

**SCHOOL OF MEDICINE UNIVERSITY OF BELGRADE
PROGRAMME OF EXERCISES IN MEDICAL PHYSIOLOGY**

IV (summer) semester 2023/2024 academic year

**Exercises will be held at A, B, C and D classrooms at the Institute of Medical physiology
on Monday (Group IA and IB) and Tuesday (Group IIA and IIB)**

Exercise XIV (4 hours)

1. Palpation of arterial pulse oscillations on various sites of the body
 2. Estimation of radial artery pulse qualities in humans
 3. Recording and analysis of arterial pulse oscillations (sphygmogram)
 4. Measurement of velocity of fluid flow (ml/min) on the various models of piezometer
 5. *Video presentation of vascular system (A.D.A.M.)*
 6. *Principles of hemodynamics (PhysioEx 4.0): Measurement of blood flow (ml/min) under condition of changes in the blood vessel radius, viscosity of blood, length of the blood vessel and pressure gradient*
- SEMINAR 8: The cardiac cycle: variations in physiological conditions. Cardiac output and its regulation (2 hours).**

**Group IA: 19.02.2024. 13:00-16:00
Group IIA: 20.02.2024. 13:00-16:00**

**Group IB: 19.02.2024. 13:00-16:00
Group IIB: 20.02.2024. 13:00-16:00**

Doc. dr B. Đurić

Asist. dr R. Jeremić

Exercise XV (4 hours)

1. Measurement of arterial blood pressure using palpatory and auscultatory methods in human
 2. Demonstration of the effects of hydrostatic pressure and the role of venous valves on venous blood flow
 3. Assessment of functional capacity of the heart and circulation during physical activity in human (Lorentz and Harvard step tests)
 4. Explanation of oculocardiac reflex
 5. *Interactive presentation of the experiment: the direct measurement of arterial blood pressure and influence of vasopressor and vasodepressor agents on the value of arterial blood pressure*
 6. *Interactive videosimulation of the effects of vasoactive substances on the isolated blood vessel*
- SEMINAR 09: Homeostatic mechanisms underlying arterial blood pressure maintenance (2 hours)**

**Group IA: 26.02.2024. 13:00-16:00
Group IIA: 27.02.2024. 13:00-16:00**

**Group IB: 26.02.2024. 13:00-16:00
Group IIB: 27.02.2024. 13:00-16:00**

Asist. dr R. Jeremić

Asist. dr J. Maričić

Exercise XVI (4 hours)

1. Obtaining of blood samples for laboratory analysis from the finger tip
2. Preparation and staining of the blood smear by Pappenheim's method
3. Identification of blood cells
4. Determination of reticulocyte count staining a slide using brilliant cresyl blue stain
5. Determination of erythrocyte sedimentation rate (ESR)

SEMINAR 10: Circulation through special regions: cerebral, coronary, skeletal muscles, and skin circulation (2 hours)

COLLOQUIUM II: 9. MOTOR NEUROPHYSIOLOGY; 10. AUTONOMIC NERVOUS SYSTEM; 11. HIGHER BRAIN FUNCTIONS AND THE LIMBIC SYSTEM; 12. PHYSIOLOGY OF HEART; 13. PHYSIOLOGY OF THE CIRCULATION

Group IA: 04.03.2024. 13:00-16:00

Group IB: 04.03.2024. 13:00-16:00

Group IIA: 05.03.2024. 13:00-16:00

Group IIB: 05.03.2024. 13:00-16:00

Doc. dr B. Đurić

Asist. dr D. Todorović

Exercise XVII (4 hours)

1. Determination of red blood cell count by haemocytometer and erythrocyte suspension optical density
2. Hematocrit (Htc) or Packed Cell Volume (PCV) determination (microhematocrit method)
3. Hemoglobin determination
4. Calculation of the mean corpuscular values (MCV, MCH, MCHC) using the former obtained values

Group IA: 11.03.2024. 13:00-16:00

Group IB: 11.03.2024. 13:00-16:00

Group IIA: 12.03.2024. 13:00-16:00

Group IIB: 12.03.2024. 13:00-16:00

Asist. dr D. Todorović

Asist. dr N. Šutulović

Exercise XVIII (4 hours)

1. OAB blood typing on the slide and in test tubes
2. Rh typing (RhD)
3. Performing of cross matching reaction and direct Coombs' test

Group IA: 18.03.2024. 13:00-16:00

Group IB: 18.03.2024. 13:00-16:00

Group IIA: 19.03.2024. 13:00-16:00

Group IIB: 19.03.2024. 13:00-16:00

Asist. dr J. Maričić

Doc. dr S. Mutavdžin Krneta

Exercise XIX (4 hours)

1. Determination of white blood cell count
2. Determination of differential white blood cell count
3. Calculation of absolute white blood cell count
4. *Interactive video presentation of homeostasis of body electrolytes (A.D.A.M.) – repetition*

Group IA: 25.03.2024. 13:00-16:00

Group IB: 25.03.2024. 13:00-16:00

Group IIA: 26.03.2024. 13:00-16:00

Group IIB: 26.03.2024. 13:00-16:00

Asist. dr R. Jeremić

Asist. dr D. Todorović

Exercise XX (4 hours)

1. Determination of platelet count by Fonio (indirect method)
2. Determination of platelet count by hemocytometer method
3. Determination of bleeding time – Duke's method
4. Determination of blood coagulation time – Bürker method
5. Determination of prothrombin time (PT)

SEMINAR 11: Hemostasis (2 hours)**Group IA: 01.04.2024. 13:00-16:00****Group IIA: 02.04.2024. 13:00-16:00****Asist. dr M. Zeković****Group IB: 01.04.2024. 13:00-16:00****Group IIB: 02.04.2024. 13:00-16:00****Doc. dr S. Mutavdžin Krneta****Exercise XXI (4 hours)**

1. Calculation of the clearance of inulin, creatinine and para-aminohippuric (PAH) acid
2. Calculation of GFR in dependence on changed values of renal blood flow (RBF), hydrostatic pressure (HP) and colloid-osmotic pressure (COP)
3. Calculation of diuresis in dependence on osmotic load of the kidneys (osmolar clearance and “free water clearance”)
4. *Interactive video simulation of function of the nephron (PhysioEx 4.0): studying the effect of factors that affect glomerular filtration rate, volume and osmolality of final urine*
5. *Interactive video presentation of functions of the urinary tract (A.D.A.M.)*

SEMINAR 12: Role of the kidneys in the regulation of extracellular fluid volume and composition.**Kidney hormones (2 hours)****Group IA: 08.04.2024. 13:00-16:00****Group IIA: 09.04.2024. 13:00-16:00****Asist. dr J. Maričić****Group IB: 08.04.2024. 13:00-16:00****Group IIB: 09.04.2024. 13:00-16:00****Asist. dr N. Šutulović****Exercise XXII (4 hours)**

1. Demonstration of the role of the diaphragm in respiration (Donders' model)
 2. Spirometry: determination of the static lung volumes and capacities
- Performing of the ergometric step-test and indirect determination of the maximal oxygen consumption (VO₂max)

SEMINAR: Chemistry in medical physiology: Acid – base balance. Body chemical buffers(2 hours)**Group IA: 15.04.2024. 13:00-16:00****Group IIA: 16.04.2024. 13:00-16:00****Doc. dr S. Mutavdžin Krneta****Group IB: 15.04.2024. 13:00-16:00****Group IIB: 16.04.2024. 13:00-16:00****Asist. dr N. Šutulović**

Exercise XXIII (4 hours)

1. Auscultation of breathing
2. *Interactive video simulation of alveolar ventilation (PhysioEx 4.0):*
 - a. *measuring respiratory volumes and capacities (simulating spirometry)*
 - b. *examining the effect of changing airway resistance, the action of surfactant and the effect of changing intrapleural pressure on the lung functions*
 - c. *analysis of the effect of various breathing patterns on PCO₂ values in the alveolar air and blood*
3. *Interactive video presentation of functions of the respiratory system (A.D.A.M.)*

SEMINAR 13: Regulation of respiration (2 hours)**Group IA: 22.04.2024. 13:00-16:00****Group IIA: 23.04.2024. 13:00-16:00****Group IB: 22.04.2024. 13:00-16:00****Group IIB: 23.04.2024. 13:00-16:00****Asist. dr N. Topalović****Asist. dr M. Zeković****Exercise XXIV (4 hours)**

1. Spirometry: measuring dynamic lung volumes: FEV₁, the maximal voluntary ventilation (MVV), and recording of the flow-volume curve
2. Cardiopulmonary resuscitation: basic principles of performing CPR by various methods (practicing on a model)
3. *Interactive video presentation of acid-base balance (A.D.A.M.)*
4. *Acid-base balance – computer simulation (PhysioEx 4.0): demonstration of buffering action of the lung and the kidney in acid-base homeostasis (compensation of acidosis and alkalosis)*

SEMINAR 14: Glucose homeostasis: hormonal regulation of glycemia (2 hours)

COLLOQUIUM III: 14. BLOOD PHYSIOLOGY; 15. RENAL PHYSIOLOGY; 16. RESPIRATORY PHYSIOLOGY; 17. ACID-BASE BALANCE; 18. PHYSIOLOGY OF THE GASTROINTESTINAL SYSTEM; 19. ENERGY BALANCE AND METABOLISM; 20. PHYSIOLOGY OF NUTRITION; 21. THERMOREGULATION

Group IA: 06.05.2024. 13:00-16:00*Group IIA: 07.05.2024. 13:00-16:00*****Group IB: 06.04.2024. 13:00-16:00****Group IIB: 07.05.2024. 13:00-16:00****Asist. dr M. Zeković****Doc. dr B. Đurić****Exercise XXV (4 hours)**

1. Calculation of the basal metabolic rate (BMR) for students
2. Calculation of the daily energy turnover in students
3. Assembling of the nutritious meal on the basis of the determined turnover of the energy
4. *Interactive video session of the gastric antrum contractile response (SimVessel): demonstration of the effects of substances that affect the spontaneous activity and the effect of passive stretching*
5. *Interactive video presentation of gastrointestinal system (A.D.A.M.)*

SEMINAR 15: Food intake regulation and hormones of the gastrointestinal system. Physiological roles of the liver (2 hours)**Group IA: 13.05.2024. 13:00-16:00****Group IIA: 14.05.2024. 13:00-16:00****Group IB: 13.05.2024. 13:00-16:00****Group IIB: 14.05.2024. 13:00-16:00****Asist. dr J. Maričić****Asist. dr N. Topalović**

Exercise XXVI (4 hours)

1. Assessment of the oral glucose tolerance test (OGTT)
2. *Interactive video simulation of the endocrine system physiology (PhysioEx 4.0):*
 - a. *determination of rat's basal metabolic rate and demonstration of the effects of thyroxine, TSH and propylthiouracil on the rat's basal metabolic rate*
 - b. *demonstration of the effect of estrogen on the morphological and functional characteristics of the uterus*
 - c. *measurement of plasma glucose concentration using spectrophotometric method and demonstration of the effect of insulin on glucose concentration in the blood*
3. *VIRTUAL PATIENT: assessment of disturbed homeostatic variables in ("SimBioSys Physiology")*

SEMINAR 16: Calcium and magnesium homeostasis; bones physiology (2 hours)

Group IA: 20.05.2024. 13:00-16:00
Group IIA: 21.05.2024. 13:00-16:00

Group IB: 20.05.2024. 13:00-16:00
Group IIB: 21.05.2024. 13:00-16:00

Asist. dr M. Zeković

Asist. dr N. Šutulović

Exercise XXVII (4 hours)

1. Examination of vaginal smear cytological features in the time course of menstrual cycle
2. Early diagnosis of the pregnancy: laboratory tests
 - a. Analysis of the blood cells (number of cell types, ESR, and mean corpuscular values) in a physiological conditions
3. Analysis of the plasma composition in physiological conditions
4. Analysis of the urine composition in physiological conditions
5. Signitures, makeup of exercises and seminars

SEMINAR 17: The women reproductive lifecycle and reproductive functions (2 hours)

Group IA: 27.05.2024. 13:00-16:00
Group IIA: 28.05.2024. 13:00-16:00

Group IB: 27.05.2024. 13:00-16:00
Group IIB: 28.05.2024. 13:00-16:00

Asist. dr N. Topalović

Asist. dr R. Jeremić

***Make up of exercises on 06.05.2024 will be organized according to schedule which will be published in timely manner.**