correction of Refractive Errors	ZK	1		
,	on theory and practical examination of refractive errors and various possibilities of correction of refractive errors. Optical and surgical				
	of refraction. Subjective methods of refraction. Correction of myopia. Correction of hypermetropia. Correction of astigmatism. Correction				
	ance. Basic techniques of surgical correction of refractive errors. Refractive surgery. Methods of laser keratorefractive surgery. Implan				
F7ABOOFP	Opthalmology Instruments	ZK	3		
	oles of different diagnostic and therapeutic ophthalmic devices will be discussed. Students will be able to test most of machines during				
-	rview, physical principles, technical construction and parameters of following devices and methods will be studied: slit lamp, ophthalm				
	, retinoscope, refractometer, tonometer, campimeter, Heidelberg retinal tomograph, optical coherence tomography, retinal nerve fibre				
(endotriellar) micros	cope, devices for subjective investigation of astigmatism, devices for investigation of ocular movements, corneal topohraphs, testing of re POLA-test, ortopic machines, Hertel exophthalmometer, devices for color vision testing.	aractive balance, el	ikonometer,		
		Z,ZK	-		
F7ABOOGB	Geometric and Opthalmic Optics	· · ·	5		
	s on basics of geometrical optics and its applications in the field of optical design of simple optical elements and systems (lenses, mir of the course deals with a description and analysis of a human eye as an optical imaging system. The design and analysis of various	-			
The second part of	correction of refraction errors is presented.c	types of speciacie			
F7ABOPO	OPT Project	KZ	5		
	DURT FIDJECL DURSE is methodical guidance of students in scientific research or development activities in the field of Optics, Optometry or Ophthalm		-		
	of the project, which will lead to the final Bachelor's Thesis (BP). The secondary objective of the course is to guide students in the syst				
	assigned task, applying the practices of the field to the tasks or projects solved by the students, as well as deepening the communica		-		
	but not least, deepening the knowledge of typographic rules, including proofreading marks, etc.		aomo. Laor		
F7ABOSUR1	Subjective Refraction I.	Z,ZK	4		
	ledges about refraction of the eye. Techniques of the subjective refraction perform testing frame or the phoropter. Techniques of the eye	· · ·			
F7ABOSUR2	Subjective Refraction II.	Z.ZK	4		
	es, students deepen their theoretical knowledge and practical skills of subjective refraction with the test frames and test sets of glasse	, ,	-		
During the lootare	binocular balance, practice working with phoropter and other techniques.				
F7ABOZFO	Foundations of Physiological Optics	ZK	2		
	ptical imaging. Physiological structure of human eye, its geometric and physical properties. Visual perception. Sensitivity of eye. Optic				
	chematic optical models of human eye. Photometric parameters of optical system of eye. Accommodation and aging of eye. Monochrom				
of human eye. Resolving power and depth of field. Influence of aberrations on image quality. Contrast sensitivity. Ametropy. Astigmatism. Aphakia. Amblyopy. Physiology of eye					
movement, methods of eve tracking. Basic principles of binocular and stereoscopic vision.					

For updated information see <u>http://bilakniha.cvut.cz/en/FF.html</u> Generated: day 2024-05-19, time 13:59.