Recomended pass through the study plan

Name of the pass: Optics and Optometry 16/17, 17/18,18/19, 19/20, 20/21

Faculty/Institute/Others:
Department:
Pass through the study plan: Optics and Optometry - full-time
Branch of study guranteed by the department: Welcome page
Guarantor of the study branch:
Program of study: Biomedical and Clinical Technology
Type of study: Bachelor full-time
Note on the pass: Informaci o předepsaném minimálním počtu PV předmětů pro konkrétní jednotlivé semestry najdete v odpovídajícím studijním plánu oboru.

Coding of roles of courses and groups of courses:
P - compulsory courses of the program, PO - compulsory courses of the branch, Z - compulsory courses, S - compulsory elective courses, PV - compulsory elective courses, F - elective specialized courses, V - elective courses, T - physical training courses

Coding of ways of completion of courses (KZ/Z/ZK) and coding of semesters (Z/L):
KZ - graded assesment, Z - assesment, ZK - examination, L - summer semester, Z - winter semester

Number of semester: 1

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
17PBOAF1	**Anatomy and Physiology I**	Z,ZK	5	2P+2S	Z	z
17PBOAFPO	**Anatomy, Physiology and General and Special Pathology of Eye**	ZK	2	2P	Z	z
17BOZP	**Occupational Safety and Health, Fire Protection and First Aid** *Petr Kudrna **Petr Kudrna** Petr Kudrna (Gar.)*	Z	0	1P	Z	z
17PBOBLG	**Biology** ***Veronika Vymětalová***	Z,ZK	5	2P+2L	Z	z
17PBOFYZ	**Physics** ***Petr Písařík***	Z,ZK	5	2P+2S	Z	z
17PBOHO	**General Histology and Histology of Eye**	KZ	2	1P+1S	Z	z
17PBOITT	**Information Technologies and Telemedicine**	KZ	3	2P+0C	Z	z
17PBOLTR	**Medical Terminology**	Z	1	1P	Z	z
17PBOMA1	**Mathematics I**	Z,ZK	5	2P+2C	Z	z
17PBOPSL	**Psychology**	KZ	2	1P+1S	Z	z

Number of semester: 2

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
17PBOAF2	**Anatomy and Physiology II**	Z,ZK	5	2P+2S	L	z
17PBOCHMO	**Chemistry for Optics and Optometry**	Z,ZK	2	2P+1L	L	z
17PBOFO	**Pharmacology of Eye** ***Ján Lešťák***	Z	2	1P	L	z
17PBOMA2	**Mathematics II** ***Jana Urzová***	Z,ZK	5	2P+2C	L	z
17PBOOP1	**Optical Laboratory I.** ***Jakub Král***	KZ	2	2L	L	z
17PBOOGB	**Geometric and Opthalmic Optics** ***Jiří Novák***	Z,ZK	6	3P+2C	L	z
17PBOPPA	**First Aid**	KZ	2	1P+1S	L	z
17PBOSTA	**Statistics**	KZ	2	1P+1S	L	z
17PBOZFOA	**Foundations of Physiological Optics** ***Jiří Novák***	ZK	2	2P	L	z
17PBOZPE	**Fundamentals of Pedagogy and Education**	KZ	2	1P+1C	L	z

Number of semester: 3

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
17PBOBCHA	**Biochemistry**	Z,ZK	3	2P+1C	Z	z
17PBOBT	**Spectacles Technology** ***Petr Písařík***	Z,ZK	6	2P+4S	Z	z
17PBOMCHA	**Macromolecular Chemistry** ***Jiří Michálek***	Z,ZK	2	1P+1S	Z	z
17PBONRA	**Clinical Refraction** ***Jiří Novák***	ZK	2	1P	Z	z
17PBOOFP	**Opthalmology Instruments** ***Jiří Novák***	KZ	3	3P	Z	z
17PBOOK1	**Opthalmology - Pathology, Clinic I.** ***Šárka Pitrová***	Z,ZK	5	2P+2S	Z	z
17PBOOF	**Physical Optics** ***Petr Písařík***	Z,ZK	4	2P+2L	Z	z
17PBOSUR1	**Subjective Refraction I.** ***Jakub Král***	Z,ZK	3	2P+2C	Z	z
17PBOVZF	**Diagnostic of Visual Functions** ***Jakub Král***	KZ	2	1P+1S	Z	z

Number of semester: 4

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
17PBOGMB	**Genetics and Molecular Biology** ***Veronika Vymětalová***	Z,ZK	5	2P+2L	L	z
17PBOKC1A	**Contact Lenses and Practice I.** ***Markéta Žáková***	Z,ZK	5	2P+2S	L	z
17PBOKRVA	**Correction of Refractive Errors** ***Ján Lešťák***	KZ	2	1P	L	z
17PBONMP	**Proposal and Management of Project** ***Marie Pospíšilová***	KZ	2	1P+1S	L	z
17PBOOK2	**Opthalmology - Patology, Clinic II.** ***Šárka Pitrová***	Z,ZK	5	2P+2S	L	z
17PBOOP2	**Optical Laboratory II.** ***Jakub Král***	KZ	2	2L	L	z
17PBOSUR2A	**Subjective Refraction II.** ***Přemysl Kučera***	Z,ZK	7	2P+4C	L	z
17PBOBS	**Biological Signals**	KZ	2	2P	L	s
17PBOBUI	**Biological Effects of Ionizing Radiation**	KZ	2	2P	L	s
17PBOHE	**Hygiene and Epidemiology**	KZ	2	2P	L	s
17PBOPPV	**Psychology of Sales and Management Staff** ***Přemysl Kučera***	KZ	2	2P	L	s

Number of semester: 5

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
17PBOBZOA	**Binocular Vision, Orthoptics** *Přemysl Kučera* ***Přemysl Kučera***	Z,ZK	7	2P+4S	Z	z
17PBOKC2A	**Contact Lenses and Practice II.** ***Markéta Žáková***	Z,ZK	5	2P+2S	Z	z
17PBOMVV	**Metodology of Research** ***Petr Písařík***	KZ	2	1P+1C	Z	z
17PBOPZP	**Problems of Persons with Visual Impairment**	KZ	2	1P+1S	Z	z
17PBOSOP	**Special Visual Aids**	Z,ZK	3	1P+1S	Z	z
17PBOSRBA	**Strabology** *Věra Lehká* ***Věra Lehká*** *Věra Lehká (Gar.)*	KZ	2	1P+1C	Z	z
17PBOTPR	**Team Project** *Přemysl Kučera, Petr Písařík, Ondřej Policar, Iva Klimešová, Jiří Novák, Martin Fůs, Michal Vymyslický, Eliška Palkovičová, Petra Srovnalová, ...* ***Petr Písařík*** *Petr Písařík (Gar.)*	KZ	5	4S	Z	z
17PBOBFT	**Biophotonics** ***Petr Písařík***	KZ	2	2P	Z	s
17PBOOVP	**Optometry in Practice** ***Markéta Žáková***	KZ	2	2P	Z	s

17PBOPOZ	**Care for Persons with Visual Impairment**	KZ	2	2P	Z	S

Number of semester: 6

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
17PBOBP	**Bachelor Thesis** *Přemysl Kučera, Petr Písařík, Ondřej Policar, Iva Klimešová, Martin Fůs, Eliška Palkovičová, Gabriela Mahelková, Jiří Cendelín, Ján Lešťák, ...* ***Petr Písařík*** *Petr Písařík (Gar.)*	Z	10	8S	L	Z
17PBOEVO	**Economy and Management**	KZ	2	1P+1S	L	Z
17PBOKC3A	**Contact Lenses and Practice III.** ***Markéta Žáková***	KZ	3	2S	L	Z
17PBOMAZ	**Management and Administration in Healthcare**	KZ	2	2P	L	Z
17PBOMI	**Microbiology and Imunology** *Veronika Vymětalová, Christiane Malá* ***Veronika Vymětalová*** *Veronika Vymětalová (Gar.)*	KZ	3	1P+1L	L	Z
17PBOOMPA	**Practical Excercises in Optometry** *Markéta Žáková* ***Markéta Žáková*** *Markéta Žáková (Gar.)*	KZ	8	6L	L	Z
17PBOMMD	**Modern Methods for Diagnostics and Correction of Eye** ***Jiří Novák***	KZ	2	2P	L	S
17PBOZE	**Medical Ethics**	KZ	2	2P	L	S
17PBOZLN	**Medical Legislation and Standards**	KZ	2	1P+1C	L	S

List of groups of courses of this pass with the complete content of members of individual groups

List of courses of this pass:

Code	Name of the course	Completion	Credits
17BOZP	Occupational Safety and Health, Fire Protection and First Aid	Z	0
17PBOAF1	Anatomy and Physiology I	Z,ZK	5
	The combined subject of anatomy and physiology is the introductory course of medical subjects for non-medical specialties.		
17PBOAF2	Anatomy and Physiology II	Z,ZK	5
	Anatomy and physiology II links to Anatomy and Physiology I. The subject covers functional aspects of particular organs and their systems.		
17PBOAFPO	Anatomy, Physiology and General and Special Pathology of Eye	ZK	2
	Introduction to pathology: definitions, goals, history, illnesses, symptoms. Etiology and pathogenesis of the disease on the organ, tissue, cellular and molecular level. External factors contributing to the emergence and development of disease. Pathogenic stimuli. Wound healing. Inflammation and tissue damage as a defensive phenomenon. Circulation disorders, atrophy, necrosis, tumors. Specific signs of pathological changes in the central nervous system, the eye, and the optical path.		
17PBOBCHA	Biochemistry	Z,ZK	3
	Cell compartments structure and functions. Protein structure and function. Enzymes as catalysts. Bioenergetics. Biological oxidation. Biogenic amines. Hormones biochemistry, hormonal regulation. Biologicaly significant radicals. Metabolism of sacharides, lipids and lipoproteins, amino-acids, proteins, nucleotides and nucleic acids. Regulation of metabolism on a cell and organ level. Biochemistry of the intestinal tract, pancreas, biochemistry of liver and xenobotics metabolism. Biochemistry of kidneys. Biochemistry of tetrapyrols and porfyrins. Biochemistry of muscles, bones. Biochemistry of nervous system. Biochemistry of blood, hemocoagulation process and fibrinolisys. Metabolism of body fluids and ions, acidobasic balance.		
17PBOBFT	Biophotonics	KZ	2
	Overview of principles and applications in the interdisciplinary sphere, connecting physics, optics and biology. Interaction of laser radiation with matter, interaction of radiation with tissue, biology basics, photobiology, bioimaging, basics of lasers, laser safety, optical biosensors, photodynamical therapy, optical manipulation with cells, nanotechnology for biophotonics, biomaterials for photonics.		
17PBOBLG	Biology	Z,ZK	5
	Basic information about the cellular level of organisms - from acelullar through prokaryotic to eukaryotic, endosymbiotic hypothesis. Structure and conformation of biopolymers (nucleid acids and proteins). Prokaryotic cells. Eukaryotic cells. Plant and animal cell structure and function. The nucleus, chemistry and structure of chromatin and chromosomes. Cytoplasm. Endomembrane system: endoplasmic reticulum, the Golgi apparatus, lysosomes, microbodies (glyoxisomes, peroxisomes), vacuoles. Semiautonomic organelles: mitochondria, sites of respiration and chloroplasts, sites of photosynthesis. The origin of eukaryotes: endosymbiotic hypothesis. Ribosomes. The cytoskeleton: microtubules, microfilaments. The cell cycle: mitotic (M) phase and interphase (G1, 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. Fundamentals of virology. Viruses - structure, life cycle and molecular biology. Viral genome.		
17PBOBP	Bachelor Thesis	Z	10
	Individual student projects at the end of bachelor studies. Topics are selected during the 5th term from a list. Bachelor thesis is defended at the end of the examination period. Bachelor thesis defence is a part of the state exam. Bachelor thesis can be written and defended either Czech or English. Students are supervised by a tutor during the above mentioned process.		

17PBOBS	Biological Signals	KZ	2
The subject deals with origins and description of the most important electric and non-electric biological signals. The principles of generation, recording and basic properties are studied in all the signals. The studied signals involve native and evoked biosignals, including biological signals of the heart, brain, muscles, nervous system, auditory signals, visual system, signals from the gastro-intestinal system etc. Advanced methods of digital biosignal processing,spectrum analysis, modern methods of artificial intelligence, features extraction, automatic classification, graphic presentation of results. Adaptive segmentation, artificial neural networks for signal procesing.			
17PBOBT	Spectacles Technology	Z,ZK	6
Subject Spectacle Technology introduces students to technology and materials used in the production of glasses and their individual components. Students will learn about the materials used in spectacle optics - their composition, chemical and technological properties, processing characteristics, behavior under various conditions and machining properties. Furthermore, the properties and conditions of technological processes used for processing these materials into different functional parts of spectacles - spectacle lenses and frames. In the practical part of the exercise, students will performe practical glasses production.			
17PBOBUI	Biological Effects of Ionizing Radiation	KZ	2
The lectures will give an overview of basic radiation biology. Students will become familiar with the biological effects of ionizing radiation: the physical and chemical processes by which radiation causes damage to the biological material; mechanisms of radiation action on the DNA and other constituents of the cell; types of damage and their repair; subcellular and cellular sensitivity and radiation response; physical, chemical and biological modifiers of radiation action; theories and models of cellular survival; and radiation biology of normal and neoplastic tissues.			
17PBOBZOA	Binocular Vision, Orthoptics	Z,ZK	7
Binocular vision conditions. Strabismus - extraocular muscles. Heterophoria, heterotrophia. Developments of binocular movement, binocular vision. Anomalous retinal correspondence, eccentric fixation. Determination of angle of deviation. Goals of treatment. Principles of therapy of strabismus - use of prisms, decentration of glasses. Pleoptics, orthoptics.			
17PBOCHMO	Chemistry for Optics and Optometry	Z,ZK	2
Students will learn the basic areas of applied chemistry, organic chemistry, polymer chemistry and macromolecular chemistry in biomedical engineering.			
17PBOEVO	Economy and Management	KZ	2
The subject presents basic economic terms, legal forms of entrepreneurship, founding budget, costs and their structure. Main contents of the subject are the problematics of accounting statements (P&L, balance sheet, cash flow). The subject also deals with competition analysis, financial analysis, product life-cycle, price strategy and the tax system.			
17PBOFO	Pharmacology of Eye	Z	2
Pharmacokinetics of drugs into the eye, application of drugs, the therapeutic effect and side effects. The most commonly used drugs.			
17PBOFYZ	Physics	Z,ZK	5
Physics course will allow students to acquire and strengthen knowledge in these branches of physics: mechanics, thermodynamics, alectromagnetic field and solid state physics. We focus on solid theoretical bases, but independent work in student labs as well as solving practical examples are also important parts of the course. Through the course we also touch the limits of the classical Physics.			
17PBOGMB	Genetics and Molecular Biology	Z,ZK	5
General genetics: basic genetic expressions. Genotypes and Phenotypes. Mendel´s theory of inheritance. Basis of clinical genetics: heredity of genetic diseases, monogenic autosomal and gonosomal heredity and monogenic autosomal and gonosomal hereditary dominant and recessive disorders, polygenic heredity, examples of hereditary diseases. Mutagenesis: types of mutations and mutations consequences, physical, chemical and biological mutagens. Carcinogenesis, cell cycle regulation, protooncogens, tumor suppressor genes, chromosomal changes in tumors. Clinical cytogenetics. Inborn chromosomal abnormalities numerical and structural, causes of chromosomal abnormalities origin, examples of the most frequent chromosomal abnormalities. Immunogenetics, heredity of blood groups. Prenatal cytogenetic diagnosis - methods, indications, ethic problems in genetics. Molecular cytogenetics, hybridization in situ. Methods in Assisted Reproduction Technology. Molecular biology. Genetic Engineering. DNA cloning. Gene therapy.			
17PBOHE	Hygiene and Epidemiology	KZ	2
The student will become familiar with the work methods used in the field of epidemiology of communicable diseases, as well as in environmental epidemiology, disease and non-infectious origins in solving a number of priorities for public health.			
17PBOHO	General Histology and Histology of Eye	KZ	2
Basics of processing samples for histological examination. Basics of cytology, general histology and microscopic anatomy. Development of eye in human embryo. Histological structure of eye and its accessory structures.			
17PBOITT	Information Technologies and Telemedicine	KZ	3
Computer history, structure of computers, motherboard, processors, memody, graphical card, computer buses, BIOS, I/O devices, server, desktop, notebook, pocket PC, data storage, mobile devices, memory card, OS, tasks and memory management, printers scanner, multimedial devices, mass data storage, multitasking, multiprocessoring, set of instruction, assembler, programming languages, power test, network, LAN, WAN, interner, TCP/IP, HTTP, FTP etc., client-server, gate, router, using IT in medicine and telemedicine.			
17PBOKC1A	Contact Lenses and Practice I.	Z,ZK	5
Contact lens history and development. Contact lens terminology. Manufacturing methods. Classification of contact lenses and their materials. Material properties. Contact lens designs. Different methods of contact lens wearing and replacement. Contact lens care: composition and principles of action. Indications and contraindications of contact lenses. Spherical soft and rigid lenses. Instrumentation of contact lens practice. Patient history, basic examination and contact lens selection. Instructions regarding handling and contact lens care. Contact lens insertion and removal.			
17PBOKC2A	Contact Lenses and Practice II.	Z,ZK	5
Toric contact lenses. Bifocal and multifocal lenses and other methods of presbyopic correction. Contact lenses in children. Tinted, cosmetic and prosthetic lenses. Therapeutic use of contact lenses. Special types of contact lenses. Contact lenses wearing under special conditions (sport, challenging occupations and environments, diseases, etc.). Drugs interaction with contact lens wearing. Contact lens complications and their management. Spherical soft and rigid lens fitting. Contact lens fitting in astigmatism and presbyopia. Aplication of RGP lenses. Basic and specific contact lens care. Follow up examinations of contact lens patients.			
17PBOKC3A	Contact Lenses and Practice III.	KZ	3
Contact lens fitting in irregular astigmatism. Contact lens and children. Contact lens fitting after surgical procedures. Refractive surgery and contact lenses. Fitting of tinted, cosmetic and prosthetic lenses. Contact lens complications and their management. Recent advances in contact lenses. Contact lens practice management.			
17PBOKRVA	Correction of Refractive Errors	KZ	2
Subject is focused on theory and practical examination of refractive errors and various possibilities of correction of refractive errors. Optical and surgical correction of refractive errors. Objective methods of refraction. Subjective methods of refraction. Correction of myopia. Correction of hypermetropia. Correction of astigmatism. Correction of presbyopia. Determination of binocular balance. Basic techniques of surgical correction of refractive errors. Refractive surgery. Methods of laser keratorefractive surgery. Implantation of intraocular lenses.			
17PBOLTR	Medical Terminology	Z	1
Attendants are made acquainted with particular terms flowing from latin but also greek expressions during their lectures. Students are continuously informed about terms of whole diagnosis and therapeutical procedures. Education is combined with continuous knowlegde check up through the use of tests.			
17PBOMA1	Mathematics I	Z,ZK	5
The subject is an introduction to differential calculus, linear algebra, and applications in analytical geometry . Differential calculus: intro to sets of numbers (natural, rational, irrational), sequences of real numbers (bounded, unbounded, monotonous, convergent, divergent), real-valued functions of one independent real variable (injective, monotonous, continuous, differentiable), inverse functions, differential of a function, Taylor polynomials, number series. Linear algebra: intro to solving linear algebraic systems of equations (LAES), Gaussian elimination algorithm for solving LAES, intro to vector spaces (linear combination of vectors, linear dependence/independence of a set of vectors, basis and dimension of a vector			

space), intro to matrix algebra (matrix operations, rank of a matrix, determinant and methods of calculation, matrix inverse, eigenvalues and eigenvectors of a matrix). Conic sections (parabola, circle, ellipse, hyperbola)and quadric surfaces(paraboloid, ellipsoid, hyperboloid).

17PBOMA2	Mathematics II	Z,ZK	5

The subject is an introduction to integral calculus and integral transforms. Integral calculus: definition of an indefinite integral, properties and methods of integration (integration by substitution, integration by parts, partial fractions), definite integral, properties, Newton-Leibnitz fundamental theorem, simple applications of both indefinite and definite integrals, improper integral, solving differential equations (ODEs) (1st order ODEs with separable variables, linear 1st order homogenous as well as non-homogenous ODEs, 2nd order linear ODEs homogenous and non-homogenous with constant coefficients),intro to multiple integrals, particularly applications of double integral. Integral transforms: Laplace transform - definition and properties, inverse Laplace transform, application of Laplace transform for solving nth order linear ODEs with constant coefficients, Z-transform - definition and properties, inverse Z-transform, application of Z-transform for solving nth order linear difference equations.

17PBOMAZ	Management and Administration in Healthcare	KZ	2
17PBOMCHA	Macromolecular Chemistry	Z,ZK	2

Fundamentals of macromolecular chemistry with respect to materials for contact and spectacle lenses. Common types of polymers and their structure elements. Types of polymerization. Copolymerization. Graft and block copolmers. Polymer gels. Rubber elasticity. Hydrogels. Polysiloxans. Siliconhydrogels. Properties of hydrogels. Applications of hydrogels in engineering and medicine. Polymeranalogical reactions. ?Subsidiary? polymers. Polymers for spectacle lenses.

17PBOMI	Microbiology and Imunology	KZ	3

Microbiology: Organization and function in microbial cell. Procaryotic cell, binary fission. Phylogenetic system of bacteria and archea. Cyanobacteria. Microbial nutrition, microbial growth - life cycle of procaryotic cell, growth curve, kinetics of bacterial growth. Influence of environmental factors on microbial growth - temperature, pH, extreme environment. Antimicrobial, antibacterial agents - antibiotics and mechanisms of their effect, dezinfection and sterilization. Energetic metabolism. Genetics and molecular biology of microorganisms. Microflora of human body. Microbial diseases and their control. Immunology: Cells and organs of the immune system. Antigens. Immune reaction. Main histocompatibility complex. B-lymphocytes. Production of immunoglobulins. Immunoglobulins, function and structure. T-lymphocytes and cellular immunity. Cytotoxic lymphocytes. Cytokines. Immunity against infection. Non-specific immunity. Allergic diseases. Immunity and nutrition. Immunopathology. Immunodeficiency. Autoimmune diseases.

17PBOMMD	Modern Methods for Diagnostics and Correction of Eye	KZ	2

Principles, present and future applications of modern methods for diagnostics of a human eye and correction of aberrations of an eye. Techniques of measurement of aberrations and geometric parameters of the eye, analysis of an influence of aberrations on vision and possibilities to apply these factors into the design of ophthalmic correction tools. Analysis of an influence of the cornea on optical properties and aberrations of an eye, possibilities of anterior segment analysis and its application for the correction of the eye. Trends in the development of ophthalmic corrective tools, methods and instruments for a superior diagnostics and analysis of properties of the eye.

17PBOMVV	Metodology of Research	KZ	2

Science, character of scientific work and its goals. Basic terminology (hypothesis, rule of law, theory, model). Information portfolio, information searching using information technologies. Experiments in medicine. Measurement process and its evaluation. Use of methods of sociology and psychology. Project proposal, structure of scientific work, defense of scientific work. Searching on internet, in library catalogues, and in bibliographic systems. The content of lectures will be directed to the actual preparation of ppt presentations and written form and content of the project and bachelor's thesis.

17PBONMP	Proposal and Management of Project	KZ	2

The project as a coordinated effort by a group of people, its types and stages of project design, SWOT analysis. Requirements for individual types of projects, documentation, financing and management. Project management, organization, coordination and implementation of the project. Presentation of the project. Team management project. The project and its leadership. Determination of team types. Communication within the team and between managers and subordinates. Leadership workshops. Motivation. The system of grant agencies in the country. Getting project abroad. Bachelor thesis as a project. Possibilities of software products for the design and management of the project

17PBONRA	Clinical Refraction	ZK	2

Description and theory of causes and occurrence of refractive errors. Optical system of eye (schematic and reduced eye model, retinal image, visual acuity). Clinical anomalies - refraction errors (hyperopia, myopia, astigmatism, presbyopia, aphakia). Occurrence and frequency of refractive errors. Causes of refractive errors. Accommodation and its changes. Presbyopia, anisometropia, aniseikonia. Measurement of refractive errors.

17PBOOF	Physical Optics	Z,ZK	4

Physical optics and its application in engineering and optometry. Fundamentals of wave optics (interference, diffraction, polarization, absorption, dispersion, reflectivity) with applications in instruments and optometry. Fundamental of photon theory of light. Photoelectric effect. Photodetectors. Light sources. Luminiscence. Fundamentals of lasers and their applications in optometry and ophthalmology. The laboratory excersises focus on selected optical measuring methods, regarding geometric and wave optics. Measurements relating to the basic characteristics of optical materials, parameters of optical elements and systems will be taken.

17PBOOFP	Opthalmology Instruments	KZ	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), specular (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.

17PBOOGB	Geometric and Opthalmic Optics	Z,ZK	6

This course focuses on basics of geometrical optics and its applications in the field of optical design of simple optical elements and systems (lenses, mirrors, prisms, telescopes, etc.). The second part of the course deals with a description and analysis of a human eye as an optical imaging system. The design and analysis of various types of spectacle lenses for correction of refraction errors is presented.

17PBOOK1	Opthalmology - Pathology, Clinic I.	Z,ZK	5
17PBOOK2	Opthalmology - Patology, Clinic II.	Z,ZK	5

Vitreous. Diseases and therapy of the retina. Glaucoma. Genetic aspects in ophthalmology. Congenital eye defects. Special subjects of pediatric interest. Ocular disorders associated with systemic diseases. Eye and bussines, sport and traffic.

17PBOOMPA	Practical Excercises in Optometry	KZ	8

Optometric practice of students in specialized institutions and optical shops.

17PBOOP1	Optical Laboratory I.	KZ	2

Practical course where students will learn the basics of spectacle lens and frames applications with respect to refractive status of the eye and practical needs of a customer. They will also practice the technology (cutting, grinding, edging, polishing) of spectacle lenses processing, centering the lens, bevelling the lens into frames and adjusting the spectacle frames. The course makes possible to apply theoretical knowledge from opthalmic optics in practice.

17PBOOP2	Optical Laboratory II.	KZ	2

Practical course where students will learn the fundamental methods for practical dispensing of individual spectacle lenses. Students will practice the methods for measuring individual parameters of a client and of individual spectacle lenses processing. Dispensing progressive and degressive spectacle lenses. The course makes possible to apply theoretical knowledge from opthalmic optics in practice.

17PBOOVP	Optometry in Practice	KZ	2

Systems of the vision care around the world.The role of the optometrist in the Czech republic and the Europe. Documents related to job of optometrist. Profession of optometrist, eye doctor, optic,visual therapist and their cooperation.Optometry equipment in practis.Additional education of optometrists.Association of optometrists.

17PBOPOZ	Care for Persons with Visual Impairment	KZ	2
Persons with severe visual impairment. Classification of vision impairment in Czech Republic. Legal and total blindness. Deaf-blind persons. Practical demonstration of usage of optical, non-optical and electronic devices for people with visual impairment. Excursion to organizations, which care about people with visual impairment.			
17PBOPPA	First Aid	KZ	2
The course gives a brief overview of the main principles and procedures for providing emergency assistance, with special attention to the failure of basic life functions and immediately life-threatening conditions. At the same time also discussed the situation of disabled mass even under conditions, including the phenomenon of CBRN. After successful completion of this course the student should be able to diagnose the failure of basic dependen-life functions, identify conditions of immediate danger to life, to perform basic resuscitation and urgent to provide urgent first aid.			
17PBOPPV	Psychology of Sales and Management Staff	KZ	2
Process of sale, its preparation and structure. Sellers and consumers (clients). Strategy and tactics of selling. Types of negotiation with a client (consumer). Reaction on problematic clients. Types of strategies for offering products. Selection of new employees. Training, operational and social adaptation of new staff. Personal leadership.			
17PBOPSL	Psychology	KZ	2
Development, methodology and method of psychology. Mental activities and psychic processes, psychology of personality, object of psychology and their formation and development. Modern psychology its concept and theory, psychic processes and stages. Psychological interpretation of personality. Application of knowledge in medical situations. Relation between technician and medical doctor, technician and patient, technician and nurse. Communication as a tool for good cooperation amongst people and helps in interactions with them. Basic expression and communication skills. Use of elocution and gestures in personal expression. Verbal and nonverbal communication. Dialogs, types of dialogs, questions during dialog. Model situations. Communication process as part of economics - components, tools and functions.			
17PBOPZP	Problems of Persons with Visual Impairment	KZ	2
Education and training - integration. Social and legal problems. Psychological care for persons with visual impairment. Organizations of seriously vision handicapped people. Optic and electronic compensatory tools (camera magnifiers, digital magnifiers). Non-optical compensatory tools (white cane, indicators of light and surface, thermometer with speaker, guide dogs, etc.), environmental adaptations for persons with visual impairment. Rehabilitation of persons with vision handicap. System of training in using special optical aids, training in using electronic special devices for persons with visual impairment.			
17PBOSOP	Special Visual Aids	Z,ZK	3
Degrees of visual impairment - low vision, legal blindness, total blindness. Possibilities of compensation of severe visual impairment. Types of compensatory devices. Optical compensatory devices for near vision (hypercorrection, magnifiers, hyperocular lenses) and distance vision (telescopic systems - Galilei, Kepler). Electronic compensatory tools (camera magnifiers, digital magnifiers). System for prescription of special optical devices. System of funding with Health Insurance.			
17PBOSRBA	Strabology	KZ	2
Strabismus - binocular viewing conditions: definitions, motor and sensory aspects. Examination, classification of strabismus. Heterophoria, heterotrophia. Nonparetic and paretic strabismus, accomodative strabismus. Amblyopia, Principles of therapy of strabismus - timing, medical treatment, surgical treatment.			
17PBOSTA	Statistics	KZ	2
Students learn basic priciples of research methodology, data collection, formulation of hypotheses and evaluation of results. Fundamental statistical methods, their usage and interpretation. Individual lectures focus on random variables, their distributions, characteristics, transformations, population and sample, estimation of parameters and testing hypotheses.			
17PBOSUR1	Subjective Refraction I.	Z,ZK	3
Basic knowledges about refraction of the eye. Techniques of the subjective refraction perform testing frame or the phoropter.Techniques of the examination near vision.			
17PBOSUR2A	Subjective Refraction II.	Z,ZK	7
During the lectures, students deepen their theoretical knowledge and practical skills of subjective refraction with the test frames and test sets of glasses. Further tests will follow on binocular balance, practice working with phoropter and other techniques.			
17PBOTPR	Team 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. Last but not least, deepening the knowledge of typographic rules, including proofreading marks, etc.			
17PBOVZF	Diagnostic of Visual Functions	KZ	2
Physiology and principles of testing of following will be discussed: vision, stereoscopy, visual field, central and peripheral vision, contrast sensitivity, dark adaptation, pupillary reactions, accommodation, eye movements, double vision, binocular vision, tear film, electrophysilogical methods.			
17PBOZE	Medical Ethics	KZ	2
The course introduces students to basic ethical issues in applied ethics due to a future career orientation. It develops students' ability to think in ethical contexts, discuss, argue and defend their views in ethical dilemma situations which brings medical environment.			
17PBOZFOA	Foundations of Physiological Optics	ZK	2
Fundamentals of optical imaging. Physiological structure of human eye, its geometric and physical properties. Visual perception. Sensitivity of eye. Optical system of human eye. Axes and pupils of eye. Schematic optical models of human eye. Photometric parameters of optical system of eye. Accommodation and aging of eye. Monochromatic and chromatic aberrations 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 eye tracking. Basic principles of binocular and stereoscopic vision.			
17PBOZLN	Medical Legislation and Standards	KZ	2
17PBOZPE	Fundamentals of Pedagogy and Education	KZ	2
Education as a scientific discipline, basic educational categories and their interrelationships. After completing the lessons, the student should understand the methods of general and special education.			

For updated information see http://bilakniha.cvut.cz/en/FF.html
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