



### Department of Human Physiology

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<http://www.upjs.sk/en/faculty-of-medicine/institutes/department-of-human-physiology>

**SUBJECT : General Medicine**

**YEAR OF EDUCATION: II.**

**TERM: Winter**

**STUDY BRANCH: physiology**

**LECTURES**

**NUMBER OF TEACHING HOURS PER WEEK:**

**1<sup>st</sup> teaching week:**

- Introduction to physiology, meaning of physiology
- homeostasis, the body fluids

**2<sup>nd</sup> teaching week:**

- Blood: functions, properties, composition
- Blood groups, blood clotting

**3<sup>rd</sup> teaching week:**

- The respiratory system and its functions
- Mechanics of the breathing

**4<sup>th</sup> teaching week:**

- Ventilation, diffusion, perfusion, exchange of the respiratory gases
- Hypoxia, control of the breathing

**5<sup>th</sup> teaching week:**

- Cardiovascular system, myocardial properties
- Electrophysiology of the heart

**6<sup>th</sup> teaching week:**

- The heart cycle
- Manifestations of the heart activity

**7<sup>th</sup> teaching week:**

- Heart work, metabolism, source of energy
- Control of the heart activity

**8<sup>th</sup> teaching week:**

- Biophysical considerations of circulation
- Hemodynamics in the high-pressure vessel system

**9<sup>th</sup> teaching week:**

- Haemodynamics in the low-pressure vessel system
- Peculiarities of the haemodynamics in some organs

**10<sup>th</sup> teaching week:**

- Control of the blood volume
- Control of the blood pressure

**11<sup>th</sup> teaching week:**

- physiology of the kidneys, morphology, innervation
- Renal processes, functional tests

**12<sup>th</sup> teaching week:**

- Gastrointestinal functions, digestion

- Absorption in GIT

**13<sup>th</sup> teaching week:**

- Regulation of gastrointestinal functions

- Thermoregulation

**EXERCISE**

**NUMBER OF TEACHING HOURS PER WEEK: 4**

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**1<sup>st</sup> teaching week:**

- Subject matter of physiology

- System of teaching of physiology, criteria for credit and exams

- Safety in the laboratory - safety instructions for students

- Instructions to the practical lessons

- Principles of the experimental work – methods, observation

- Fundamentals of statistics in physiology, utility of computers in physiology

**2<sup>nd</sup> teaching week:**

- Physiological principles

- Cell membranes, membrane receptors

- Body fluids - compartments, measurement

- Exchange of substances between cell and external environment

- Homeostasis

- Manners of blood samples taking

- Proof of the blood

- Determination of hematocrit value

- Erythrocyte sedimentation rate and factors of the sedimentation

- Determination of haemoglobin content, derivatives of haemoglobin

**3<sup>rd</sup> teaching week:**

- Blood

- Osmotic fragility of red blood cells

- Determination of the red blood cell count

- Determination of the white blood cell count

- Red blood cell values

**4<sup>th</sup> teaching week:**

- The respiratory system and its functions

- Non-respiratory functions of the respiratory system

- Mechanics of breathing

- Blood smear, differential leucocyte count, Hink nuclear number

- Blood groups determination

- Determination of the Rh-factor

**5<sup>th</sup> teaching week:**

- The exchange of the respiratory gases

- Gases properties, place and mechanisms of the gases transport

- Exchange of gases, transport of the respiratory gases between lungs and tissue

- Exchange of gases in the tissue

- Determination of the platelets count

- Blood clotting time

- Bleeding time

- Quick test

- Examination of the activated partial thromboplastin time (APTT)

**6<sup>th</sup> teaching week:**

- Regulation of the respiratory activity (nervous, chemical, reflex and suprapontine mechanisms)
- Adaptation of respiration on the changed conditions (hypoxia, hyperoxia, hyperbaria)
- Model of breathing- modelling of the inspiration and expiration
  - Muller manoeuvre
  - Valsalva manoeuvre
- Spirography – testing by VOLUTEST
- The O<sub>2</sub> and CO<sub>2</sub> influences on the breathing
- Voluntary apnoea

#### **7<sup>th</sup> teaching week:**

- The basic properties of the myocardium
- Excitation and conduction of the heart impulse
- The heart contraction and its energetics
- Percussion and auscultation of the lungs
- EUTEST
- Peak Flow Meter
- Computer spirometry

#### **8<sup>th</sup> teaching week:**

- Heart cycle
- Mechanical events of the heart activity
- Electrophysiology of the heart
- Evaluation of ECG

#### **9<sup>th</sup> teaching week:**

- Control of the heart activity
- Intracardial mechanisms
- Extracardial mechanisms
- Percussion and auscultation of the heart
- Phonocardiography
- Examination of arterial pulse
- Systolic time intervals

#### **10<sup>th</sup> teaching week:**

- Blood circulation – physical considerations
- Haemodynamics in the high-pressure system
- Haemodynamics in venous and capillary network
- Autonomous reflexes acting on the heart

#### **11<sup>th</sup> teaching week:**

- Organ haemodynamics
- Control of the blood volume and blood pressure
- Measurements of the blood pressure
- Computer model of the blood pressure
- Electronic model of the blood pressure
- Model of the blood vessel elasticity
- Resistance of blood capillaries

#### **12<sup>th</sup> teaching week:**

- Renal physiology
- Urine examination - density, pH, proteins, glucose
- Urine examination: ketone bodies, bile stains, blood, pus
- Quantitative examination of the native sediment
- Qualitative examination of the stained sediment
- The renal functional tests

**13<sup>th</sup> teaching week:**

- Digestive system
- Evaluation of the practical lessons
- Credits

**TERM: Summer**

**LECTURES**

**NUMBER OF TEACHING HOURS PER WEEK: 3**

**1<sup>st</sup> teaching week:**

- General neurophysiology
- Synaptic transmission, receptors

**2<sup>nd</sup> teaching week:**

- Somesthetic analysator
- Vision

**3<sup>rd</sup> teaching week:**

- Hearing
- Vestibular functions

**4<sup>th</sup> teaching week:**

- Control of the somatic functions by spinal cord
- Control of the somatic functions by brain stem

**5<sup>th</sup> teaching week:**

- Control of the somatic functions by cerebellum and basal ganglia
- Peripheral autonomic nervous system

**6<sup>th</sup> teaching week:**

- Hypothalamus
- Integrative functions of formatio reticularis and thalamus

**7<sup>th</sup> teaching week:**

- Integrative functions of limbic system and cerebral cortex
- Manifestation of cerebral activity. Vigility and sleep

**8<sup>th</sup> teaching week:**

- Higher nervous activity
- Learning, memory, speech

**9<sup>th</sup> teaching week:**

- Endocrinology, basis of the hormonal integration and regulation
- Thyroid gland, parathyroid glands

**10<sup>th</sup> teaching week:**

- Endocrine functions of medulla and suprarenal cortex
- Regulation of carbohydrate metabolism, pancreas

**11<sup>th</sup> teaching week:**

- Gonads, reproductive system
- The pituitary gland, hypothalamic relationships

**12<sup>th</sup> teaching week:**

- Nonspecific endocrine glands
- Physiology of the skeletal muscle

**13<sup>th</sup> teaching week:**

- Physiology of the smooth muscle
- Physiology of exercise

**14<sup>th</sup> teaching week:**

- Biorythms

- Physiology of the childhood, stress

**TERM: Summer**

**EXERCISES**

**NUMBER OF TEACHING HOURS PER WEEK: 5**

**1<sup>st</sup> teaching week:**

- Safety in the laboratory
- Organizational instructions the practical lessons
- Thermoregulation
- Physiology of the digestion
- Demonstration of digestive activity of ptyalin
- Examination of the gastric juice
- Menu
- Measurement of the body temperature
- Function of sweat glands and neutralization ability of the skin

**2<sup>nd</sup> teaching week:**

- General neurophysiology
- Model of the analogic and functional connection of the neurons
- Cutaneous sense
- Weber's fallacies
- Purkinje image test
- Astigmatism
- Flicker

**3<sup>rd</sup> teaching week:**

- Receptors
- Somesthetic analyser
- Proprioceptive analyser
- Ophthalmoscopy
- Examination of the visual acuity (visus)
- Examination of the visual field (perimetry)
- Colour vision
- Colour mixture

**4<sup>th</sup> teaching week:**

- Vision
- Determination of near and far points
- Binocular vision
- Reversible figures and optic fallacies
- Otoloscopy
- Examination of the hearing by whispered words
- Examination of the hearing by tuning forks

**5<sup>th</sup> teaching week:**

- Hearing
- Statokinetic receptors
- Cutaneous, deep and visceral sensation
- Demonstration – irritation of vestibular apparatus of animal
- Examination of vestibular apparatus
- Localisation of the taste
- Smell
- Film: Examination of vestibular apparatus

**6<sup>th</sup> teaching week:**

- Control of somatic functions
- Examinations of somatic – exteroceptive reflexes of man
- Examinations of somatic – proprioceptive reflexes of man
- Postural and upright reflexes of rabbit

**7<sup>th</sup> teaching week:**

- Vegetative nervous system
- Hypothalamus
- Examination of function of cerebellum
- Examination of vegetative reflexes of man
- Measurement of the reaction time
- Bilateral transfer

**8<sup>th</sup> teaching week:**

- Integrative and associative functions of CNS
- Manifestation of cerebrum functions
- Electronic model of sleep
- Model of the conditioned salivary reflex
- Memory testing by Melli method
- Associative test

**9<sup>th</sup> teaching week:**

- Higher nervous activity – reflexes, the first signaling system, learning and memory
- Dynamometry
- Ergography
- Ergometry

**10<sup>th</sup> teaching week:**

- Basal functions of gonadal glands
- Thyroid gland
- Parathyroid glands
- Krestovnik's test
- Lian's test
- Ruffier's test
- Test of the maximal expiratory force
- Burger's test

**11<sup>th</sup> teaching week:**

- Adrenal medulla and cortex
- Pancreas
- Gonadal glands, gravidity
- Glucose – loading test
- Functions kidney test
- Test of gravidity
- Basal metabolism
- Ca – test (Chvostekov)
- Measurement of the basal metabolic rate

**12<sup>th</sup> teaching week:**

- Hypophysis
- Others hormone
- The practical repeating of the rigorous practical lessons

**13<sup>th</sup> teaching week:**

- Muscle physiology
- The practical repeating of the rigorous practical lessons

**14<sup>th</sup> teaching week:**

- Problematic questions from physiology
- Exam from the rigorous practical lessons
- Credit

Košice,

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