



## Course syllabus - part A Physiology 2/2

**48SJ-PHYSII**  
**ECTS: 3.68**  
**CYCLE: 2022L**

### SUBJECT MATTER CONTENT

#### LECTURE

Cardiac muscle the heart as a pump. Rhythmical excitation of the heart. Local and control of the tissue blood flow. Nervous regulation of the circulation, and control of the arterial blood pressure. The microcirculation and lymphatic system. Regulation of respiration. general principles of gastrointestinal function, nervous control and blood circulation. Digestion and absorption in the GI. Acid base-regulation. renal regulation of potassium, calcium, phosphate and magnesium. Renal mechanisms for control of blood volume and extracellular fluid volume. Introduction to endocrinology; pituitary hormones, thyroid metabolic hormones, insulin, glucagon.

#### SEMINAR

#### CLASSES

Cardiac muscle and the heart. Conduction pathways, myocardial autorhythmic cells. The stages of the cardiac action potential. Heart rate under the influence of the sympathetic and parasympathetic system. Electrical stimulation of a frog heart (stimulation experiment program). Effects of various drugs, hormones, ions and temperature on heart rate. Electrocardiography and Heart sounds: Auscultation, normal heart sounds measured by a stethoscope and a cardiomicrophon. ECG- the transthoracic electrical activity of the heart, Limb bipolar, augmented and precordial unipolar leads; electrical activity record of the limb leads I, II and III - Einthoven's triangle and axial reference system. Identification and analysis of the amplitude and the duration of the major components of the ECG (P wave, QRS complex, T wave, QT-interval). Calculation of the heart rate from ECG. The time relationships between electrical and mechanical activity of the heart, simultaneously measured by ECG and by the auscultation. The heart rate variability between individuals. Respiratory sinus arrhythmia. Contraction of the ventricular mean electrical axis. - Mechanics of respiration. Normal and rapid breathing, duration of the respiratory cycle, inspiratory time and expiratory time, peak inspiratory and expiratory flows. The effects of holding breath after inhaling and after exhaling. The effect of voluntary hyperventilation on breath-holding and the recovery of normal breathing rhythm. Rate of breathing or frequency. Variations in breathing. Rebreathing exhaled gases. Hypercapnia. The effect of breath-holding on heart rate. Respiratory Volumes. The principles of spirometry and how integration of the flow signal gives a volume. Lung volumes and capacities. Measuring normal respiratory volumes Ventilatory function tests: static lung volumes, dynamic lung volumes (VC, ERV, PEF, FVC, FEV1). Tiffeneau test. Relate recorded lung volumes and capacities, to those of a typical person of the same gender, height and age. The effect of airway restrictions on PIF, PEF, FVC and FEV1. Energetic processes and physiological changes during physical efforts. Cardiovascular, respiratory and metabolic effects of exercise. Acute and chronic physiological changes in response to exercise stress. Classification of physical efforts. Aerobic endurance. Aerobic fitness

**Legal acts specifying learning outcomes:**  
672/2020

**Disciplines:** medical sciences

**Status of the**

**course:** Obligatoryjny

**Group of courses:** A -

przedmioty podstawowe

**Code:** ISCED 0912

**Field of study:** Medicine

**Scope of education:**

**Profile of education:**

General academic

**Form of studies:** full-time

**Level of studies:** uniform

master's studies

**Year/semester:** 2/4

**Types of classes:** Lecture, Seminar, Classes

**Number of hours in**

**semester:** Lecture: 25.00,

Seminar: 10.00, Classes:

52.00

**Language of**

**instruction:** English

**Introductory subject:**

**Prerequisites:** It is assumed

that all students have completed the required prerequisite courses and have knowledge of Human Anatomy.

**Name of the organisational unit conducting the**

**course:** Katedra Fizjologii i

Patofizjologii Człowieka

**Person responsible for the**

**realization of the course:** dr

hab. n. med. Agnieszka

Skowrońska, prof. UWM, prof.

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**Additional remarks:** None

testing (muscular fitness, cardiovascular and cardiorespiratory analyses, maximal rate of oxygen consumption - methods of measurement). Fatigue and recovery after exercise. Overview of digestive processes. Specific of enzyme action, impact of temperature and pH levels on enzyme activity. The effects of amylase on starch, determine the optimal pH level at which amylase works, and observe the effects of temperature on enzyme activity. Salivary amylase and cellulose. Pepsin. Digestion of protein. Peptide absorption. Digestion and absorption of fats. Lipase, Bile, and Lipid digestion. The roles of bile salts in emulsion and micelles. Enterohepatic circulation of bile acid. Functions of bile acid. Digestion and absorption of carbohydrates mainly glucose and sucrose in small intestine. Blood sugar level, hypoglycemia. Mechanisms of urine formation. Reabsorption of nutrients, water, and ions. Regulation of urine concentration and volume. Formation of dilute and concentrated urine. Antidiuretic Hormone (ADH). Water balance. Urinalysis test strips. Physical characteristics of urine. Chemical composition of urine. Microscopic examination of urine sediment. Principles of hormonal regulation of reproduction. The male reproductive system. Spermatogenesis. Components of semen. Experiments on assessment of the viability of sperm, influence different environmental changes on their survivability. Organs of the female reproductive system. Physiological changes during menstrual cycles in women. Determination the phase of women's cycle on the basis of microscopic image of the saliva, urine-based ovulation tests and vaginal smear of the rat. Conventional and LBC cytology. Oogenesis and follicular development. Isolation of swine oocytes from ovaries. Fertilization. Human chorionic gonadotropin and pregnancy tests. First stages of human embryo development (gastrulation, somites, primitive streak). Lactation. Detection of casein in milk and colostrum. Observation of fat in the milk

## **TEACHING OBJECTIVE**

Human physiology is the science of the mechanical, physical, and biochemical functions of humans, their organ systems, organs and the cells of which they are composed. This course is designed to provide students with an understanding of the function and regulation of the human body and physiological integration of the organ systems to maintain homeostasis. During the course you will examine human functions in a systemic fashion. The main objective in teaching this course is to ensure that you learn essential concepts and facts about human physiology, understand the major functions of organ systems in human, learn how the body strives for and achieves homeostasis, experience practical application of physiological principles. You need to learn how the healthy human body functions before you can learn in future classes how disease and injury impair its function.

## **DESCRIPTION OF THE LEARNING OUTCOMES OF THE COURSE IN RELATION TO THE DESCRIPTION OF THE CHARACTERISTICS OF THE SECOND LEVEL LEARNING OUTCOMES FOR QUALIFICATIONS AT LEVELS 6-8 OF THE POLISH QUALIFICATION FRAMEWORK IN RELATION TO THE SCIENTIFIC DISCIPLINES AND THE EFFECTS FOR FIELDS OF STUDY:**

**Symbols for outcomes related to the discipline:**

M/NM+++

**Symbols for outcomes related to the field of study:**

B.W1.+ , C.W49.+ , K.2.+ , B.W21.+ , B.U13.+ , K.4.+ , K.8.+ , B.U7.+ , B.W22.+ , K.3.+ , B.W2.+ , B.W25.+ , K.9.+ , B.U9.+ , K.11.+ , K.1.+ , B.W20.+

## **LEARNING OUTCOMES:**

**Knowledge:**

W1 - Defines physiological processes in the human body. Knows the activities and mechanisms of regulation of all organs and systems of the human body. BW1. Describes water and electrolyte balance in biological systems. BW2. Describes the acid-base balance and buffer mechanisms and their importance in systemic homeostasis. BW21. Knows the activities and mechanisms of regulation of all organs and systems of the human body, including the circulatory, respiratory, digestive, urinary, skin and the relationships between them. BW20. Knows the basics stimulation and conduction in the nervous system and higher nervous functions, as well as the physiology of skeletal muscle and smooth muscle cells. and function of blood. BW25. Knows the mechanism of action of hormones, and the consequences of hormonal regulation disorders. BW22. Knows the reproductive function and mechanism in women and men. BW25. Knows the relationship between factors disturbing the balance of biological processes and physiological changes. CW49. Knows and understands the enzymes involved in digestion, the mechanism of hydrochloric acid production in the stomach, the role of bile, the process of absorption of digestive products.

**Skills:**

U1 - B.U7. Performs simple functional tests assessing the human body (stress tests, exercise tests). Interprets numerical data concerning basic physiological variables. B.U9. Supports simple measuring instruments and evaluates the accuracy of measurements. B.U13. Plans and performs simple scientific research, interprets the results and draws conclusions.

**Social competence:**

K1 - K.1. Establishing and maintaining deep and respectful contact with the patient, as well as showing understanding for worldview and cultural differences. K.2. Being guided by the good of the patient. K.3. Abidance of medical confidentiality and patient rights. K.4. Taking actions towards the patient based on ethical principles, with the awareness of social conditions and limitations resulting from the disease. K.8. Draws conclusions from his own measurements or observations. K9. Implements the principles of professional cooperation in a team of specialists, including representatives of other medical professions, as well as in a multicultural and multinational environment. K11. Accepts responsibility for decisions made in the course of professional activities, including in terms of their own safety and that of others.

**TEACHING FORMS AND METHODS:**

Lecture(W1;):A multimedia presentation - the transfer of knowledge in the form of a lecture.

Seminar(W1;U1;K1;):The case study. Discussion, inquiry knowledge, analysis and definition of the problem, explain the concepts and physiological mechanisms. Classes in the form of PBL (Problem Based Learning).

Classes(W1;U1;K1;):Practical laboratory exercise- working with simulation software, physiological experiments. 10 students participate in the lab classes.

**FORM AND CONDITIONS OF VERIFYING LEARNING****OUTCOMES:**

Seminar: Part in the discussion - During the presentation of case study we assess the level of discussion, the presentation of the problem, its explanation, the individual involvement of each student in the group, creativity and sharing of responsibilities within the group. (W1;K1;);

Seminar: Evaluation of the work and cooperation in the group - Students work in groups of 5 on one case study. We assess the contribution of individual student to work groups, the interaction between individuals

in a group. How they exchange views, knowledge on the topic, how to analyze a problem, submit a preliminary explanation of the problem, their activity engagement. (W1;U1;K1);

Lecture: Written exam - The final exam is consist of test; 60 questions of multiple choice and the descriptive part; 10 questions cover the entire material from physiology. (W1;U1);

Classes: Report - Checking the ability to work in a team and analyze the results of experments. Quizess for each lab will be pick up and graded. (W1;U1;K1);

Classes: Colloquium test - Written test consisting of parts of the test (multiple choice questions) and descriptive part. (W1);

Classes: Colloquium practical - At the end of the lab classes t the practical exam in physiology will be held. This is a part of final physiology exam. Exam is organized in the form of a station with a specific task to perform Objective Structured Exam system / OSCE / . (W1;U1;K1);

#### **BASIC LITERATURE:**

1. Arthur C. Guyton, *Guyton and Hall. "Textbook of Medical Physiology," 13th Revised Edition*, Wyd. Elsevier, R. 2016, s.
2. Costanzo L.S., *Physiology, Sixth Edition*, Wyd. Elsevier, R. 2017, s.

#### **SUPPLEMENTARY LITERATURE:**

1. Costanzo L.S., *BRS Physiology, Seventh Edition*, Wyd. Wolters Kluwier, R. 2018, s.

## Detailed description of ECTS credits awarded - part B

**48SJ-PHYSII**  
**ECTS: 3.68**  
**CYCLE: 2022L**

### Physiology 2/2

The number of ECTS credits awarded consists of:

1. Contact hours with the academic teacher:

- participation in: Lecture	25.0 h
- participation in: Seminar	10.0 h
- participation in: Classes	52.0 h
- consultation	5.0
	Total: 92.0 h.

2. Independent work of a student:

Total: 0 h

contact hours + independent work of a student Total: 92.0 h

1 ECTS credit = 25-30 h of an average student's work, number of ECTS credit = 92.0 h : 25.0 h/ECTS = 3.68 ECTS on average: 8.0 ECTS

- including the number of ECTS credits for contact hours with the direct participation of an academic teacher: 0,00 ECTS points,

- including the number of ECTS credits for hours of independent work of a student: