Study plan

Name of study plan: Optics and Optometry

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Optics and Optometry
Type of study: Bachelor full-time
Required credits: 180
Elective courses credits: 0
Sum of credits in the plan: 180
Note on the plan:

Name of the block: Compulsory courses
Minimal number of credits of the block: 180
The role of the block: Z

Code of the group: F7PBO POV 21
Name of the group: Optics and Optometry
Requirement credits in the group: In this group you have to gain 180 credits
Requirement courses in the group: In this group you have to complete 57 courses
Credits in the group: 180
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
F7PBOAF1	**Human Anatomy and Physiology I.** *Jakub Tlapák **Jakub Tlapák** Jakub Tlapák (Gar.)*	Z,ZK	4	2P+2C	Z	z
F7PBOAF2	**Human Anatomy and Physiology II.** *Jakub Tlapák **Jakub Tlapák** Jakub Tlapák (Gar.)*	Z,ZK	4	2P+2C	L	z
F7PBOAFPO	**Anatomy, Physiology and General and Special Pathology of Eye** *Jakub Arendáč, Libor Eichenmann **Libor Eichenmann** Libor Eichenmann (Gar.)*	ZK	2	2P	Z	z
F7PBOBP	**Bachelor Thesis** *Petr Písařík, Martin Fůs, Iva Klimešová, Jana Urzová, Markéta Žáková, Ján Lešťák, Aneta Buchtelová, Jiří Michálek, Leontýna Varvařovská, ... **Petr Písařík** Petr Písařík (Gar.)*	Z	10	4XT+1.5S	L	z
17BOZP	**Occupational Safety and Health, Fire Protection and First Aid** *Petr Kudrna **Petr Kudrna** Petr Kudrna (Gar.)*	Z	0	1P	Z	z
F7PBOBV	**Binocular Vision** *Markéta Žáková, Ondřej Policar, Přemysl Kučera **Eliška Kubecová** Markéta Žáková (Gar.)*	Z,ZK	7	2P+4C	Z	z
F7PBOBCH	**Biochemistry for Optometrists** *Romana Široká **Romana Široká** Romana Široká (Gar.)*	Z,ZK	2	1P+1C	Z	z
F7PBOBLG	**Biology for Optometrists** *Aneta Buchtelová, Kristýna Marková, Taťána Jarošíková, Hana Vrbová **Aneta Buchtelová** Taťána Jarošíková (Gar.)*	Z,ZK	4	2P+2L	Z	z
F7PBOBT	**Spectacles Technology** *Jakub Král Jakub Král (Gar.)*	Z,ZK	6	2P+4C	Z	z
F7PBOCHO	**Chemistry for Optics and Optometry** *Romana Široká **Romana Široká** Romana Široká (Gar.)*	Z,ZK	3	2P+1C	L	z
F7PBOEVO	**Economy and Management** *Martina Caithamlová **Martina Caithamlová** Martina Caithamlová (Gar.)*	KZ	2	1P+1S	Z	z
F7PBOFO	**Pharmacology of Eye** *Ján Lešťák **Ján Lešťák** Ján Lešťák (Gar.)*	Z	2	2P	L	z
F7PBOFYZ	**Physics for Optometrists** *Petr Písařík, Jana Urzová, Eva Urbánková, Jan Mikšovský, Karina Zamrazilová **Petr Písařík** Jana Urzová (Gar.)*	Z,ZK	4	2P+2C+1L	L	z
F7PBOGMB	**Genetics and Molecular Biology for Optometrists** *Aneta Buchtelová, Kristýna Marková, Iva Hammerbauerová **Iva Hammerbauerová** Aneta Buchtelová (Gar.)*	Z,ZK	3	2P+2C	L	z

F7PBOHO	**General Histology and Histology of Eye** *Kamila Procházková, Jiří Uhlík **Jiří Uhlík** Jiří Uhlík (Gar.)*	KZ	2	1P+1C	Z	z
F7PBOHE	**Hygiene and Epidemiology** *Lucie Lidická **Emil Pavlík** Emil Pavlík (Gar.)*	KZ	2	1P	L	z
F7PBOITT	**Information Technologies and Telemedicine** *Lenka Lhotská **Lenka Lhotská** Lenka Lhotská (Gar.)*	KZ	2	2P	Z	z
F7PBOKC1	**Contact Lenses I.** *Libor Eichenmann, Iva Klimešová, Markéta Žáková, Jiří Michálek **Libor Eichenmann** Jiří Michálek (Gar.)*	Z,ZK	3	2P+2C	L	z
F7PBOKC2	**Contact Lenses II.** *Libor Eichenmann, Iva Klimešová, Markéta Žáková, Jiří Michálek, Leontýna Varvařovská **Jiří Michálek** Jiří Michálek (Gar.)*	Z,ZK	5	2P+2C	Z	z
F7PBOKRV	**Correction of Refractive Errors** *Ján Lešťák **Ján Lešťák** Ján Lešťák (Gar.)*	ZK	1	1P	L	z
F7PBOLTL	**Medical Terminology and Latin for Optometrists** *Dana Rebeka Ralbovská **Dana Rebeka Ralbovská** Dana Rebeka Ralbovská (Gar.)*	Z	2	1P	Z	z
F7PBOMCH	**Macromolecular Chemistry for Optometrists** *Jiří Michálek **Jiří Michálek** Jiří Michálek (Gar.)*	Z,ZK	3	1P+1C	Z	z
F7PBOMAZ	**Management and Administration in Healthcare** *Jiří Černý **Jiří Černý** Jiří Černý (Gar.)*	KZ	2	1P	Z	z
F7PBOMVV	**Metodology of Research** *Petr Písařík, Marie Pospíšilová **Petr Písařík** Marie Pospíšilová (Gar.)*	KZ	2	1P+1S	Z	z
F7PBOMI	**Microbiology and Imunology** *Kristýna Marková, Taťána Jarošíková, Hana Vrbová **Taťána Jarošíková** Taťána Jarošíková (Gar.)*	KZ	2	1P+1L	L	z
F7PBONR	**Clinical Refraction** *Jiří Novák **Jiří Novák** Jiří Novák (Gar.)*	ZK	2	1P	Z	z
F7PBONMP	**Proposal and Management of Project** *Marie Pospíšilová **Marie Pospíšilová** Marie Pospíšilová (Gar.)*	KZ	2	1P+1C	L	z
F7PBOATO	**Professional English Terminology for Opticians and Optometrists** *Eva Motyčková **Eva Motyčková** Eva Motyčková (Gar.)*	Z	2	2S	L	z
F7PBOP1	**Professional Training I.** *Petr Písařík, Markéta Žáková **Petr Písařík** Petr Písařík (Gar.)*	Z	4	2XT	L	z
F7PBOP2	**Professional Training II.** *Petr Písařík, Markéta Žáková **Petr Písařík** Petr Písařík (Gar.)*	Z	20	10XT+1.5C	L	z
F7PBOOFP	**Opthalmology Instruments** *Martin Fůs, Jiří Novák **Jiří Novák** Jiří Novák (Gar.)*	ZK	3	3P	Z	z
F7PBOOK1	**Opthalmology - Pathology, Clinic I.** *Martin Fůs, Šárka Pitrová **Šárka Pitrová** Šárka Pitrová (Gar.)*	Z,ZK	4	2P+2C	Z	z
F7PBOOK2	**Opthalmology - Patology, Clinic II.** *Martin Fůs, Šárka Pitrová **Šárka Pitrová** Šárka Pitrová (Gar.)*	Z,ZK	3	2P+2C	L	z
F7PBOOP1	**Optical Laboratory I.** *Jakub Král **Jakub Král** Jakub Král (Gar.)*	KZ	2	2C	L	z
F7PBOOP2	**Optical Laboratory II.** *Jakub Král **Jakub Král** Jakub Král (Gar.)*	KZ	2	2C	L	z
F7PBOOPAT	**Optical Aids and Assistive Technologies for the Visually Impaired** *Zuzana Mudrová **Martina Králová** Zuzana Mudrová (Gar.)*	Z,ZK	2	1P+1C	Z	z
F7PBOOF	**Physical Optics** *Petr Písařík, Jan Mikšovský, Marie Pospíšilová, Jiří Novák **Petr Písařík** Jiří Novák (Gar.)*	Z,ZK	4	2P+2L	Z	z
F7PBOOGB	**Geometric and Opthalmic Optics** *Petr Písařík, Jiří Novák **Petr Písařík** Jiří Novák (Gar.)*	Z,ZK	5	3P+2C	L	z
F7PBOOVP	**Optometry in Practice** *Markéta Žáková **Markéta Žáková** Markéta Žáková (Gar.)*	KZ	2	2P+1C	Z	z
F7PBOPTDK	**Prospective Technologies for Diagnostics and Vision Correction** *Jiří Novák **Jiří Novák** Jiří Novák (Gar.)*	KZ	2	2P	L	z
F7PBOPZP	**Problems of Persons with Visual Impairment** *Martina Králová **Martina Králová** Martina Králová (Gar.)*	KZ	2	1P+1C	L	z
F7PBOPVZ	**Sales Skills and Employee Management** *Markéta Žáková, Přemysl Kučera **Přemysl Kučera** Markéta Žáková (Gar.)*	KZ	2	2P	Z	z
F7PBOPPP	**Programming Tools and Fundamentals of Data Processing** *Petr Písařík **Petr Písařík** Petr Písařík (Gar.)*	Z	1	0.5P+0.5C	Z	z
F7PBOPO	**OPT Project** *Petr Písařík, Martin Fůs, Iva Klimešová, Jana Urzová, Markéta Žáková, Ján Lešťák, Aneta Buchtelová, Jiří Michálek, Leontýna Varvařovská, ... **Petr Písařík** Markéta Žáková (Gar.)*	KZ	5	4C	Z	z
F7PBOPP	**First Aid** *Pavel Böhm **Pavel Böhm** Pavel Böhm (Gar.)*	KZ	2	1P+1C	L	z
F7PBOPSO	**Psychology and Communication** *Dana Rebeka Ralbovská **Dana Rebeka Ralbovská** Dana Rebeka Ralbovská (Gar.)*	KZ	2	1P+1S	Z	z
F7PBOSRB	**Strabology and Basics of Orthoptics** *Věra Lehká **Věra Lehká** Věra Lehká (Gar.)*	KZ	2	1P+1C	Z	z

F7PBOSUR1	**Subjective Refraction I.** *Markéta Žáková, Leontýna Varvařovská, Přemysl Kučera* ***Markéta Žáková*** *Markéta Žáková (Gar.)*	Z,ZK	4	2P+2C	Z	z
F7PBOSUR2	**Subjective Refraction II.** *Markéta Žáková, Leontýna Varvařovská, Přemysl Kučera, Eliška Kubecová* ***Eliška Kubecová*** *Markéta Žáková (Gar.)*	Z,ZK	4	2P+4C	L	z
F7PBOUO	**Introduction to Optics and Optometry** *Petr Písařík, Jana Urzová, Markéta Žáková, Ján Lešťák, Eva Urbánková, Jiří Novák* ***Petr Písařík*** *Petr Písařík (Gar.)*	Z,ZK	2	1P+1C	Z	z
F7PBOVKM	**Selected Chapters from Mathematics for Optometrists** *Jana Urzová, Lukáš Liebzeit* ***Lukáš Liebzeit*** *Jana Urzová (Gar.)*	Z,ZK	4	2P+2C	Z	z
F7PBOVZF	**Diagnostic of Visual Functions** *Ján Lešťák, Přemysl Kučera* ***Leontýna Varvařovská*** *Ján Lešťák (Gar.)*	KZ	2	1P+1C	Z	z
F7PBOZFO	**Foundations of Physiological Optics** *Jiří Novák* ***Jiří Novák*** *Jiří Novák (Gar.)*	ZK	2	2P	L	z
F7PBOZPE	**Fundamentals of Pedagogy and Education** *Monika Donevová* ***Monika Donevová*** *Monika Donevová (Gar.)*	KZ	2	1P+1C	L	z
F7PBOZSM	**Fundamentals of Statistics and Measurement Processing** *Jana Urzová, Lukáš Liebzeit* ***Lukáš Liebzeit*** *Jana Urzová (Gar.)*	KZ	3	1P+2C	Z	z
F7PBOVLZ	**Fundamentals of Public Health Care and Legislation in Health Care** *Jan Bříza* ***Jan Bříza*** *Jan Bříza (Gar.)*	KZ	2	2P	L	z
F7PBOEO	**Medical Ethics** *Martina Dingová Šliková* ***Martina Dingová Šliková*** *Martina Dingová Šliková (Gar.)*	Z	1	1P	Z	z

Characteristics of the courses of this group of Study Plan: Code=F7PBO POV 21 Name=Optics and Optometry

F7PBOAF1	Human Anatomy and Physiology I.	Z,ZK	4

The aim of Anatomy part of studying is to gain an overview of the structure and composition of the human body. The aim of Physiology part of studying is to understand the functioning of living matter based on the description of a cell and the exchange of chemicals, energy and information with the environment. Entry requirements of the course: - - Output knowledge, skills, abilities and competences: The course serves to understand the relationships between the structure and functions of the human body. The teaching follows modern pedagogical trends consisting in a direct connection between the morphology and the functions of organ systems. Seminar teaching is closely linked to the topics of lectures and connected with practical exercises. It focuses significantly on problems of program and uses activation methodologies to increase student motivation. The use of modern multimedia programs (eg ADAM and others) is a matter of course. From a theoretical and practical point of view, the main emphasis will be on the morphology and function of vital organs and systems.

F7PBOAF2	Human Anatomy and Physiology II.	Z,ZK	4

Introduction to pathology: definition, goals, history, disease, symptoms. Etiology and pathogenesis of the diseases at the organ, tissue, cellular and molecular level. External factors of the deseases origin and development. Pathogenic stimuli. Wound healing. Inflammation as a defensive and autoaggressive phenomenon. Circulatory disorders, atrophy, necrosis. Tumors. Specific features of pathological changes of the central nervous system, eye, optical pathways.

F7PBOAFPO	Anatomy, Physiology and General and Special Pathology of Eye	ZK	2

Definitions, goals, history, diseases, symptomatology. Etiology and pathogenesis of a disease on a tissular, cellular and molecular level. External factors of the origin and development of the disease. Pathogenic impulses. Wound healing. Inflammation as a defensive and autoaggressive phenomenon. Circulatory disorders, atrophy, necrosis. Tumours. Specific features of pathological changes in the central nervous system, visual pathway and eye itself.

F7PBOBP	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 courses and in the allotted 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. Subsequently, these evaluations and the result of the state final examination in the subject areas are included in one final evaluation.

17BOZP	Occupational Safety and Health, Fire Protection and First Aid	Z	0
F7PBOBV	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 origin, development of visual functions, disorders of binocular vision, practical examination of binocular vision, heterophoria and fixation disparity, relationship of accommodation and vergence, vergence disorders and visual training.

F7PBOBCH	Biochemistry for Optometrists	Z,ZK	2

The course is aimed at providing students with the basic knowledge of biochemistry, the structure and properties of biochemically important substances that make up living organisms, and the principles of metabolic and energy transformations in organisms. Emphasis is placed on understanding the importance of these substances to the life of organisms and linking the knowledge gained to the wider context. During the lectures, students will get to know the basics of biochemistry of organ systems and some important pathologies Attention is also paid to the biochemistry of vision.

F7PBOBLG	Biology for Optometrists	Z,ZK	4

In the course the student will gain clear knowledge of general and cell biology, through the formation of cells and organelles (endosymbiotic theory) and basic chemical composition of cells (simple inorganic and organic substances, carbohydrates, fats, amino acids, biopolymers - NK and proteins), construction of non-cellular forms (especially viruses) and cells, both prokaryotic (bacteria) and eukaryotic (plant, animal and fungal cells), they will also get acquainted with cell metabolism (anabolism and catabolism), growth and cell differentiation, division (cell cycle and its regulatory mechanisms) to after extinction by apoptosis and necrosis. They will get acquainted with the basics of microbiology (viral and bacterial diseases of man) and applications in technical and medical fields. He will gain detailed knowledge about the internal structure of the eukaryotic cell, its endomembrane system and semiautonomous organelles and the processes that take place in them. Following in the field of molecular biology, they will get acquainted with the basic processes that are necessary for the implementation of genetic information, the processes of replication, transcription, translation (ie proteosynthesis) and gene expression, the genetic code. In general genetics with basic genetic terminology and processes of passing genetic information from parents to offspring according to Mendel's and Morgan's laws, changing genetic information in the form of mutations and possibilities of repair in the cell. Human genetics (clinical genetics) includes basic examination methods and human genetic diseases (autosomal dominant, recessive, gonosomal dominant, recessive, mitochondrial and others). Following the great development of molecular biology and biochemistry techniques, the student is acquainted with genetic engineering and its methods of genetically modified organisms and their preparation, as well as tissue cultures and biotechnologies. Applied biology in technical and medical fields describes the use of biological structures and mechanisms in modern technology and medicine. The conclusion consists of issues related to the field of animal cells and tissues, their histology and issues of biocompatibility.

F7PBOBT	Spectacles Technology	Z,ZK	6

The student is introduced to the basic operation of the Optical Laboratory. The student learns the habits that are standard in completing spectacle correction. The student learns to obtain individual client parameters, centration and selection of the appropriate lens for subsequent eyeglass fitting. The student also learns to adjust and repair spectacle correction.

F7PBOCHO	Chemistry for Optics and Optometry	Z,ZK	3
Students will learn the basic areas of applied chemistry, organic chemistry, polymer chemistry and macromolecular chemistry in biomedical engineering.			
F7PBOEVO	Economy and Management	KZ	2
This course provides a portfolio of tools from micro-economics, 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, price strategy and the tax system. Students will get a general overview of the company and its key functional areas.			
F7PBOFO	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.			
F7PBOFYZ	Physics for Optometrists	Z,ZK	4
The course represents for students a unit that will allow them to gain basic knowledge in the areas of: mechanics, thermodynamics, electricity and magnetism and solid state physics, especially in those sub-areas that they can use in further study and practice. Emphasis is placed on theoretical knowledge, but also on solving problems and measuring selected quantities. The limits of classical physics will be presented in a suitable form.			
F7PBOGMB	Genetics and Molecular Biology for Optometrists	Z,ZK	3
The course focuses on general, applied, and clinical genetics as well as molecular biology. Students are introduced to fundamental genetic concepts, the structure and function of genetic information, nucleic acids and proteins, the genetic code, and the mechanisms of gene expression, including protein synthesis. Core concepts of general genetics such as gene, allele, genotype, and phenotype are discussed, together with the principles of inheritance described by Mendels and Morgans laws. The clinical genetics component covers modes of inheritance of genetic disorders, including autosomal and sex-linked monogenic inheritance, polygenic and multifactorial inheritance, and selected examples of hereditary diseases. The course also addresses mutagenesis, types of mutations and their consequences, physical, chemical, and biological mutagens, carcinogenesis, regulation of cell division, proto-oncogenes, tumor suppressor genes, and chromosomal alterations in cancer. Further topics include clinical cytogenetics, congenital chromosomal abnormalities (numerical and structural), basics of epigenetics, immunogenetics, and the inheritance of blood groups. Students are also introduced to prenatal cytogenetic diagnostics (methods, indications, and ethical aspects), molecular cytogenetics and in situ hybridization techniques, assisted reproduction methods, genetic engineering, DNA cloning, and principles of gene therapy. Learning outcomes: Students gain fundamental knowledge in general genetics, cytology and cytogenetics, clinical genetics, molecular biology, and genetic engineering, providing a foundation for further specialized study.			
F7PBOHO	General Histology and Histology of Eye	KZ	2
Basics of cytology, general histology, microscopic anatomy, and embryology. Basics of processing samples for histological examination. Histological structure of eye and its accessory structures. Development of eye in human embryo.			
F7PBOHE	Hygiene and Epidemiology	KZ	2
Students should learn theoretical basics of Epidemiology and Hygiene disciplines in depth covered by lecture topics. As result of this subject, student should be familiar with targets and working methods used in all disciplines of infectious and non-infectious epidemiology, environmental epidemiology and in solving of priorities and problems of Public Health Protection. Outcoming knowledge, skills, abilities and competences: Knowledge of basic methods used in preventive medical disciplines and legislation.			
F7PBOITT	Information Technologies and Telemedicine	KZ	2
The aim of the course is to introduce to students the basics of information technology and telemedicine at the level of a more professional user. The student will gain a sufficient comprehensive overview of the use of information technology in medicine and telemedicine, and specifically in the field of optics and optometry. Emphasis is placed on a general overview and knowledge of the principles and mechanisms, so that the student has a clear idea of the possibilities and risks associated with the use of computer technology in medicine. Based on the acquired knowledge, the student should be able to choose appropriate hardware and software solutions according to the requirements of applications, he/she should have a basic awareness of security in IT. The student should get a good basis for the use of information technology.			
F7PBOKC1	Contact Lenses I.	Z,ZK	3
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.			
F7PBOKC2	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 prosthetic contact lenses. Therapeutic use of contact lenses. Special types of contact lenses. Special uses of contact lenses (sports, demanding occupations and environments, patients with general diseases, etc.). Drug interactions with contact lenses. Complications of contact lenses and their solutions. Application of soft and rigid spherical lenses. Application of contact lenses in astigmatism and presbyopia. Basic and specific care of contact lenses. Inspection of patients with contact lenses.			
F7PBOKRV	Correction of Refractive Errors	ZK	1
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.			
F7PBOLTL	Medical Terminology and Latin for Optometrists	Z	2
During the course, students are introduced to individual terms based on Latin as well as Greek expressions. Students are continuously acquainted with the dates of entire diagnoses and therapeutic procedures. Teaching takes place mainly in the form of self-study.			
F7PBOMCH	Macromolecular Chemistry for Optometrists	Z,ZK	3
An introduction to macromolecular chemistry with respect to contact lens and spectacle optics materials. In particular, common types of polymers and their structural units will be discussed, with a focus on selected materials that somehow enter into the manufacturing process of contact lenses, respectively spectacle frames and lenses, including the synthesis of their monomers (MMA, HEMA, MA, NVP, CAB, etc.). Attention will be paid to the basic concepts and laws in macromolecular chemistry (chain structure, polymerization contraction, glass transition temperature, polymerization degree, molar mass of polymers, types of polymer structures, types of polymerizations and their methods, more emphasis will be placed on radical polymerization with its individual phases). In the context of contact lens materials, copolymerization issues will be explained, including graft and block copolymers. Special attention will be paid to polymer gels, network structure, characterization of gels, rubbery elasticity, hydrogels, polysiloxanes, silicone hydrogels, including their characterization by selected properties (botnation properties, mechanical properties, optical properties) and how to determine them. In addition to the application of hydrogels in medical and technical practice, polymers for spectacle optics and "auxiliary" polymers used in contact lens manufacturing or packaging (PE, PP,) will be continuously emphasized. Crosslinking agents, stepwise polyreactions and polymer analogue reactions will also be mentioned.			
F7PBOMAZ	Management and Administration in Healthcare	KZ	2
Getting to know the structure of the health sector and financing models Health. Zoom administrative management issues various types of medical workplaces, their necessary interconnection. Orientation in the specific features of health facilities and European systems of health care workplaces.			
F7PBOMVV	Metodology of Research	KZ	2

F7PBOMI	Microbiology and Imunology	KZ	2
Immunology: Cells and organs of the immune system. Antigens. Development of the immune response. The main histocompatibility complex. T lymphocytes and cellular immunity. Cellular cytotoxicity. Cytokines. B lymphocytes and antibody production. Immunoglobulins. Defense functions of the immune system. Anti-infective immunity. Innate immunity. Allergic diseases. Nutrition and immunity, the effect of human microbiome on the immune system. Immunopathology. Immunodeficiency. Autoimmune diseases. Microbiology: Microorganisms, division. Non-cellular forms of infections - viruses. Procaryotes. Bacterial cell structure and function. Phylogenetic system of bacteria and archaea. Eucaryotes. Cell structure and function of eukaryotic microorganisms - fungi, protozoa. Metabolism and growth of microorganisms, life cycle of prokaryotic cells, growth curve. Influence of environmental factors on the growth of microorganisms - temperature, pH. Antimicrobials - antivirals, antibiotics and chemotherapeutics, mechanism of action, disinfection, sterilization. The microbiome of the human body. Human microbial diseases. Infectious diseases of the eye caused by microorganisms - viral, bacterial, fungal and caused by protozoa.		
F7PBONR	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.			
F7PBONMP	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			
F7PBOATO	Professional English Terminology for Opticians and Optometrists	Z	2
The aim of this course is to develop and improve communication skills related to the field of Optics and Optometry. Emphasis is placed on presentation and defence skills, both in oral and written form. The classes focus on acquiring specialised vocabulary, understanding professional texts, and presenting ones own opinions. The course covers professional topics such as refractive errors of the eye, methods of correction, visual aids, visual development, and types of vision examinations. Special emphasis is also placed on patient communication, including explaining individual visual defects and examination procedures, describing options for subsequent correction, and providing instructions for the use of visual aids.atient.			
F7PBOP1	Professional Training I.	Z	4
The aim of the course is to use the theoretical and practical knowledge acquired in lectures and exercises in real practice conditions. During classes, under the professional guidance of mentors (guaranteed by contract), the student gradually learns the correct procedures and adapts to work in the chosen field. Topics for professional practice are the sale, repair and adjustment of glasses, the grinding of spectacle lenses and the determination of objective and subjective refraction.			
F7PBOP2	Professional Training II.	Z	20
F7PBOOFP	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), 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.			
F7PBOOK1	Opthalmology - Pathology, Clinic I.	Z,ZK	4
The course focuses on the basic symptoms of diseases of the eye and its surroundings, the individual parts of the eye and the ocular adnexa are gradually discussed, and a large number of slides are used to instruct students on the clinical examination of individual pathologies and their basic characteristics. Interpretation links students to the integration of anatomy, pathological anatomy and physiology with the fundamentals of effective pharmacotherapy. The teaching follows modern trends in the diagnosis and treatment of pathological conditions and is supplemented by video presentations of interesting cases. Interesting case studies from clinical practice are also demonstrated. Theoretical teaching is closely linked to the topics of lectures and connected with practical exercises aimed at acquiring skills in investigation. With the help of quizzes, students can continuously check their knowledge and ability to remember the lectured material. In terms of theory and practice, the main emphasis is on the student's ability to acquire the most important knowledge that they will be able to use in practical life in their future profession. Part of the training course is a full-day practical block, which students complete in ON KLADNO under the direct supervision of an ophthalmologist.			
F7PBOOK2	Opthalmology - Patology, Clinic II.	Z,ZK	3
The course focuses on basic retinal diseases, their conservative and surgical treatment, general diseases and their influence on the eye, congenital eye defects, eye diseases of childhood, neuro-ophthalmology and traumatology in ophthalmology. Instruction links students to the integration of anatomy, pathological anatomy and physiology with the fundamentals of effective pharmacotherapy. The teaching follows modern trends in the diagnosis and treatment of pathological conditions, and is supplemented by video presentations of interesting cases and demonstrations of interesting case reports from clinical practice. Theoretical teaching is closely linked to the topics of the lectures and connected with practical exercises aimed at acquiring knowledge and skills in practical investigation of a given pathology of the eye. Using quizzes, students can continuously check their knowledge and ability to remember the lectured material. In terms of theory and practice, the main emphasis is on the student's ability to acquire the most important knowledge that they will be able to use in practical life in their future profession as an optometrist. Exercises at the FBMI CTU will be followed by a tour of the departments of the Eye Clinic JL, where they participate in the operation at the patient's bedside and directly in the operating room. They will participate in cataract surgery procedures using modern technologies such as virtual navigation system and femtosecond laser. They will also be able to test their knowledge using a 3D virtual reality studio designed for ophthalmology training. They will have a guided tour of the MRI department. The students also participate in practical blocks at ophthalmology clinical departments (Ophthalmology Department of Kladno Hospital, Ophthalmology Clinic of the 1st Faculty of Medicine of the Charles University in Prague and Ophthalmology Department of Kolín Hospital), where they get acquainted with the organization of operation, instrumentation, participate in the examination of patients under the guidance of ophthalmologists in general and specialized departments such as retinal or glaucoma outpatient clinics. By completing the course, students gain a broad theoretical and practical overview of the problems and diagnosis of eye diseases, including their treatment or surgical intervention.			
F7PBOOP1	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.			
F7PBOOP2	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.			
F7PBOOPAT	Optical Aids and Assistive Technologies for the Visually Impaired	Z,ZK	2
F7PBOOF	Physical Optics	Z,ZK	4
The student will become familiar with the basic parts of physical optics, which will enable him to better understand the professional issues of eye optics and optometry. The subject deals in detail with the basics and application of physical optics in technology and biomedicine. Individual physical phenomena and processes from the field of wave optics (e.g. interference, diffraction and polarization of light) are discussed in detail here, together with their consequences and practical applications in the field of instrumentation, correction and diagnostic aids and methods used in optometry. The basics of the photon theory of light, the quantum principle of the interaction of light with matter, the basics of laser technology and its applications in science, technology, and biomedicine, especially in the field of optometry and ophthalmology, are also mentioned. The exercises take place in the form of laboratory optical measurements.			

F7PBOOGB	Geometric and Opthalmic Optics	Z,ZK	5
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.			
F7PBOOVP	Optometry in Practice	KZ	2
F7PBOPTDK	Prospective Technologies for Diagnostics and Vision Correction	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.			
F7PBOPZP	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.			
F7PBOPVZ	Sales Skills and Employee Management	KZ	2
F7PBOPPP	Programming Tools and Fundamentals of Data Processing	Z	1
The course is focused on the practical mastery of such software tools, which the student will use not only during their studies, but especially will use these tools and instruments in practice. The course aims to get acquainted with modern software and focuses on office applications, processing and visualization of experimental data and graphic presentation. Selected topics of the course are aligned with the syllabus of the internationally recognized concept of testing computer knowledge and skills ECDL (European Computer Driving License).			
F7PBOPO	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. Last but not least, deepening the knowledge of typographic rules, including proofreading marks, etc.			
F7PBOPP	First Aid	KZ	2
The course gives a brief overview of the main principles and procedures of providing emergency first aid with special attention to the procedures for failure of basic vital functions and life threatening situations. The subject also includes situations of mass casualty of victims in crisis situations and emergencies, including the phenomenon of CBRN.			
F7PBOPSO	Psychology and Communication	KZ	2
During the lectures, students will be acquainted with the problems of psychology of patients, with mental states in diagnostic - therapeutic activities, in providing psychological assistance to patients during treatment and in coping with chronic states of the disease. Students are provided with theoretical knowledge of basic psychological procedures in communication with patients with various types and degrees of damage to health, instructions on how to manage difficult situations in care about the individual needs of the sick, disabled and dying, and also emphasizes the importance of caring for the mental state of health professionals.			
F7PBOSRB	Strabology and Basics of Orthoptics	KZ	2
F7PBOSUR1	Subjective Refraction I.	Z,ZK	4
Basic knowledges about refraction of the eye. Techniques of the subjective refraction perform testing frame or the phoropter.Techniques of the examination near vision.			
F7PBOSUR2	Subjective Refraction II.	Z,ZK	4
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. The teaching will also cover specific and difficult refractive conditions and the relationship between refractive deficit and eye and general diseases. An essential topic is the examination of pediatric patients and patients with specific needs. An important scope of the subject is an introduction to the examination of binocular vision.			
F7PBOUO	Introduction to Optics and Optometry	Z,ZK	2
The course summarizes the knowledge of optics and optometry and is an introductory course that will show students the possibilities of their future profession. During the lectures, students will be acquainted with the basic concepts, development, current state and future of the field studied. Students will get acquainted with the basics of ray, wave and quantum optics using selected numerical problems. Emphasis is placed on getting acquainted with the content and basic concepts of further study.			
F7PBOVKM	Selected Chapters from Mathematics for Optometrists	Z,ZK	4
The course summarizes and systematizes the secondary school curriculum and builds on them. Students will get acquainted with the basics of linear algebra, differential and integral calculus of real functions of one real variable in applications. Emphasis is placed on the requirements of further study - solving equations of various types and their systems, modifications of trigonometric expressions and geometry of conic sections and the mutual position of the sphere and the plane.			
F7PBOVZF	Diagnostic of Visual Functions	KZ	2
The course focuses on the examination of the visual functions of the eye. It explains the importance of individual examinations and their physiological nature. It also explains their changes in various ocular abnormalities. Great emphasis is placed on the practical mastery and understanding of each examination.			
F7PBOZFO	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.			
F7PBOZPE	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.			
F7PBOZSM	Fundamentals of Statistics and Measurement Processing	KZ	3
F7PBOVLZ	Fundamentals of Public Health Care and Legislation in Health Care	KZ	2
Students will learn about health systems around the world as well as the history and development of organizational and reimbursement systems in health care. In relation to the organisational systems, they will also learn about the principles of health care financing, both preventive and curative, not only in the Czech Republic and the EU, but also in the world. Application of Act No. 258/2000 Coll. in relation to supervision. Supervision of the provisions of the Labour Code, particularly in the area of occupational health and safety prevention. The procedure and methods of decision-making of supervisory bodies in the event of breaches of generally applicable regulations, including internal management acts relating to health protection. Interpretation of labour law relations between the employee and the employer, rights and obligations. Legal responsibilities in the health sector.			
F7PBOEO	Medical Ethics	Z	1
The student gets acquainted with the basic philosophical terminology, the fundamental philosophical directions on which ethics is based. He is acquainted with the history of ethics and understands the basic principles of Christian ethics and bioethics. He also knows the codes of ethics used in clinical practice, has knowledge of ethics concerning current biomedical research, can analyze alternative medicine's ethical problems, and take their positions on them			

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
F7PBOAF1	Human Anatomy and Physiology I.	Z,ZK	4
The aim of Anatomy part of studying is to gain an overview of the structure and composition of the human body. The aim of Physiology part of studying is to understand the functioning of living matter based on the description of a cell and the exchange of chemicals, energy and information with the environment. Entry requirements of the course: - - Output knowledge, skills, abilities and competences: The course serves to understand the relationships between the structure and functions of the human body. The teaching follows modern pedagogical trends consisting in a direct connection between the morphology and the functions of organ systems. Seminar teaching is closely linked to the topics of lectures and connected with practical exercises. It focuses significantly on problems of program and uses activation methodologies to increase student motivation. The use of modern multimedia programs (eg ADAM and others) is a matter of course. From a theoretical and practical point of view, the main emphasis will be on the morphology and function of vital organs and systems.			
F7PBOAF2	Human Anatomy and Physiology II.	Z,ZK	4
Introduction to pathology: definition, goals, history, disease, symptoms. Etiology and pathogenesis of the diseases at the organ, tissue, cellular and molecular level. External factors of the deseases origin and development. Pathogenic stimuli. Wound healing. Inflammation as a defensive and autoaggressive phenomenon. Circulatory disorders, atrophy, necrosis. Tumors. Specific features of pathological changes of the central nervous system, eye, optical pathways.			
F7PBOAFPO	Anatomy, Physiology and General and Special Pathology of Eye	ZK	2
Definitions, goals, history, diseases, symptomatology. Etiology and pathogenesis of a disease on a tissular, cellular and molecular level. External factors of the origin and development of the disease. Pathogenic impulses. Wound healing. Inflammation as a defensive and autoaggressive phenomenon. Circulatory disorders, atrophy, necrosis. Tumours. Specific features of pathological changes in the central nervous system, visual pathway and eye itself.			
F7PBOATO	Professional English Terminology for Opticians and Optometrists	Z	2
The aim of this course is to develop and improve communication skills related to the field of Optics and Optometry. Emphasis is placed on presentation and defence skills, both in oral and written form. The classes focus on acquiring specialised vocabulary, understanding professional texts, and presenting ones own opinions. The course covers professional topics such as refractive errors of the eye, methods of correction, visual aids, visual development, and types of vision examinations. Special emphasis is also placed on patient communication, including explaining individual visual defects and examination procedures, describing options for subsequent correction, and providing instructions for the use of visual aids.atient.			
F7PBOBCH	Biochemistry for Optometrists	Z,ZK	2
The course is aimed at providing students with the basic knowledge of biochemistry, the structure and properties of biochemically important substances that make up living organisms, and the principles of metabolic and energy transformations in organisms. Emphasis is placed on understanding the importance of these substances to the life of organisms and linking the knowledge gained to the wider context. During the lectures, students will get to know the basics of biochemistry of organ systems and some important pathologies Attention is also paid to the biochemistry of vision.			
F7PBOBLG	Biology for Optometrists	Z,ZK	4
In the course the student will gain clear knowledge of general and cell biology, through the formation of cells and organelles (endosymbiotic theory) and basic chemical composition of cells (simple inorganic and organic substances, carbohydrates, fats, amino acids, biopolymers - NK and proteins), construction of non-cellular forms (especially viruses) and cells, both prokaryotic (bacteria) and eukaryotic (plant, animal and fungal cells), they will also get acquainted with cell metabolism (anabolism and catabolism), growth and cell differentiation, division (cell cycle and its regulatory mechanisms) to after extinction by apoptosis and necrosis. They will get acquainted with the basics of microbiology (viral and bacterial diseases of man) and applications in technical and medical fields. He will gain detailed knowledge about the internal structure of the eukaryotic cell, its endomembrane system and semiautonomous organelles and the processes that take place in them. Following in the field of molecular biology, they will get acquainted with the basic processes that are necessary for the implementation of genetic information, the processes of replication, transcription, translation (ie proteosynthesis) and gene expression, the genetic code. In general genetics with basic genetic terminology and processes of passing genetic information from parents to offspring according to Mendel's and Morgan's laws, changing genetic information in the form of mutations and possibilities of repair in the cell. Human genetics (clinical genetics) includes basic examination methods and human genetic diseases (autosomal dominant, recessive, gonosomal dominant, recessive, mitochondrial and others). Following the great development of molecular biology and biochemistry techniques, the student is acquainted with genetic engineering and its methods of genetically modified organisms and their preparation, as well as tissue cultures and biotechnologies. Applied biology in technical and medical fields describes the use of biological structures and mechanisms in modern technology and medicine. The conclusion consists of issues related to the field of animal cells and tissues, their histology and issues of biocompatibility.			
F7PBOBP	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 courses and in the allotted 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. Subsequently, these evaluations and the result of the state final examination in the subject areas are included in one final evaluation.			
F7PBOBT	Spectacles Technology	Z,ZK	6
The student is introduced to the basic operation of the Optical Laboratory. The student learns the habits that are standard in completing spectacle correction. The student learns to obtain individual client parameters, centration and selection of the appropriate lens for subsequent eyeglass fitting. The student also learns to adjust and repair spectacle correction.			
F7PBOBV	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 origin, development of visual functions, disorders of binocular vision, practical examination of binocular vision, heterophoria and fixation disparity, relationship of accommodation and vergence, vergence disorders and visual training.			
F7PBOCHO	Chemistry for Optics and Optometry	Z,ZK	3
Students will learn the basic areas of applied chemistry, organic chemistry, polymer chemistry and macromolecular chemistry in biomedical engineering.			
F7PBOEO	Medical Ethics	Z	1
The student gets acquainted with the basic philosophical terminology, the fundamental philosophical directions on which ethics is based. He is acquainted with the history of ethics and understands the basic principles of Christian ethics and bioethics. He also knows the codes of ethics used in clinical practice, has knowledge of ethics concerning current biomedical research, can analyze alternative medicine's ethical problems, and take their positions on them			
F7PBOEVO	Economy and Management	KZ	2
This course provides a portfolio of tools from micro-economics, 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, price strategy and the tax system. Students will get a general overview of the company and its key functional areas.			

F7PBOFO	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.			
F7PBOFYZ	Physics for Optometrists	Z,ZK	4
The course represents for students a unit that will allow them to gain basic knowledge in the areas of: mechanics, thermodynamics, electricity and magnetism and solid state physics, especially in those sub-areas that they can use in further study and practice. Emphasis is placed on theoretical knowledge, but also on solving problems and measuring selected quantities. The limits of classical physics will be presented in a suitable form.			
F7PBOGMB	Genetics and Molecular Biology for Optometrists	Z,ZK	3
The course focuses on general, applied, and clinical genetics as well as molecular biology. Students are introduced to fundamental genetic concepts, the structure and function of genetic information, nucleic acids and proteins, the genetic code, and the mechanisms of gene expression, including protein synthesis. Core concepts of general genetics such as gene, allele, genotype, and phenotype are discussed, together with the principles of inheritance described by Mendels and Morgans laws. The clinical genetics component covers modes of inheritance of genetic disorders, including autosomal and sex-linked monogenic inheritance, polygenic and multifactorial inheritance, and selected examples of hereditary diseases. The course also addresses mutagenesis, types of mutations and their consequences, physical, chemical, and biological mutagens, carcinogenesis, regulation of cell division, proto-oncogenes, tumor suppressor genes, and chromosomal alterations in cancer. Further topics include clinical cytogenetics, congenital chromosomal abnormalities (numerical and structural), basics of epigenetics, immunogenetics, and the inheritance of blood groups. Students are also introduced to prenatal cytogenetic diagnostics (methods, indications, and ethical aspects), molecular cytogenetics and in situ hybridization techniques, assisted reproduction methods, genetic engineering, DNA cloning, and principles of gene therapy. Learning outcomes: Students gain fundamental knowledge in general genetics, cytology and cytogenetics, clinical genetics, molecular biology, and genetic engineering, providing a foundation for further specialized study.			
F7PBOHE	Hygiene and Epidemiology	KZ	2
Students should learn theoretical basics of Epidemiology and Hygiene disciplines in depth covered by lecture topics. As result of this subject, student should be familiar with targets and working methods used in all disciplines of infectious and non-infectious epidemiology, environmental epidemiology and in solving of priorities and problems of Public Health Protection. Outcoming knowledge, skills, abilities and competences: Knowledge of basic methods used in preventive medical disciplines and legislation.			
F7PBOHO	General Histology and Histology of Eye	KZ	2
Basics of cytology, general histology, microscopic anatomy, and embryology. Basics of processing samples for histological examination. Histological structure of eye and its accessory structures. Development of eye in human embryo.			
F7PBOITT	Information Technologies and Telemedicine	KZ	2
The aim of the course is to introduce to students the basics of information technology and telemedicine at the level of a more professional user. The student will gain a sufficient comprehensive overview of the use of information technology in medicine and telemedicine, and specifically in the field of optics and optometry. Emphasis is placed on a general overview and knowledge of the principles and mechanisms, so that the student has a clear idea of the possibilities and risks associated with the use of computer technology in medicine. Based on the acquired knowledge, the student should be able to choose appropriate hardware and software solutions according to the requirements of applications, he/she should have a basic awareness of security in IT. The student should get a good basis for the use of information technology.			
F7PBOKC1	Contact Lenses I.	Z,ZK	3
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.			
F7PBOKC2	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 prosthetic contact lenses. Therapeutic use of contact lenses. Special types of contact lenses. Special uses of contact lenses (sports, demanding occupations and environments, patients with general diseases, etc.). Drug interactions with contact lenses. Complications of contact lenses and their solutions. Application of soft and rigid spherical lenses. Application of contact lenses in astigmatism and presbyopia. Basic and specific care of contact lenses. Inspection of patients with contact lenses.			
F7PBOKRV	Correction of Refractive Errors	ZK	1
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.			
F7PBOLTL	Medical Terminology and Latin for Optometrists	Z	2
During the course, students are introduced to individual terms based on Latin as well as Greek expressions. Students are continuously acquainted with the dates of entire diagnoses and therapeutic procedures. Teaching takes place mainly in the form of self-study.			
F7PBOMAZ	Management and Administration in Healthcare	KZ	2
Getting to know the structure of the health sector and financing models Health. Zoom administrative management issues various types of medical workplaces, their necessary interconnection. Orientation in the specific features of health facilities and European systems of health care workplaces.			
F7PBOMCH	Macromolecular Chemistry for Optometrists	Z,ZK	3
An introduction to macromolecular chemistry with respect to contact lens and spectacle optics materials. In particular, common types of polymers and their structural units will be discussed, with a focus on selected materials that somehow enter into the manufacturing process of contact lenses, respectively spectacle frames and lenses, including the synthesis of their monomers (MMA, HEMA, MA, NVP, CAB, etc.). Attention will be paid to the basic concepts and laws in macromolecular chemistry (chain structure, polymerization contraction, glass transition temperature, polymerization degree, molar mass of polymers, types of polymer structures, types of polymerizations and their methods, more emphasis will be placed on radical polymerization with its individual phases). In the context of contact lens materials, copolymerization issues will be explained, including graft and block copolymers. Special attention will be paid to polymer gels, network structure, characterization of gels, rubbery elasticity, hydrogels, polysiloxanes, silicone hydrogels, including their characterization by selected properties (botnation properties, mechanical properties, optical properties) and how to determine them. In addition to the application of hydrogels in medical and technical practice, polymers for spectacle optics and "auxiliary" polymers used in contact lens manufacturing or packaging (PE, PP,) will be continuously emphasized. Crosslinking agents, stepwise polyreactions and polymer analogue reactions will also be mentioned.			
F7PBOMI	Microbiology and Imunology	KZ	2
Immunology: Cells and organs of the immune system. Antigens. Development of the immune response. The main histocompatibility complex. T lymphocytes and cellular immunity. Cellular cytotoxicity. Cytokines. B lymphocytes and antibody production. Immunoglobulins. Defense functions of the immune system. Anti-infective immunity. Innate immunity. Allergic diseases. Nutrition and immunity, the effect of human microbiome on the immune system. Immunopathology. Immunodeficiency. Autoimmune diseases. Microbiology: Microorganisms, division. Non-cellular forms of infections - viruses. Procaryotes. Bacterial cell structure and function. Phylogenetic system of bacteria and archaea. Eucaryotes. Cell structure and function of eukaryotic microorganisms - fungi, protozoa. Metabolism and growth of microorganisms, life cycle of prokaryotic cells, growth curve. Influence of environmental factors on the growth of microorganisms - temperature, pH. Antimicrobials - antivirals, antibiotics and chemotherapeutics, mechanism of action, disinfection, sterilization. The microbiome of the human body. Human microbial diseases. Infectious diseases of the eye caused by microorganisms - viral, bacterial, fungal and caused by protozoa.			
F7PBOMVV	Metodology of Research	KZ	2
F7PBONMP	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

F7PBONR	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.

F7PBOOF	Physical Optics	Z,ZK	4

The student will become familiar with the basic parts of physical optics, which will enable him to better understand the professional issues of eye optics and optometry. The subject deals in detail with the basics and application of physical optics in technology and biomedicine. Individual physical phenomena and processes from the field of wave optics (e.g. interference, diffraction and polarization of light) are discussed in detail here, together with their consequences and practical applications in the field of instrumentation, correction and diagnostic aids and methods used in optometry. The basics of the photon theory of light, the quantum principle of the interaction of light with matter, the basics of laser technology and its applications in science, technology, and biomedicine, especially in the field of optometry and ophthalmology, are also mentioned. The exercises take place in the form of laboratory optical measurements.

F7PBOOFP	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), 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.

F7PBOOGB	Geometric and Opthalmic Optics	Z,ZK	5

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.

F7PBOOK1	Opthalmology - Pathology, Clinic I.	Z,ZK	4

The course focuses on the basic symptoms of diseases of the eye and its surroundings, the individual parts of the eye and the ocular adnexa are gradually discussed, and a large number of slides are used to instruct students on the clinical examination of individual pathologies and their basic characteristics. Interpretation links students to the integration of anatomy, pathological anatomy and physiology with the fundamentals of effective pharmacotherapy. The teaching follows modern trends in the diagnosis and treatment of pathological conditions and is supplemented by video presentations of interesting cases. Interesting case studies from clinical practice are also demonstrated. Theoretical teaching is closely linked to the topics of lectures and connected with practical exercises aimed at acquiring skills in investigation. With the help of quizzes, students can continuously check their knowledge and ability to remember the lectured material. In terms of theory and practice, the main emphasis is on the student's ability to acquire the most important knowledge that they will be able to use in practical life in their future profession. Part of the training course is a full-day practical block, which students complete in ON KLADNO under the direct supervision of an ophthalmologist.

F7PBOOK2	Opthalmology - Patology, Clinic II.	Z,ZK	3

The course focuses on basic retinal diseases, their conservative and surgical treatment, general diseases and their influence on the eye, congenital eye defects, eye diseases of childhood, neuro-ophthalmology and traumatology in ophthalmology. Instruction links students to the integration of anatomy, pathological anatomy and physiology with the fundamentals of effective pharmacotherapy. The teaching follows modern trends in the diagnosis and treatment of pathological conditions, and is supplemented by video presentations of interesting cases and demonstrations of interesting case reports from clinical practice. Theoretical teaching is closely linked to the topics of the lectures and connected with practical exercises aimed at acquiring knowledge and skills in practical investigation of a given pathology of the eye. Using quizzes, students can continuously check their knowledge and ability to remember the lectured material. In terms of theory and practice, the main emphasis is on the student's ability to acquire the most important knowledge that they will be able to use in practical life in their future profession as an optometrist. Exercises at the FBMI CTU will be followed by a tour of the departments of the Eye Clinic JL, where they participate in the operation at the patient's bedside and directly in the operating room. They will participate in cataract surgery procedures using modern technologies such as virtual navigation system and femtosecond laser. They will also be able to test their knowledge using a 3D virtual reality studio designed for ophthalmology training. They will have a guided tour of the MRI department. The students also participate in practical blocks at ophthalmology clinical departments (Ophthalmology Department of Kladno Hospital, Ophthalmology Clinic of the 1st Faculty of Medicine of the Charles University in Prague and Ophthalmology Department of Kolín Hospital), where they get acquainted with the organization of operation, instrumentation, participate in the examination of patients under the guidance of ophthalmologists in general and specialized departments such as retinal or glaucoma outpatient clinics. By completing the course, students gain a broad theoretical and practical overview of the problems and diagnosis of eye diseases, including their treatment or surgical intervention.

F7PBOOP1	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.

F7PBOOP2	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.

F7PBOOPAT	Optical Aids and Assistive Technologies for the Visually Impaired	Z,ZK	2
F7PBOOVP	Optometry in Practice	KZ	2
F7PBOP1	Professional Training I.	Z	4

The aim of the course is to use the theoretical and practical knowledge acquired in lectures and exercises in real practice conditions. During classes, under the professional guidance of mentors (guaranteed by contract), the student gradually learns the correct procedures and adapts to work in the chosen field. Topics for professional practice are the sale, repair and adjustment of glasses, the grinding of spectacle lenses and the determination of objective and subjective refraction.

F7PBOP2	Professional Training II.	Z	20
F7PBOPO	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. Last but not least, deepening the knowledge of typographic rules, including proofreading marks, etc.

F7PBOPP	First Aid	KZ	2

The course gives a brief overview of the main principles and procedures of providing emergency first aid with special attention to the procedures for failure of basic vital functions and life threatening situations. The subject also includes situations of mass casualty of victims in crisis situations and emergencies, including the phenomenon of CBRN.

F7PBOPPP	Programming Tools and Fundamentals of Data Processing	Z	1

The course is focused on the practical mastery of such software tools, which the student will use not only during their studies, but especially will use these tools and instruments in practice. The course aims to get acquainted with modern software and focuses on office applications, processing and visualization of experimental data and graphic presentation.

	Selected topics of the course are aligned with the syllabus of the internationally recognized concept of testing computer knowledge and skills ECDL (European Computer Driving License).		
F7PBOPSO	Psychology and Communication	KZ	2
	During the lectures, students will be acquainted with the problems of psychology of patients, with mental states in diagnostic - therapeutic activities, in providing psychological assistance to patients during treatment and in coping with chronic states of the disease. Students are provided with theoretical knowledge of basic psychological procedures in communication with patients with various types and degrees of damage to health, instructions on how to manage difficult situations in care about the individual needs of the sick, disabled and dying, and also emphasizes the importance of caring for the mental state of health professionals.		
F7PBOPTDK	Prospective Technologies for Diagnostics and Vision Correction	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.		
F7PBOPVZ	Sales Skills and Employee Management	KZ	2
F7PBOPZP	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.		
F7PBOSRB	Strabology and Basics of Orthoptics	KZ	2
F7PBOSUR1	Subjective Refraction I.	Z,ZK	4
	Basic knowledges about refraction of the eye. Techniques of the subjective refraction perform testing frame or the phoropter.Techniques of the examination near vision.		
F7PBOSUR2	Subjective Refraction II.	Z,ZK	4
	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. The teaching will also cover specific and difficult refractive conditions and the relationship between refractive deficit and eye and general diseases. An essential topic is the examination of pediatric patients and patients with specific needs. An important scope of the subject is an introduction to the examination of binocular vision.		
F7PBOUO	Introduction to Optics and Optometry	Z,ZK	2
	The course summarizes the knowledge of optics and optometry and is an introductory course that will show students the possibilities of their future profession. During the lectures, students will be acquainted with the basic concepts, development, current state and future of the field studied. Students will get acquainted with the basics of ray, wave and quantum optics using selected numerical problems. Emphasis is placed on getting acquainted with the content and basic concepts of further study.		
F7PBOVKM	Selected Chapters from Mathematics for Optometrists	Z,ZK	4
	The course summarizes and systematizes the secondary school curriculum and builds on them. Students will get acquainted with the basics of linear algebra, differential and integral calculus of real functions of one real variable in applications. Emphasis is placed on the requirements of further study - solving equations of various types and their systems, modifications of trigonometric expressions and geometry of conic sections and the mutual position of the sphere and the plane.		
F7PBOVLZ	Fundamentals of Public Health Care and Legislation in Health Care	KZ	2
	Students will learn about health systems around the world as well as the history and development of organizational and reimbursement systems in health care. In relation to the organisational systems, they will also learn about the principles of health care financing, both preventive and curative, not only in the Czech Republic and the EU, but also in the world. Application of Act No. 258/2000 Coll. in relation to supervision. Supervision of the provisions of the Labour Code, particularly in the area of occupational health and safety prevention. The procedure and methods of decision-making of supervisory bodies in the event of breaches of generally applicable regulations, including internal management acts relating to health protection. Interpretation of labour law relations between the employee and the employer, rights and obligations. Legal responsibilities in the health sector.		
F7PBOVZF	Diagnostic of Visual Functions	KZ	2
	The course focuses on the examination of the visual functions of the eye. It explains the importance of individual examinations and their physiological nature. It also explains their changes in various ocular abnormalities. Great emphasis is placed on the practical mastery and understanding of each examination.		
F7PBOZFO	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.		
F7PBOZPE	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.		
F7PBOZSM	Fundamentals of Statistics and Measurement Processing	KZ	3

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