

GENERAL MEDICINE – YEAR 2

SYLLABI OF THE COURSES OFFERED TO EXCHANGE STUDENTS

YEAR 2 / SEMESTER 3

aVLBC0321c Biochemistry I - practice

Faculty of Medicine

autumn

Extent and Intensity

0/2/0. 3 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

prof. RNDr. Eva Táborská, CSc.

Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Contact Person: Monika Šudáková

Supplier department: Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Course objectives

Seminars (A) and practicals (B) have a common content. The aim of the course is to obtain knowledge on essential metabolic processes on the cellular level. Understanding of these processes is a base for comprehension of metabolism on the tissue and organ level. In the introductory lessons are summarized basic terms from chemistry needed for understanding of body structure a physico-chemical processes occurring in it (chemical composition of the body, survey of biologically important elements, water, electrolytes, non-electrolytes, osmotic pressure, acid-base, redox and precipitation reactions), the following lectures are focused on biochemical pathways in cells.

Learning outcomes

At the end of the course students will:

- understand the meaning of basic chemical terms (pH, osmolality, electrolyte, buffer, etc.) and apply this knowledge when describing the properties of body fluids.
- describe the role of macro- and microbiogenic elements in the organism
- discuss the properties and function of enzymes
- describe basic catabolic and anabolic pathways of carbohydrate, lipid and protein metabolism, and their relationships.
- understand the principles of energy production, utilization and deposition at the cellular level.

- explain the function of cell membranes and the principle of compartmentalization at the cellular level and the transport processes on the membrane.
- describe protein synthesis, starting with the replication and transcription, translation and post-translational modifications. Understand the relationship between protein structure and function.
- explain the function of hemoglobin in oxygen transport and maintaining acid-base balance.
- discuss the principles of some diseases at the molecular level.

Syllabus

- 1A: Introduction to biochemistry.
- 1B: Electrolytes, osmolality, tonicity, oncotic pressure, osmolal gap.
- 2A: Acid-base reactions, pH of body fluids.
- 2B: Buffers, Henderson-Hasselbalch equation.
- 3A: TEST 1 (sem 1A-2B). Biochemically important organic compounds I (alcohols, aldehydes).
- 3B: Biochemically important organic compounds II (carboxylic acids and derivatives).
- 4A: Bioenergetics, Gibbs energy, ATP, redox reactions.
- 4B: Enzymes, kinetics, saturation curve, inhibition.
- 5A: Cofactors of enzymes, relation to vitamins.
- 5B: Citrate cycle, respiratory chain.
- 6A: Saccharides, structures, nutrition, digestion. Transport of glucose into cells. Glycolysis.
- 6B: Metabolism of glycogen. Metabolism of fructose and galactose.
- 7A: TEST 2 (sem 3A-6B). Surfactants (types, physiological roles). Lipids (structures).
- 7B: Cell membranes, transport.
- 8A: Lipids in nutrition, digestion. Catabolism of fatty acids, ketone bodies.
- 8B: Desaturation of fatty acids. Cholesterol.
- 9A: Metabolism of bile acids, eicosanoids, phospholipids.
- 9B: Lipophilic vitamins, ROS. Lipoperoxidation.
- 10A: TEST 3 (sem 7A-9B). Amino acids, proteins, structure, properties.
- 10B: Hemoglobin, types, function, abnormal types.
- 11A: Digestion of proteins, general features of amino acid metabolism, synthesis of urea.
- 11B: Metabolism of amino acids I (catabolism, synthesis of non-essential AA, congenital disorders).
- 12A: Metabolism of amino acids II (conversions to special products, heme).
- 12B: TEST 4 (sem 10A-12A). Structure of bases, nucleosides, nucleotides, roles of nucleotides. Metabolism of purine and pyrimidine bases I.
- 13A: Metabolism of purine and pyrimidine bases II.
- 13B: DNA, RNA structure, replication, transcription.
- 14A: Protein synthesis. Post-translation modification, collagen synthesis. Credit test.
- 14B: Consultations, compensatory lessons.

Literature

required literature

- Seminar texts available in Information system

- RODWELL, Victor W., David A. BENDER, Kathleen M. BOTHAM, Peter J. KENNELLY and P. Anthony WEIL. Harper's illustrated biochemistry. Thirty-first edition. New York: McGraw-Hill, 2018. x, 789. ISBN 9781260288421.
- KOOLMAN, Jan and Klaus-Heinrich ROEHM. Color Atlas of Biochemistry. 3rd ed. Georg Thieme Verlag, 2013. ISBN 978-3-13-100373-7.

Teaching methods

Course is based on group discussion to the given topics. The outlines of discussion are in the recommended textbook. Complementary materials are available in section Study materials.

Assessment methods

Full attendance in seminars is the principal condition. If any absence, it must be apologized through Department of Study Affairs up to five days. If apology is recorded in Information System, then student is allowed to make up the absence according to teacher's instructions. Four revision tests are written in seminars, semestral limit for credit is 42. If the semestral limit is not fulfilled, student must write the Credit test (limit 14/30). All absences must be made up before writing the credit test. One repetition of the Credit test is approved. Depending on epidemiological situation, assessment method may be altered. The current conditions will be posted in IS (Study materials – Course-related instructions).

Language of instruction

English

aVLBC0321p Biochemistry I - lecture

Faculty of Medicine

autumn

Extent and Intensity

3/0/0. 3 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

doc. RNDr. Josef Tomandl, Ph.D.

Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Supplier department: Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Course objectives

The aim of the course is to obtain knowledge on essential metabolic processes on the cell level. Understanding these processes is a base for comprehension of metabolism on the tissue and organ level. In the introductory lessons are summarized basic terms from chemistry needed for an understanding of body structure physico-chemical processes occurring in it ((chemical composition of the body, survey of biologically important elements, water, electrolytes, non-electrolytes, osmotic pressure, acid-base, redox and precipitation reactions), the following lectures are focused on biochemical pathways in cells.

Learning outcomes

At the end of the course students will:

- understand the meaning of basic chemical terms (pH, osmolality, electrolyte, buffer, etc.) and apply this knowledge when describing the properties of body fluids.
- describe the role of macro- and micro-biogenic elements in the organism
- discuss the properties and function of enzymes
- describe basic catabolic and anabolic pathways of carbohydrate, lipid and protein metabolism, and their relationships.
- understand the principles of energy production, utilization and deposition at the cellular level.
- explain the function of cell membranes and the principle of compartmentalization at the cellular level and the transport processes on the membrane.
- describe protein synthesis, starting with the replication and transcription, translation and post-translational modifications.
- understand the relationship between protein structure and function.
- explain the function of hemoglobin in oxygen transport and maintaining acid-base balance.
- discuss the principles of some diseases at the molecular level.

Syllabus

- Chemical composition of the human body, biogenic elements. Water (properties, distribution), electrolytes, non-electrolytes, osmolality.
- Acid-base reactions, pH, buffers, Henderson-Hasselbalch equation.
- Bioenergetics (Gibbs energy, high-energy compounds, chemical equilibrium). Introduction to metabolism.
- Redox reactions (redox potential, Nernst-Peters equation, biological redox systems).
- Enzymes (classes, nomenclature). Characteristic features, enzyme kinetics, inhibition.
- Cofactors (overview, functions, relation to vitamins).
- Three phases of catabolism, citrate cycle, respiratory chain, oxidative phosphorylation.
- Saccharides (structures), saccharides in nutrition, digestion.
- Metabolism of glucose, transport of glucose into cells, glycolysis (aerobic, anaerobic). Pyruvate dehydrogenase complex. Gluconeogenesis.
- Glycogen (synthesis, catabolism).
- Metabolism of fructose, galactose, lactose. Pentose phosphate pathway. Glycosaminoglycans, proteoglycans.
- Lipids and fatty acids (classification, structure). Lipids in nutrition. Lipophilic vitamins.
- Digestion of lipids, surfactants. Fatty acids (structure, synthesis, catabolism).
- Triacylglycerols (synthesis and degradation). Ketone bodies (synthesis, catabolism), phospholipids (structural types, synthesis, catabolism).
- Lipid peroxidation (reactions, products, antioxidants). Eicosanoids (main features of synthesis). Cholesterol (structure, synthesis, regulation, conversions).
- Bile acids (structure, synthesis, conversions). Calcitriol (structure, synthesis, conversions).

- Amino acids (structure, properties). Peptides. Proteins (structure, folding, properties, structure of myosin, collagen, immunoglobulins).
- Hemoglobin, myoglobin (structure, functions, Bohr effect), hemoglobinopathies.
- Digestion of proteins, intracellular degradation of proteins.
- General features in the metabolism of amino acids. Ammonia – sources, transport forms, detoxication.
- Catabolism of individual amino acids. Congenital disorders of amino acids metabolism.
- Synthesis of non-essential amino acids.
- Conversions of amino acids to specialized products (synthesis of biogenic amines, creatine, NO, melanin, iodothyronines, carnosine).
- Synthesis of heme, porphyrias.
- Structure of nucleosides and nucleotides, uric acid. Synthesis and catabolism of purine and pyrimidine bases, synthesis of nucleotides.
- Structure of DNA, replication, repairs.
- Structure of RNA, transcription and its regulation, processing.
- Synthesis of proteins, folding. Transport and sorting of proteins, post-translational modifications.
- Biosynthesis of collagen, elastin, proteoglycans.

Literature

required literature

- RODWELL, Victor W., David A. BENDER and Kathleen M. BOTHAM. *Harper's illustrated biochemistry*. 30th ed. New York: Mc Graw- Hill, 2015. xii, 817. ISBN 9781259252860.

recommended literature

- LIEBERMAN, Michael and Alisa PEET. *Marks' basic medical biochemistry: a clinical approach*. Illustrated by Matthew Chansky. 5th edition. Philadelphia: Wolters Kluwer, 2018. xii, 1051. ISBN 9781496387721.
- VASUDEVAN, D. M., S. SREEKUMARI and Kannan VAIDYANATHAN. *Textbook of biochemistry for medical students*. Eighth edition. New Delhi: Jaypee The Health Sciences Publisher, 2016. xvi, 718. ISBN 9789385999741.
- KOOLMAN, Jan and Klaus-Heinrich ROEHM. *Color Atlas of Biochemistry*. 3rd ed. Georg Thieme Verlag, 2013. ISBN 978-3-13-100373-7.
- RONNER, Peter. *Netter's Essential Biochemistry*. Philadelphia: Elsevier, 2018. 482 pp. ISBN 978-1-929007-63-9.

Teaching methods

Lectures.

Assessment methods

Students pass to continuing education in next semester without any duty of knowledge checking in this semester.

Language of instruction

English

aVLBC0321s Biochemistry I - seminar

Faculty of Medicine

autumn

Extent and Intensity

0/4/0. 7 credit(s). Type of Completion: z (credit).

Taught in person

Supervisor

doc. RNDr. Josef Tomandl, Ph.D.

Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Supplier department: Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Course objectives

The aim of the course is to obtain knowledge on essential metabolic processes on the cellular level. Understanding these processes is a base for comprehension of metabolism on the tissue and organ level. Introductory lessons summarize the basic terms of chemistry needed for an understanding of body structure and physico-chemical processes occurring in it (chemical composition of the body, biologically important elements, water, electrolytes, non-electrolytes, osmotic pressure, acid-base, redox and precipitation reactions), the following lectures are focused on biochemical pathways in cells.

Learning outcomes

At the end of the course, students will be competent to:

- understand the meaning of basic chemical terms (pH, osmolality, electrolyte, buffer, etc.) and apply this knowledge when describing the properties of body fluids.
- describe the role of macro/microbiogenic elements in the body.
- discuss the properties and function of enzymes
- describe basic catabolic and anabolic pathways of carbohydrates, lipids, and protein metabolism, and their relationships.
- understand the principles of energy production, utilization and deposition at the cellular level.
- explain the function of cell membranes and the principle of compartmentalization at the cellular level and the transport processes on the membrane.
- describe protein synthesis, starting with the replication and transcription, translation and post-translational modifications.
- understand the relationship between protein structure and function.
- explain the function of hemoglobin in oxygen transport and maintaining acid-base balance.
- discuss the principles of some diseases at the molecular level.

Syllabus

- Electrolytes, osmolality, tonicity, oncotic pressure, osmolal gap.
- Acid-base reactions, pH of body fluids.
- Buffers, Henderson-Hasselbalch equation.
- Biochemically important organic compounds I (alcohols, aldehydes).
- Biochemically important organic compounds II (carboxylic acids and derivatives).
- Bioenergetics, Gibbs energy, ATP, redox reactions.
- Enzymes, kinetics, saturation curve, inhibition.
- Cofactors of enzymes, relation to vitamins.
- Citrate cycle, respiratory chain.
- Saccharides, structures, nutrition, digestion. Transport of glucose into cells. Glycolysis.
- Metabolism of glycogen. Metabolism of fructose and galactose.
- Surfactants (types, physiological roles). Lipids (structures).
- Biological membranes. Membrane transport.
- Lipids in nutrition, digestion. Catabolism of fatty acids, ketone bodies.
- Desaturation of fatty acids. Cholesterol.
- Metabolism of bile acids, eicosanoids, phospholipids.
- Lipophilic vitamins, ROS. Lipid peroxidation.
- Amino acids, proteins, structure, properties.
- Hemoglobin, types, function, abnormal types.
- Digestion of proteins, general features of amino acid metabolism, synthesis of urea.
- Metabolism of amino acids I (catabolism, synthesis of non-essential AA, congenital disorders).
- Metabolism of amino acids II (conversions to special products, heme).
- Structure of bases, nucleosides, nucleotides, roles of nucleotides. Metabolism of purine and pyrimidine bases I.
- Metabolism of purine and pyrimidine bases II.
- DNA, RNA structure, replication, transcription.
- Protein synthesis. Post-translation modification, collagen synthesis.

Literature

required literature

Seminar texts available in Information system

- RODWELL, Victor W., David A. BENDER, Kathleen M. BOTHAM, Peter J. KENNELLY and P. Anthony WEIL. Harper's illustrated biochemistry. Thirty-first edition. New York: McGraw-Hill, 2018. x, 789. ISBN 9781260288421.

recommended literature

- LIEBERMAN, Michael and Alisa PEET. Marks' basic medical biochemistry : a clinical approach. Illustrated by Matthew Chansky. 5th edition. Philadelphia: Wolters Kluwer, 2018. xii, 1051. ISBN 9781496387721.
- KOOLMAN, Jan and Klaus-Heinrich ROEHM. Color Atlas of Biochemistry. 3rd ed. Georg Thieme Verlag, 2013. ISBN 978-3-13-100373-7.
- VASUDEVAN, D. M., S. SREEKUMARI and Kannan VAIDYANATHAN. Textbook of biochemistry for medical students. Eighth edition. New Delhi: Jaypee The Health Sciences Publisher, 2016. xvi, 718. ISBN 9789385999741.

Teaching methods

Seminar. The course is based on group discussion on the given topics. The outlines of discussion are in the recommended textbook. Complementary materials are available in section Study materials in IS MUNI.

Assessment methods

Course-unit credit. Conditions for giving the course-unit credit (both conditions should be met):

- Full attendance in lessons. All absences should be justified and then made up.
- At least 70% success rate from partial revision tests or 50% success rate in credit test, the resit credit test can be taken only once.

The detailed conditions are posted in Information System (Study materials – Course-related instructions).

Language of instruction

English

aVLFY0321c Physiology I - practice

Faculty of Medicine

autumn

Extent and Intensity

0/3/0. 3 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

prof. MUDr. Marie Nováková, Ph.D.

Department of Physiology – Theoretical Departments – Faculty of Medicine

Contact Person: MUDr. Zuzana Nováková, Ph.D.

Supplier department: Department of Physiology – Theoretical Departments – Faculty of Medicine

Course objectives

To teach student clinically relevant examination methods and interpretation of their results in the context of physiology.

Learning outcomes

At the end of the course, students should be able:

- to apply practically the methods used for examination of the functions of human organ systems
- to interpret the acquired records with respect to physiological processes taking place in human organisms.
- to derive and calculate other parameters and indices routinely used in clinical practice.

- to evaluate the results acquired both by measurement and by calculation, and to explain possible deviations.

Syllabus

Erect posture examination. Estimation of reaction time using the computer. Examination of reflexes in man. Recording of Achilles' tendon reflex. Skin sensation and general physiology of the skin. Cutaneous sense organs. Signal detection by PowerLab system – instructions. EOG - electrooculography. Vertigo and nystagmus. EEG - electroencephalography. Evoked potentials. Estimation of visual acuity. Accomodation. Scheiner's experiment. Visual field and blind spot. Examination of color blindness. Astigmatism. Higher cognitive functions –reading. Pneumography. Spirometric examination. Recording of forced vital capacity. Red blood cell count. Estimation of hemoglobin concentration and mean corpuscular hemoglobin. Calculated parameters of red blood cells. Estimation of blood group by slide method. Pneumography. Estimation of airway resistance. Erythrocyte sedimentation rate. Estimation of osmotic resistance of red blood cells.

Literature

required literature

- NOVÁKOVÁ, Marie. *Physiology and neuroscience practicals*. 1. dotisk 1. vyd. Brno: Masarykova univerzita, 2017. 149 pp. ISBN 978-80-210-6369-3.

Teaching methods

The course is organized in the form of laboratory practices where students examine each other by a given method, and they prepare the report from measured data.

Assessment methods

Credits are given on the basis of full attendance in practices, handling of all laboratory reports and passing the credit test. Students can be examined (oral or written form) during the semester from current topics.

Language of instruction

English

aVLFY0321p Physiology I - lecture

Faculty of Medicine

autumn

Extent and Intensity

3/0/0. 3 credit(s). Type of Completion: z (credit).

Guaranteed by

prof. MUDr. Marie Nováková, Ph.D.

Department of Physiology – Theoretical Departments – Faculty of Medicine

Contact Person: MUDr. Zuzana Nováková, Ph.D.

Supplier department: Department of Physiology – Theoretical Departments – Faculty of Medicine

Course objectives

To teach students to understand and interpret various functions of human body.

Learning outcomes

At the end of the course, students will:

- have sufficient theoretical background required for profession of physician.
- be able to recall principles of human body functions in detail – from a cell level, across particular organs to a complex human organism.
- be able to explain relationships among chemical, physical and biological factors of living processes.
- An essential aim is that students acquire critical scientific thinking, ability of independent text analysis and fundamental information selection.

Syllabus

- Introduction to study. Structural and functional organization of the living systems. Internal environment (homeostasis). Physiology of cell membranes. Excitable tissues. Introduction to neuroscience – the regulatory role of the nervous system (NS). The cellular base of NS. Synapse and integration of information at the synaptic level. Hierarchy and evolution of NS. Somatosensitivity, viscerosensitivity, proprioception and pain. Olfactory and gustatory systems. Auditory and vestibular systems. Vision. Motor system. Autonomic nervous system. Limbic system. Neocortex. The highest functions of the nervous system. General principles of endocrine functions. Hypothalamus. Adenohypophysis. Thyroid gland. Regulation of calcium metabolism. Regulation of endocrine pancreas. Adrenal gland. Stress. Physiology of reproduction. Physiology of pregnancy. Physiology of parturition and lactation. Physiology of blood. Blood clotting. Blood types (groups). Plasma proteins. Immune system.

Literature

required literature

- BORON, Walter a Emile L. BOULPAEP. *Medical Physiology*. 3rd edition. Elsevier 2016. ISBN 9781455743773

recommended literature

- BARRETT, Kim E., Scott BOITANO, Susan M. BARMAN and Heddwen L. BROOKS. *Ganong's review of medical physiology*. Twenty-fifth edition. Chicago: McGraw-Hill, 2016. xi, 750. ISBN 9781259255380.
- HALL, John E. *Guyton and Hall textbook of medical physiology*. 13th edition. Philadelphia, PA: Elsevier, 2016. xix, 1145. ISBN 9781455770052.
- SILBERNAGL, Stefan and Agamemnon DESPOPOULOS. *Color atlas of physiology*. 6th ed., completely rev. and. New York: Thieme, 2009. xiii, 441. ISBN 9783135450063.

Teaching methods

Lessons are led in the form of lectures.

Assessment methods

Students pass to continuing education in next semester without any duty of knowledge checking in this semester.

Language of instruction

English

aVLFY0321s Physiology I - seminar

Faculty of Medicine

autumn

Extent and Intensity

0/1/0. 2 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

prof. MUDr. Marie Nováková, Ph.D.

Department of Physiology – Theoretical Departments – Faculty of Medicine

Contact Person: MUDr. Zuzana Nováková, Ph.D.

Supplier department: Department of Physiology – Theoretical Departments – Faculty of Medicine

Course objectives

To teach students to understand and interpret various functions of human body.

Learning outcomes

After finishing the course, students will be able to understand the terms used in the general and systemic physiology of man. Students will acquire the knowledge necessary for analysis and subsequent interpretation of phenomena taking place on cell, tissue and organ levels as well as on the level of the whole human organism.

Syllabus

I. Intercellular contact. Resting membrane potential. Action potential. II. Nerve as an excitable tissue. Glial cells. Synapses. Neuromuscular junction. III. Autonomic nervous system (ANS) – overview. ANS - the roles and divisions. ANS regulation in organs - the principles of regulation. IV. General principles of endocrine physiology. Humoral regulation of mineral and water metabolism. Regulation of glycemia. Humoral regulation of energy production. Endocrine component of the stress response. V. General principles of endocrine physiology - related to reproduction. Cyclic changes in the reproductive system. Pregnancy. Physiology of parturition. Lactation. VI. Circulation and hemostasis. Primary hemostasis and platelets. Hemocoagulation. Regulation of hemostasis. Clinical applications.

Literature

required literature

- BORON, Walter F. and Emile L. BOULPAEP. *Medical physiology*. Third edition. Philadelphia: Elsevier, 2017. xii, 1297. ISBN 9781455743773.

recommended literature

- HALL, John E. and Arthur C. GUYTON. *Guyton and Hall textbook of medical physiology*. 12th ed. Philadelphia, Pa.: Saunders/Elsevier, 2011. xix, 1091. ISBN 9781416045748.
- BARRETT, Kim E. *Ganong's review of medical physiology*. 23rd ed. Maidenhead: McGraw-Hill, 2010. ix, 714. ISBN 9780071270663.
- SILBERNAGL, Stefan and Agamemnon DESPOPOULOS. *Color atlas of physiology*. 6th ed., completely rev. and. New York: Thieme, 2009. xiii, 441. ISBN 9783135450063.

Teaching methods

Tuition is done in the form of a seminar. Students must read the literature of a particular area of physiology in advance and they intensify their knowledge in discussion with the teacher.

Assessment methods

The course-unit credit is conditioned by full attendance and 60% control of preparedness in the seminars (control test at the beginning of seminar - 6 and more points).

Language of instruction

English

YEAR 2 / SEMESTER 4

aVLLM0421c Medical Microbiology I - practice

Faculty of Medicine

spring

Extent and Intensity

0/3/0. 3 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

prof. MUDr. Filip Růžička, Ph.D.

Department of Microbiology – Institutions shared with St. Anne's Faculty Hospital – Faculty of Medicine

Contact Person: MUDr. Ondřej Zahradníček

Supplier department: Department of Microbiology – Institutions shared with St. Anne's Faculty Hospital – Faculty of Medicine

Course objectives

At the end of this course, students should be able to understand main diagnostic methods in medical microbiology.

Learning outcomes

At the end of this course, students should be able:

to prepare a wet mount, Gram-stained preparation, to observe the results in a microscope, to list other staining methods

to list culture media, their use, differences between them, to reinoculate a strain/specimen to a culture medium

to identify bacteria and yeasts by means of various methods of biochemical identification and other identification methods

to describe antibiotic susceptibility/resistance testing methods and to read their results

to describe animal experiment (only basically)

to read results of nucleic acid detection in microbiology (only basically)

to describe methods detecting antigens or antibodies, their use for antibody detection/antigen detection in specimen/antigen analysis of a strain; to read the results of these methods including titers, titer dynamics, detection of IgM/IgA/IgG; to interpret the results; to describe precipitation, agglutination, agglutination on carriers, complement-fixing test, neutralisation reaction, immunofluorescence, radioimmunoassay, ELISA, Western blotting

Besides that, students will be able to describe the basis of medical virology

Syllabus

- J01 Safety in a laboratory, technique of work with loop, wet mount. Gram staining, demonstration of more staining methods. Demonstration of pictures of various organisms and structures in Gram staining.
- J02 Bacterial culture
- J03 Physiology of bacteria, identification according to biochemical activity and virulence factor determination
- J04 Molecular methods in microbiology
- J05 Microbes and outer influences, decontamination methods
- J06 Testing of bacterial susceptibility to antimicrobial drugs, detection of resistance factors
- J07 Biofilm infections
- J08 Introduction to serology, agglutination and precipitation, dilution and measuring titres
- J09 Following dynamics of titres, complement-fixing test, neutralisation
- J10 Reactions with labeled components (IMF, RIA, ELISA) including immunoblotting
- J11 Medical virology I (hepatitis, HIV, herpesviruses)
- J12 Medical virology II (influenza, respiratory viruses, tick-borne encephalitis)
- J13 Medical parasitology (basics)
- J14 Medical mycology (basics)
- J15 No practical sessions (only exceptionally individual substitutions)

Literature

required literature

- *Medical microbiology : a guide to microbial infections : pathogenesis, immunity, laboratory diagnosis and control*. Edited by David Greenwood. 18th ed. Edinburgh: Churchill Livingstone, 2012. xvi, 778. ISBN 9780702040900.

recommended literature

- *Mims' medical microbiology*. Edited by Richard V. Goering - Cedric A. Mims. 4th ed. Philadelphia, PA: Mosby Elsevier, 2008. xi, 656. ISBN 9780808923725.
- *Manual of clinical microbiology*. Edited by James Versalovic. 10th ed. Washington: ASM Press, 2011. xxiii, 126. ISBN 9781555814632.
- BJARNSHOLT, Thomas, Claus MOSER and Niels HØIBY. *Biofilm Infections*. : Springer, 2011. ISBN 978-1-4419-6084-9. [e-book](#)

not specified

- Book No 1 + lectures + all materials from practical sessions are basic for the examination. Other books are recommended.

Teaching methods

practical training in lab

self-study with use of e-learning materials

Assessment methods

Conditions for credits:

(1) absolving all practicals, with the following notes:

- no substitution is needed for one justified absence + one without official justification
- in case of more justified absences, some form of substitution (e. g. some homework) is needed
- not justified absences (except that one "sick day") are not allowed

(2) complete laboratory report (signature of a teacher is not necessary)

(3) successfully written final test (usually 10 multiple choice questions, each for one point; 7 points needed)

(4) all ROPOT questionnaires completed successfully; if they are always fulfilled in time (prior to particular lab session), the student has a bonus of one point for the final test

Language of instruction

English

aVLLM0421p Medical Microbiology I - lecture

Faculty of Medicine

spring

Extent and Intensity

1/0/0. 1 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

prof. MUDr. Filip Růžička, Ph.D.

Department of Microbiology – Institutions shared with St. Anne's Faculty Hospital – Faculty of Medicine

Contact Person: MUDr. Ondřej Zahradníček

Supplier department: Department of Microbiology – Institutions shared with St. Anne's Faculty Hospital – Faculty of Medicine

Course objectives

At the end of the course, students should be able to understand basic terms and principles in medical microbiology.

Learning outcomes

At the end of the course student should be able to:

define microbial morphology and physiology, basics of microbial genetics

describe microbial biofilm and its properties

define pathogenicity and virulence, factors of pathogenicity and virulence, pathogenesis and course of infection

discuss antimicrobial immunity, active and passive immunisation

describe tenacity of microorganisms, basic principles and practical use of decontamination methods

Syllabus

- The syllabus of knowledge from both terms (VLLM0421p, VLLM0521p) is uploaded in the Study materials in pdf format:
https://is.muni.cz/auth/el/med/jaro2022/aVLLM0421p/um/2022_Syllabus_of_Medical_Microbiology.pdf Particular lectures for VLLM0421p: 1. Introduction to microbiology & Microbes and environment
- 2. Antibiotics I.
- 3. Antibiotics II.
- 4. Antibiotics III.
- 5. Antibiotics IV.
- 6. Antibiotics V.
- 7. Other antimicrobials
- 8. Principles of antimicrobial treatment
- 9. Pathogenicity and virulence
- 10. Microbial biofilm
- 11. Microbes and the host
- 12. Microbes and host immunity
- 13. Notes to special microbiology I.

- 14. Notes to special microbiology II.

Literature

required literature

- *Medical microbiology : a guide to microbial infections : pathogenesis, immunity, laboratory diagnosis and control.* Edited by David Greenwood. 18th ed. Edinburgh: Churchill Livingstone, 2012. xvi, 778. ISBN 9780702040900.

recommended literature

- *Mims' medical microbiology.* Edited by Richard V. Goering - Cedric A. Mims. 4th ed. Philadelphia, PA: Mosby Elsevier, 2008. xi, 656. ISBN 9780808923725.
- MURRAY, Patrick R., Ken S. ROSENTHAL and George S., et al. KOBAYASHI. *Medical microbiology.* 6th ed. St. Louis: Mosby, 2008. 960 pp. ISBN 0-323-05470-6.
- BJARNSHOLT, Thomas, Claus MOSER and Niels HØIBY. *Biofilm Infections.* : Springer, 2011. ISBN 978-1-4419-6084-9. [e-book](#)
- Book No 1 + lectures + all materials from practical sessions are basic for the examination. Other books are recommended.

Teaching methods

lecture

Assessment methods

This is the first part of lectures, no specific end. After the second block of lectures (aVLLM0522p) there is the practical and theoretical examination.

Language of instruction

English

aVLBC0422c Biochemistry II - practice

Faculty of Medicine

spring

Extent and Intensity

0/3/0. 2 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

doc. RNDr. Josef Tomandl, Ph.D.

Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Contact Person: RNDr. Hana Paulová, CSc.

Supplier department: Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Course objectives

Course is complementary to aVLBC0422p. The aim of the course is to bring experience with solving practical problems in clinical biochemistry, to acquire practical laboratory skills and to learn students to use results of biochemical analysis for diagnostics.

Learning outcomes

The student will be able:

- to explain the ways of obtaining biological material for biochemical analysis and is familiar with the rules of manipulation.
- to describe physiological values of the most important biochemical parameters.
- to interpret the results of biochemical analyzes, discusses the significance of the findings.
- to understand the principles of the most important biochemical-analytical methodologies.
- to be oriented in basic laboratory manipulations.

Syllabus

Introduction to practice - organization, work and safety principles, principles of pipetting

Selected examinations of glucose metabolism - P/B/U-glucose, glycemic profile, OGTT, U-ketone bodies

Selected examinations of lipid and cholesterol metabolism - S/B-cholesterol, S-TG, S-LDL/HDL/non-HDL-cholesterol

Selected liver tests - ALT/AST, S/U-bilirubin, U-UBG

Investigation of proteins in blood serum - S-total protein, S-albumin, electrophoresis, S/B-CRP, S-ferritin

Selected kidney examinations - S/U-creatinine, creatinine clearance, eGFR, FR and FE water, U-proteins, U-albumin, S/U-urea, nitrogen balance

Chemical qualitative analysis of urine - diagnostic strips

Selected examinations of urolithiasis - S/U-uric acid, stones

Literature

required literature

- Study materials for the course in IS MUNI.

Teaching methods

Laboratory practical classes

Assessment methods

Course-unit credit.

Conditions for giving the course-unit credit (all conditions should be met):

- completion of all classes, missed exercises must be made up,
- elaboration and approval of all protocols.

The detailed conditions are posted in IS MUNI (Study materials – Course-related instructions).

Language of instruction

English

aVLBC0422p Biochemistry II - lecture

Faculty of Medicine

spring

Extent and Intensity

2/0/0. 4 credit(s). Type of Completion: zk (examination).

Taught in person.

Guaranteed by

doc. RNDr. Josef Tomandl, Ph.D.

Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Supplier department: Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Course objectives

The course extends the knowledge of biochemistry acquired in the course Biochemistry I and deals with the integration of biochemical processes in the human body. The aim is to understand biochemical processes characteristic of individual tissues and organs and principles of their regulation. It focuses on the relationship between health and disease from a biochemical point of view. It points to the links between biochemical principles and other medical subjects such as physiology, immunology, pharmacology, toxicology and others. It is also an introduction to clinical biochemistry.

Learning outcomes

After completing the course, the student will be able to:

- explain the interrelationships between the metabolism of nutrients in different states of the organism.
- describe the metabolic characteristics of the main organs and tissues and the main disorders, and discuss their connection with diseases.
- explain the principles of metabolism regulation at all levels.
- understand the principles of maintaining homeostasis in the organism and acid-base balance, including solving model situations.
- discuss the composition of body fluids and their disorders in connection with the principles of homeostasis.

Syllabus

- Blood plasma lipids. Metabolism of lipoproteins.
- Overview of nutrient metabolism in different states.
- Metabolic functions of liver. Catabolism of heme. Biochemical tests for liver diseases.
- Metabolism of iron and copper. Biotransformation of xenobiotics. Metabolism of ethanol.
- Water and Na⁺, K⁺ ions balance, osmolality and volume of ECF.
- Acid-base balance. Transport of O₂ and CO₂. Buffer bases. Parameters of acid-base status.
- Biochemical functions of kidneys. Glomerular filtration. Tubular resorption and secretion.
- General mechanisms of action of signal molecules. Hormone receptors.
- Steroid and thyroid hormones.
- Nervous tissue. Cerebrospinal fluid. Neurosecretion. Neurotransmitters and their receptors.
- Endothelial cells. Blood-coagulation cascade, inhibition of clotting. Fibrinolysis.
- Metabolism of calcium, magnesium, phosphates, fluorine, and iodine.
- Extracellular matrix. Bone tissue. Articular cartilage and skin.
- Biochemistry of blood cells. Major proteins of blood plasma.

Literature

required literature

- RODWELL, Victor W., David A. BENDER and Kathleen M. BOTHAM. Harper's illustrated biochemistry. 30th ed. New York: Mc Graw- Hill, 2015. xii, 817. ISBN 9781259252860.
- Study materials for the course Biochemistry II in IS MUNI.

recommended literature

- LIEBERMAN, Michael and Alisa PEET. Marks' basic medical biochemistry : a clinical approach. Illustrated by Matthew Chansky. 5th edition. Philadelphia: Wolters Kluwer, 2018. xii, 1051. ISBN 9781496387721.
- RONNER, Peter. Netter's Essential Biochemistry. Philadelphia: Elsevier, 2018. 482 pp. ISBN 978-1-929007-63-9.
- KOOLMAN, Jan and Klaus-Heinrich ROEHM. Color Atlas of Biochemistry. 3rd ed. Georg Thieme Verlag, 2013. ISBN 978-3-13-100373-7.
- VASUDEVAN, D. M., S. SREEKUMARI and Kannan VAIDYANATHAN. Textbook of biochemistry for medical students. Eighth edition. New Delhi: Jaypee The Health Sciences Publisher, 2016. xvi, 718. ISBN 9789385999741.
- Recommended literature from medical physiology in the course aVLFY0422p.

Teaching methods

Lectures

Assessment methods

Oral exam. The student will randomly draw two questions from Biochemistry I and two questions from Biochemistry II. The student answers without preparation.

Language of instruction

English

aVLBC0422s Biochemistry II - seminar

Faculty of Medicine

spring

Extent and Intensity

0/3/0. 3 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

doc. RNDr. Josef Tomandl, Ph.D.

Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Contact Person: RNDr. Hana Paulová, CSc.

Supplier department: Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Course objectives

Seminars are complementary to the course Biochemistry II - lecture. The aim of the course is to practise (i) the basic principles of intermediary metabolism and its regulation in various states of the organism at all levels, (ii) the characteristic features of metabolism of individual organs and tissues, (iii) the principles of maintaining homeostasis of the organism, including acid-base balance.

Learning outcomes

The student will be able:

- to explain the interrelationship between the metabolism of nutrients under different states of the organism.
- to describe the metabolic characteristics of major organs and tissues and major disorders, discusses their association with diseases.
- to understand and discuss principles of maintaining homeostasis and acid-base balance in the organism, including modelling situations
- to discuss the composition of body fluids and their disorders in connection with the principles of homeostasis.
- to explain the principles of metabolism regulation at all levels.

Syllabus

- Enzyme assays in clinical diagnostics. Methods in clinical biochemistry. Analysers, POCT.
- Blood glucose. Protein metabolism. Proteins in nutrition. Transport forms of ammonia.
- Lipoproteins and their metabolism. Cholesterol transport and balance.
- Relationships between major metabolic pathways of essential nutrients in various states. Malnutrition. Obesity. Metabolic syndrome. Metabolism during stress.
- Liver functions, role in nutrient metabolism. Heme catabolism, hyperbilirubinemia. Role of liver in metabolism of hormones and vitamins. Metabolism of Fe.
- Biotransformation of xenobiotics. Metabolism of ethanol.

- Water and mineral metabolism. Sodium and water homeostasis, osmolality and volemia.
- Acid-base balance, parameters, regulation, disorders. Buffer bases. Transport of O₂ and CO₂.
- Major functions of kidneys. Glomerular filtration. Tubular resorption and secretion.
- Neurotransmitters and hormone receptors. The most common signal pathways.
- Steroid and thyroid hormones.
- Biochemistry of muscle work. Effect of NO. Energetics of muscle work.
- Metabolism of Ca, Mg, P, F, I.
- Extracellular matrix. Metabolism of connective tissue and skin, bone biomarkers.

Literature

required literature

- Study materials for the course Biochemistry II in IS MUNI.
- RODWELL, Victor W., David A. BENDER, Kathleen M. BOTHAM, Peter J. KENNELLY and P. Anthony WEIL. Harper's illustrated biochemistry. Thirty-first edition. New York: McGraw-Hill, 2018. x, 789. ISBN 9781260288421.

recommended literature

- LIEBERMAN, Michael, Allan D. MARKS and Alisa PEET. Marks' basic medical biochemistry : a clinical approach. Illustrated by Matthew Chansky. 4th ed. Baltimore: Lippincott, Williams & Wilkins, 2013. ix, 1014. ISBN 9781451100037.
- Recommended literature from medical physiology in the course aVLFY0422p.

Teaching methods

Seminary course. Class discussions on assigned topics.

Assessment methods

Course-unit credit.

Conditions for giving the course-unit credit (all conditions should be met):

- completion of all lessons, missed lessons must be made up,
- minimal success rate of 70 % from the sum of all revision tests or minimal success rate of 50 % from the credit test. The resit credit test can be taken only once.

The detailed conditions are posted in IS MUNI (Study materials – Course-related instructions).

Language of instruction

English

aVLBC0422t Biochemistry II Laboratory Medicine - seminar

Faculty of Medicine

spring

Extent and Intensity

0/1.3/0. 2 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

doc. RNDr. Josef Tomandl, Ph.D.

Department of Biochemistry - Theoretical Departments - Faculty of Medicine

Contact Person: RNDr. Hana Paulová, CSc.

Supplier department: Department of Biochemistry - Theoretical Departments - Faculty of Medicine

Course objectives

The course combines theoretical biochemistry knowledge with clinical applications.

The aim of the course is to provide information about the importance of clinical biochemistry and its implementation, factors affecting laboratory results, the importance of biological variability and its application in the evaluation of results, diagnostic effectiveness of laboratory tests. The aim of the course is also to acquaint students in more detail with some specific biochemical tests, such as disorders of carbohydrate metabolism, liver and heart disease, assessment of renal function, and examination of urine and cerebrospinal fluid.

Learning outcomes

After completing the course, the student will be familiar:

- have an idea of the importance of clinical-biochemical examinations, their implementation, factors influencing the results and their control.
- have an idea of biological variability, evaluation of results and diagnostic effectiveness of laboratory tests.
- familiar with biochemical examinations in liver diseases, carbohydrate metabolism disorders and cardiovascular diseases.
- familiar with examinations of renal function, acid-base balance and its disorders, examination of urine and cerebrospinal fluid.

Syllabus

- Factors influencing results of laboratory examinations, preanalytical factors. Collection and processing of blood. Communicating results of biochemical examination
- Analytical factors influencing results of laboratory examinations. Validation and interpretation of results, critical difference. Diagnostic accuracy.
- Biochemical examinations in diabetes mellitus. Laboratory control of the disease.
- Biochemical investigations of lipid metabolism. Atherosclerosis risk factors.
- Laboratory tests in myocardial infarction.
- Biochemical examinations of liver diseases, laboratory diagnostics of hyperbilirubinemia. Laboratory examination of specific liver diseases.
- Laboratory examination of the gastrointestinal tract.
- Urine sampling and collection. Physical and chemical examination of urine.
- Examination of glomerular filtration. Examination of renal tubular function. Examination for urolithiasis.
- Cerebrospinal fluid analysis.

Literature

required literature

- Study materials for the course available in IS MUNI.

recommended literature

- Rajdl. D. a kol. Clinical biochemistry (e-book, formats: .pdf, .epub, .mobi) 1st ed. Prague, Karolinum Press, 2016, 426 s. ISBN: 978-80-246-3497-5. Download: <https://karolinum.cz/en/books/rajdl-clinical-biochemistry-17096>

not specified

- Study materials for the course in IS MUNI.

Teaching methods

Seminars, active discussions of problems, biochemical case reports.

Assessment methods

Conditions for giving the course-unit credit (all conditions should be met):

- completion of all lessons, missed lessons must be made up,
- minimal success rate of 70 % from the sum of all revision tests or minimal success rate of 50 % from the credit test. The resit credit test can be taken only once.
The detailed conditions are posted in IS MUNI (Study materials – Course-related instructions).

Language of instruction

English

aVLFY0422c Physiology II - practice

Faculty of Medicine

spring

Extent and Intensity

0/3/0. 3 credit(s). Type of Completion: z (credit).

Taught in person.

Guaranteed by

prof. MUDr. Marie Nováková, Ph.D.

Department of Physiology – Theoretical Departments – Faculty of Medicine

Contact Person: MUDr. Zuzana Nováková, Ph.D.

Supplier department: Department of Physiology – Theoretical Departments – Faculty of Medicine

Course objectives

To teach student clinically relevant examination methods and interpretation of their results in the context of physiology.

Learning outcomes

At the end of the course, students should be able:

- to apply practically the methods used for examination of the functions of human organ systems.
- to interpret the acquired records with respect to physiological processes taking place in human organisms.
- to derive and calculate other parameters and indices routinely used in clinical practice.
- to evaluate the results acquired both by measurement and by calculation, and to explain possible deviations.

Syllabus

- Evaluation of nutritional state. Evaluation of sensitivity of respiratory centre to hypercapnia. Recruitment and summation in skeletal muscle. Blood pressure in man. Non-invasive methods of blood pressure measurement. Measurement of basic metabolic rate (BMR). Energy output in change of body position. Repay of oxygen debt. Calculation of energy expenditure. Examination of pulse by palpation. Ergometry. ECG. Blood flow in forearm (Pletysmography). Digital model of aortic function (a simulation program). Blood flow in veins. Apex beat, heart sounds. Systolic time intervals. Measurement of pulse wave velocity. Sphygmography.

Literature

required literature

- NOVÁKOVÁ, Marie. *Physiology and neuroscience practicals*. 1. dotisk 1. vyd. Brno: Masarykova univerzita, 2017. 149 pp. ISBN 978-80-210-6369-3.

Teaching methods

The course is organized in the form of laboratory practices where students examine each other by given method, and they prepare the report from measured data.

Assessment methods

Credits are given on the basis of full attendance in practices and handling of all laboratory reports and successfully passed credit test (70% and more). The knowledge of current topic can be tested (written or oral form).

Language of instruction

English

aVLFY0422p Physiology II - lecture

Faculty of Medicine

spring

Extent and Intensity

4/0/0. 5 credit(s). Type of Completion: zk (examination).

Taught in person.

Supervisor

prof. MUDr. Marie Nováková, Ph.D.

Department of Physiology – Theoretical Departments – Faculty of Medicine

Contact Person: MUDr. Zuzana Nováková, Ph.D.

Supplier department: Department of Physiology – Theoretical Departments – Faculty of Medicine

Course objectives

At the end of the course, students will have sufficient theoretical background required for profession of physician. Student should be able to recall principles of human body functions in detail - from a cell level, across particular organs to a complex human organism. Students will be able to explain relationships among chemical, physical and biological factors of living processes. An essential aim is that students acquire critical scientific thinking, ability of independent text analysis and fundamental information selection.

Learning outcomes

Student will be able:

- to describe all physiological functions in human body and eventual consequences of their failure.

Syllabus

- Skeletal, smooth and heart muscle. Respiratory functions. Pulmonary mechanics. Gas transport. Respiration under various physiological conditions. Regulation of respiration. Functional morphology of the kidney. Clearance. Counter-current system. Regulation of kidney functions. Metabolism of saccharides, lipids and proteins. Energy metabolism. Vitamins, minerals and water in nutrition. GIT - mechanical functions. GIT – secretory functions. GIT - resorption and other functions. Coordination in GIT. Regulation of food intake. Physiology of the heart. Conduction system. Cardiac electrophysiology. Electromechanical coupling. Electrocardiography. Arrhythmias. Cardiac mechanics. Heart cycle. Heart failure. Regulation of blood circulation, blood pressure. Variability of circulatory parameters. Rheology of the blood. Microcirculation. Circulatory failure. Regulation of blood flow. Coronary circulation. Regional circulation (pulmonary, skin, muscle, cerebral, splanchnic, renal, fetal). Circulatory reactions. Thermoregulation. Physiology of exercise. Physiology of adaptation. Kidney in regulation of homeostasis. Physiology of childhood and adolescence, aging.

Literature

required literature

- BORON, Walter F. and Emile L. BOULPAEP. *Medical physiology*. Third edition. Philadelphia: Elsevier, 2017. xii, 1297. ISBN 9781455743773.

recommended literature

- HALL, John E. and Arthur C. GUYTON. *Guyton and Hall textbook of medical physiology*. 12th ed. Philadelphia, Pa.: Saunders/Elsevier, 2011. xix, 1091. ISBN 9781416045748.

- SILBERNAGL, Stefan and Agamemnon DESPOPOULOS. *Color atlas of physiology*. 6th ed., completely rev. and. New York: Thieme, 2009. xiii, 441. ISBN 9783135450063.
- BARRETT, Kim E. *Ganong's review of medical physiology*. 23rd ed. Maidenhead: McGraw-Hill, 2010. ix, 714. ISBN 9780071270663.

Teaching methods

Lessons are led in the form of lectures.

Assessment methods

The final examination in Physiology consists of two parts: practical and oral. Successful passing of a practical examination is a condition for admission to the oral examination. During practical examination student randomly chooses one of the methods and practically demonstrates and explains the measured parameters; for the oral examination, 3 questions are randomly chosen via IS MUNI by PC and the student answers them immediately. The practical examination represents 20% and the oral examination 80% of final grade. Students pass the examination at Physiology on condition that they succeed in both abovementioned parts.

Language of instruction

English

aVLFY0422s Physiology II - seminar

Faculty of Medicine

spring

Extent and Intensity

0/1.5/0. 2 credit(s). Type of Completion: z (credit).

Guaranteed by

prof. MUDr. Marie Nováková, Ph.D.

Department of Physiology – Theoretical Departments – Faculty of Medicine

Contact Person: MUDr. Zuzana Nováková, Ph.D.

Supplier department: Department of Physiology – Theoretical Departments – Faculty of Medicine

Course objectives

After finishing the course, students will be able to understand the terms used in general and systemic physiology of man. Students will acquire knowledge necessary for analysis and subsequent interpretation of phenomena taking place on cell, tissue and organ levels as well as on the level of whole human organism.

Learning outcomes

Student will be able:

- to understand and interpret various functions of human body.

Syllabus

I. Ventilation of the lungs. Gas transport. Regulation of respiration. Assessment of respiratory functions. II. Body fluids. Renal blood flow. Renal functions. Glomerular filtration. Tubular processes. Countercurrent system. pH and its regulation by kidneys. III. Mechanical functions of GIT. GIT secretions. Co-ordination of GIT segments. IV. Cardiac conduction system and myocardial cellular electrophysiology. Action potential spreading through myocardium and its registration. ECG leads. ECG curve. ECG curve interpretation, arrhythmias. V. Heart as a muscle. Cardiac cycle. Polygraphy. Autoregulation of the heart. Coronary circulation. VI. Regulation and adaptation. Regulation and adaptation to exercise. Thermoregulation – the principles. Adaptation to heat or cold. Reactions to body posture changes. Reactions to bleeding.

Literature

required literature

- BORON, Walter F. and Emile L. BOULPAEP. *Medical physiology : a cellular and molecular approach*. 1st ed. Philadelphia: Saunders, 2003. xiii, 1319. ISBN 0721632564.

recommended literature

- HALL, John E. and Arthur C. GUYTON. *Guyton and Hall textbook of medical physiology*. 12th ed. Philadelphia, Pa.: Saunders/Elsevier, 2011. xix, 1091. ISBN 9781416045748.
- BARRETT, Kim E. *Ganong's review of medical physiology*. 23rd ed. Maidenhead: McGraw-Hill, 2010. ix, 714. ISBN 9780071270663.
- SILBERNAGL, Stefan and Agamemnon DESPOPOULOS. *Color atlas of physiology*. 6th ed., completely rev. and. New York: Thieme, 2009. xiii, 441. ISBN 9783135450063.

Teaching methods

Tuition is done in the form of seminar. Students should read the literature of particular area of physiology and eventually prepare their own presentation of the topic. During the seminars, students present the topics and intensify their knowledge in discussion with the teacher.

Assessment methods

The course-unit credit is conditioned by full attendance and 60% control of preparedness in the seminars (control test at the beginning of seminar - 6 and more points).

Language of instruction

English

aVLLP0431c Clinical Introduction I - practice

Faculty of Medicine

spring

Extent and Intensity

0/1.3/0. 3 credit(s). Type of Completion: z (credit).

Taught online.

Guaranteed by

MUDr. Jan Konečný, Ph.D.

First Department of Surgery – Institutions shared with St. Anne's Faculty Hospital – Faculty of Medicine

Supplier department: Department of Biochemistry – Theoretical Departments – Faculty of Medicine

Course objectives (in Czech)

The course combines theoretical biochemistry knowledge with clinical applications.

Syllabus

- Biochemical investigations in clinical medicine and their significance. Biochemical analysers, point of care testing. Factors influencing results of laboratory examinations. Blood collection and processing. Laboratory tests in clinical biochemistry. Sources of error, assessing the significance of a test result. System of quality control. Biological and analytical variations, critical difference. Reference intervals. Interpretation of results. Diabetes mellitus - laboratory diagnosis. Hypoglycaemia, hyperglycaemia, screening and monitoring, oGTT test. Glycosuria, fructosamine, haemoglobin, microalbuminuria, insulin, C-peptide, autoantibodies. Biochemical diagnosis of liver diseases. Tests for the integrity of hepatocytes. The tests for hepatocellular cholestasis. Tests of the liver's biosynthetic capacity. Laboratory diagnosis of jaundice. Laboratory tests of specific liver diseases. Biochemical markers of myocardial injury - cardiac troponin, myoglobin, CK-MB mass. Laboratory tests in heart failure - natriuretic peptides. Tests for homocysteine, hsCRP, lipid spectrum. Sampling and urine collection for physical, chemical, microbiological and microscopic examination. Physical examination of urine (pH, density, osmolality). Chemical examination of urine. Glomerular filtration rate (creatinine, cystatin). Morphological analysis of urine. Examination of urine sediment. Kidney stones analysis – classification of kidney stones according to the composition, factors affecting their formation, methods of analysis. Cerebrospinal fluid (CSF) analysis. Indications, puncture, basic and special examination, typical findings in some neurological diseases, markers of CSF leakage. Investigation of blood count, hemocoagulation. Immunohematological and isoserological determinations.

Literature

required literature

- Texts available in Information System.

Teaching methods (in Czech)

Seminars, active discussions of problems, biochemical case reports.

Assessment methods

Conditions of giving the credits • Submission of all completed protocols with answers to the Homework Vaults in relevant dates. • Required attendance in seminars. • All absences must be made up according to teacher instructions. • Obtaining 9 points from the credit test

Language of instruction

English

aVLLP0431p Clinical Introduction I - lecture

Faculty of Medicine

spring

Extent and Intensity

2.3/0/0. 0 credit(s). Type of Completion: z (credit).

Supervisor

MUDr. Jan Konečný, Ph.D.

First Department of Surgery - Institutions shared with St. Anne's Faculty Hospital - Faculty of Medicine

Literature

recommended literature

- CHROBÁK, Ladislav, Thomas GRAL and Jiří KVASNIČKA. *Physical examination in internal medicine*. 1. vyd. Praha: Grada, 2003. 239 s. ISBN 9788024706177.

Language of instruction

English

aVLTZ0451 Theoretical Bases of Clinical Medicine I - seminar

Faculty of Medicine

spring

Extent and Intensity

0/1.5/0. 2 credit(s). Type of Completion: z (credit).

Guaranteed by

doc. MUDr. Leoš Křen, Ph.D.

Department of Pathology – Joint workplaces with the University Hospital Brno – workplaces of the Bohunice and Mater. Hospital – Faculty of Medicine

Supplier department: Department of Pathology – Joint workplaces with the University Hospital Brno – workplaces of the Bohunice and Mater. Hospital – Faculty of Medicine (90,00 %), Department of Biology – Theoretical Departments – Faculty of Medicine (10,00 %)

Course objectives

This newly introduced subject focuses on overview exercising of substantial problems from the point of view of anatomist, embryologist, physiologist, pathological physiologist, pathologist, microbiologist, immunologist and finally, corresponding clinician. Using this approach we will conceptually approach closer to strategy of USMLE, Step 1.

Syllabus

Stem cells, wound healing, regeneration in medicine Guarantor of topic: doc. MUDr. Aleš Hampl, CSc. 1. Importance and perspectives of stem cells application in medicine I (2 hrs, , MUDr. Martin Pešl, Ph.D.; Mgr. Vladimír Rotrekl, Ph.D.) 2. Importance and perspectives of stem cells application in medicine II (2 hrs, doc. Hampl) 3. Wound healing in dermatology (2 hrs, dr. Slonková) 4. Autologous and allogenic hematopoietic stem cells transplantation: introduction, contemporary indications and trends (2 hrs, prof. M. Krejčí) 5. Possibilities of using of cardiomyocytes produced by induced pluripotent stem cells of individual patient in medicine (1 hr, doc. Bébarová) Wound healing in surgery (1 hr, doc. Veverková) Metabolic bone diseases Guarantor of topic: prof. MUDr. Anna Vašků, CSc. 6. Osteoporosis, osteodystrophy, and osteomalacia: Bone state in patients with chronic renal failure: pathophysiological point of view (2 hrs, prof. A. Vašků) 7. Metabolism of calcium and phosphates (1 hr, doc. Babula) Laboratory diagnostics (Ca, phosphates, PTH, PTHrP, vitamin D, paraproteins) – 1 hr, doc. Babula) 8. Clinical example (woman aged 85, living alone with pathophysiological fracture history)- (1 hr, prof. A. Vašků) 9. Molecular biology concepts in oncogenesis Guarantor of topic: prof. MUDr. Anna Vašků, CSc. 10. Concept of „Read and Write“ genome and consequences of its application in oncology (prof. A. Vašků, 2 hrs) 11. Importance of epigenetics in oncology (prof. Slabý; 1.5 hr) 12. „Next generation sequencing“ in oncology (doc. Mráz, 2 hrs) 13. Importance of cytogenetics in hematological malignancies (doc. Ševčíková, 2 hrs) 14. EXAM TEST

Literature

recommended literature

- SILBERNAGL, Stefan and Florian LANG. *Color atlas of pathophysiology / Stefan Silbernagl, Florian Lang*. 3rd edition. Stuttgart: Thieme, 2016. x, 438. ISBN 9783131165534.
- DAMJANOV, Ivan. *Pathophysiology*. Illustrated by Matt Chansky. 1st ed. Philadelphia: Saunders/Elsevier, 2009. vii, 464. ISBN 9781416002291.

Teaching methods

Education will be realised by interactive seminars, practicals and lectures.

Assessment methods

Written test at the end of each semester.

Language of instruction

English

aVLIL021 Information Literacy

Faculty of Medicine

autumn / spring

Extent and Intensity

0/0/0. 3 credit(s). Type of Completion: z (credit).

Taught online.

Guaranteed by

Mgr. Jiří Kratochvíl, Ph.D.

Central Library – Specialized Units – Faculty of Medicine

Contact Person: Mgr. Petr Sejk

Course objectives

At the end of this course student should be able to: - search for full texts of journal articles or books concerning concrete topics (search in library catalogues, online databases, on the Internet) - recognise the quality information resources - write texts according to rules for creating scholarly texts - cite correctly according to recommended citation styles

Learning outcomes

At the end of this course student should be able to: - search for full texts of journal articles or books concerning concrete topics (search in library catalogues, online databases, on the Internet) - recognise the quality information resources - write texts according to rules for creating scholarly texts - cite correctly according to recommended citation styles

Syllabus

- 1. Introduction. Information resources.
- 2. Searching.
- 3. Multidisciplinary databases.
- 4. Subject specific databases
- 5. Rules for creating scholarly texts. Publication ethics.
- 6. Citation Ethics. Creating bibliographic references.
- 7. Evaluation of scientific work.

Literature

recommended literature

- LIPSON, Charles. *Doing honest work in college : how to prepare citations, avoid plagiarism, and achieve real academic success*. 2nd ed. Chicago: University of Chicago Press, 2008. 258 p. ISBN 0226484777.
- BADKE, William B. *Research strategies : finding your way through the information fog*. 3rd ed. New York: iUniverse, Inc., 2008. xviii, 213. ISBN 9780595477470.
- MATTHEWS, Janice R. and Robert W. MATTHEWS. *Successful scientific writing : a step-by-step guide for the biological and medical sciences*. 3rd ed. Cambridge: Cambridge University Press, 2008. xii, 240. ISBN 9780521699273.
- HOCK, Randolph. *The extreme searcher's Internet handbook : a guide for the serious searcher*. 2nd ed. Medford, N.J.: CyberAge Books, 2007. xxvii, 326. ISBN 9780910965767.

Teaching methods

e-learning, training

Assessment methods

Two mock tests, seven assignments during the semester.

Language of instruction

English