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FACULTY OF MEDICINE

Approved:
Dean:
(Prof. Yoto Yotov, MD, PhD)

SYLLABUS

IN

PATHOPHYSIOLOGY

Specialty	**MEDICINE**
Educational - qualification degree	**master**
Organizational form of education	**full-time**
Auditorial activity (Lectures/Seminars)	**60 /60**
Extra-auditorial activity	**90**
ECTS- credits	**7**
Discipline type	**compulsory**
Semester/s of education	**fifth and sixth**
Semester of examination	**sixth**
Developer of the Syllabus:	**Assoc.prof. Kameliya Zhechkova Bratoeva, MD, PhD**

Varna, 2024

ANNOTATION

Aims of the course	Pathophysiology is a fundamental medical science that studies the general etiology, mechanisms /pathogenesis/ of the main types of pathological processes and diseases, the principles of their therapy and serves as a bridge between preclinical disciplines and the clinic in the education of medical students. The main goal of education in the discipline of pathophysiology is to provide information about the causes, risk and provoking factors for the occurrence, development and outcome of diseases, as well as about the main mechanisms and patterns by which diseases develop and recovery. The subject of pathophysiology is the causes and mechanisms of impaired functions at the level of cells, organs, systems and the organism as a whole in case of disease or injury, and the main method is the experiment, which allows the study of the mechanisms of injury in the living organism. Pathophysiology plays a fundamental role in the education of medical students, which has several emphases: the study of general, special and clinical pathophysiology, as well as the acquisition of basic and specific practical skills for modeling various disease processes. The course of study in pathophysiology includes general nosology, basic types of pathological processes, pathophysiology of the blood, digestive, cardiovascular, excretory, respiratory, nervous and endocrine systems, disorders of metabolism and energy, including functional diagnostics of damaged systems. It aims to reveal the general mechanisms that disrupt the functions of individual systems in the main pathological processes and diseases and to indicate why and how structural and functional impairments lead to the symptoms and signs of the disease. The discipline is planned in the curriculum for study in two semesters - 5th and 6th semester, 60 hours of lectures and 60 hours of exercises, in parallel with other fundamental sciences such as general pathology and clinical-propaedeutics of internal diseases and surgery. Thus, the educational content is built on the knowledge of the anatomical structure of the human body, normal physiological functions, biophysical and biochemical essence of life processes. During the course of training, students are expected to become familiar with the manifestations of dysfunctions that represent the essence of general pathological processes and systemic pathologies and to acquire skills to recognize them. An important goal of student training is to master medical terminology and be able to use it in practice, as well as to create attitudes towards translational scientific research - identifying gaps between basic science and clinical practice, and conducting research to resolve clinical issues, health promotion and treatment methods. Pathophysiology seeks to form in students functional thinking, medical logic and skills to integrate knowledge from the main disciplines to solve the problems of the sick organism in the clinic.

Outcomes for students at the end of the course:	
Competences	The main tasks of the discipline of pathophysiology arise from the goal and are aimed at mastering the educational material necessary for the overall

	development of medical students as professionals. At the end of the training course, it is expected that they will develop competence in understanding the structure/function relationship in the pathogenesis of diseases and, accordingly, better recognition of clinical manifestations (symptoms, signs and syndromes) in various diseases, for the correct solution of the problems of each patient, as well as the opportunity for self-improvement and improvement of qualifications throughout their professional career. At the end of the training course, each student is expected to possess the following knowledge, skills and competencies:
Competence group	**1. Patient Care** that is compassionate, appropriate, and effective for treating health problems and promoting health.
Knowledge	▪ Knowledge of the general etiology, mechanisms /pathogenesis/ of the main types of pathological processes and diseases, the principles of their therapy, necessary for understanding the course of the diseases and correctly solving the problems arising from the process for each patient. ▪ Knowledge of the pathophysiological mechanisms of damage in the human body, which is a prerequisite for a better understanding of the deviations from the norm and their more effective elimination.
Skills	▪ Mastering the general methods for functional research and assessment of various pathologies, which forms practical skills and competencies necessary for preventive, diagnostic, therapeutic and rehabilitation care; ▪ Skills for understanding and interpreting the observed facts in the clinic and for the correct solution of the problems faced by each patient, which includes: - Gather essential and accurate information about the patient -Counsel patients and family members -Recognize the indicators for procedures -Describe the procedure in appropriate language for patients and caretakers -Acknowledge the impact of the procedure on patient and family - Competently perform all medical procedures required for their scope of practice - Perform the procedure in a way that maximizes patient comfort - Make informed diagnostic and therapeutic decisions - Prescribe and perform essential medical procedures - Provide effective health management, maintenance, and prevention

	guidance
Competence group	**2. Medical Knowledge** about established and evolving biomedical, clinical, and cognate (eg, epidemio-logical and social-behavioral) sciences and the application of this knowledge to patient care.
Knowledge	▪ Knowledge of the manifestations of dysfunctions, which represent the essence of general pathological processes and systemic pathologies, necessary for students to acquire skills to recognize them. ▪ Knowledge of the general patterns of impaired regulation of physiological processes in the diseased organism, the causes and mechanisms of development, as well as opportunities for their experimental modeling. ▪ Knowledge of the methodology of scientific research in the field of experimental medicine mastery of methods for experimental activity and research in the field of physiological and medical-biological sciences.
Skills	▪ Skills for practical application of their knowledge from biological, medical, human, etc. sciences, as well as to build on their knowledge from the further studied general medical and clinical disciplines, which are essential for their formation as specialists. ▪ To acquire new scientific and clinical knowledge. ▪ An investigative and analytical approach to clinical problem solving and knowledge acquisition. ▪ An ability to apply medical knowledge to clinical situations ▪ An ability to teach others.
Competence group	**3. Practice-Based Learning and Improvement** that involves investigation and evaluation of their own patient care, appraisal, and assimilation of scientific evidence, and improvements in patient care.
Knowledge	▪ Theoretical knowledge in the field of pathophysiology, based on modern scientific methods and standards for the implementation of an individual approach in the therapy of diseases, taking into account the indications and contraindications for the application of treatment and competencies for practical application. ▪ The acquired knowledge in pathophysiology constitutes a base on which students build the study of all clinical disciplines. They are the basis for understanding the principles of a healthy lifestyle, which includes proper nutrition, work, rest, social relations, and therefore are an integral part of preventive medicine.
Skills	▪ Working with scientific literature and databases: ability to search, systematize, analyze and critically evaluate scientific sources. ▪ Skills for applying the acquired knowledge to solve complex scientific and practical tasks, including participation in multidisciplinary research teams. ▪ Interpreting research results; identifying different diseases and enabling the future physician to independently collect new information and enrich his professional skills.

	▪ Skills for critical thinking and analysis, based on evidence, as well as integration of innovative approaches in clinical practice, which include: - investigate and evaluate patient care practices - appraise and assimilate scientific evidence, and - improve the practice of medicine.
Competence group	**4. Interpersonal and Communication Skills** that result in effective information exchange and teaming with patients, their families, and other health professionals.
Knowledge	▪ The acquired knowledge, skills and competence in the discipline are a mandatory prerequisite for a full understanding and mastery of the clinical disciplines - internal medicine, surgery, neurology, obstetrics and gynecology, physiotherapy, etc.
Skills	▪ Familiarity with medical terminology and acquisition of skills to use it correctly for communication with other medical professionals. ▪ Skills to apply the acquired knowledge to solve complex scientific and practical tasks, including participation in multidisciplinary research teams. ▪ Create and sustain a therapeutic relationship with patients and families ▪ Work effectively as a member or leader of a health care team
Competence group	**5. Professionalism,** as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.
Knowledge	▪ Knowledge that will enable students to interpret results from research conducted to identify various diseases and enable the future physician to independently collect new information and enrich their professional skills.
Skills	▪ Demonstrating Professional Conduct and Accountability ▪ Demonstrating Humanism and Cultural Proficiency ▪ Maintaining Emotional, Physical, and Mental Health, and Pursuing Continual Personal and Professional Growth

Key competencies for lifelong learning[1], that the discipline develops:	
Literacy competence Literacy is the ability to identify, understand, express, create, and interpret concepts, feelings, facts and opinions in both oral and written forms, using visual, sound/audio and digital materials across disciplines and contexts. It implies the ability to communicate and connect effectively with others, in an appropriate and creative way.	**X**
Multilingual competence This competence defines the ability to use different languages appropriately and effectively for communication. It broadly shares the main skill dimensions of literacy: it is based on the ability to understand, express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing) in an appropriate range of societal and cultural contexts according to one's wants or needs.	

[1] As defined in 2018 r. by the European Union Council (https://eur-lex.europa.eu/legal-content/BG/TXT/HTML/?uri=CELEX:32018H0604(01)&from=EN)

Mathematical competence and competence in science, technology, engineering A. Mathematical competence is the ability to develop and apply mathematical thinking and insight in order to solve a range of problems in everyday situations. Building on a sound mastery of numeracy, the emphasis is on process and activity, as well as knowledge. Mathematical competence involves, to different degrees, the ability and willingness to use mathematical modes of thought and presentation (formulas, models, constructs, graphs, charts). B. Competence in science refers to the ability and willingness to explain the natural world by making use of the body of knowledge and methodology employed, including observation and experimentation, in order to identify questions and to draw evidence-based conclusions. Competences in technology and engineering are applications of that knowledge and methodology in response to perceived human wants or needs. Competence in science, technology and engineering involves an understanding of the changes caused by human activity and responsibility as an individual citizen.	X
Digital competence Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking.	X
Personal, social and learning to learn competence Personal, social and learning to learn competence is the ability to reflect upon oneself, effectively manage time and information, work with others in a constructive way, remain resilient and manage one's own learning and career. It includes the ability to cope with uncertainty and complexity, learn to learn, support one's physical and emotional well-being, to maintain physical and mental health, and to be able to lead a health-conscious, future-oriented life, empathize and manage conflict in an inclusive and supportive context.	X
Citizenship competence the ability to act as responsible citizens and to fully participate in civic and social life, based on an understanding of social, economic, legal and political concepts and structures, as well as global developments and sustainability.	
Entrepreneurship competence Entrepreneurship competence refers to the capacity to act upon opportunities and ideas, and to transform them into values for others. It is founded upon creativity, critical thinking and problem solving, taking initiative and perseverance and the ability to work collaboratively in order to plan and manage projects that are of cultural, social or financial value.	
Cultural awareness and expression competence Competence in cultural awareness and expression involves having an understanding of and respect for how ideas and meaning are creatively expressed and communicated in different cultures and through a range of arts and other cultural forms. It involves being engaged in understanding, developing and expressing one's own ideas and sense of place or role in society in a variety of ways and contexts.	

Methods of education

- **Lectures.** Lectures are presented in the classical manner with the main goal of introducing students to the theoretical basis of the studied material. Lectures are richly illustrated by the lecturer with multimedia presentation of schemes, macroscopic and histological photographs; they are accompanied by appropriate examples from practice. Particular attention is paid to the connection of theoretical statements with practical problems, in order to establish logical connections and stimulate clinical thinking and active participation of students. The curriculum in pathophysiology provides for 60 hours of lectures (V and VI semesters). The lecture course includes lectures on general nosology, basic types of pathological processes and systemic nosology.
- **Seminars**. Practical exercises partially cover the lecture topics, but consider the problems from a practical point of view. This allows to master algorithms for collecting information and working with facts and gradually acquiring differential-diagnostic thinking and reaching the final diagnosis. These skills are absolutely necessary and applicable in the mastering of clinical disciplines. The curriculum for practical training includes 60 hours of practical exercises. In each practical exercise, a discussion and analysis of basic pathogenetic mechanisms, clinical and functional manifestations /theoretical

part/ is carried out, as well as modeling of some pathological processes and diseases and solving clinically oriented situational tasks, aiming for a ratio of experiment/clinic – 50/50. The program of practical exercises also includes seminar exercises, which consider solving practical and creative tasks, case studies; conducting consultations, discussions, working with scientific literature, regulatory documents, databases and presentations, in which students become acquainted with the studied material theoretically and through a multimedia presentation, films with experiments, analysis of real studies from patient lists, schemes and drawings of experimental data with clinical significance. In this way, the preparation of students for each methodological unit is optimized and their motivation for depth knowledge in the field of pathophysiology as a fundamental science is strengthened.

Links with other courses from the curriculum of the specialty
Pathophysiology is a fundamental science of medicine that is a unifying link between preclinical and clinical disciplines.

- **Builds upon knowledge acquired in:**
  - **physiology**
  - **biochemistry**
  - **pathology**
- **Necessary for the all clinical disciplines**
- **Other related disciplines:**
  - anatomy and histology
  - molecular biology
  - biophysics