

**SCHOOL OF MEDICINE UNIVERSITY OF BELGRADE**  
**PROGRAMME OF EXERCISES IN MEDICAL PHYSIOLOGY**  
**IV (summer) semester 2021 – 2022. academic year**

**Exercise XIV (4 hours); 21-22.02.2022. (dr Biljana Đurić & dr Jovana Jakovljević)**

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 9: Cardiac cycle: variations in different physiological conditions. Cardiac output and cardiac output regulation (2 hours), (dr Marina Đelić, Associate Professor)**

**Exercise XV (4 hours); 28.02.-01.03.2022. (dr Rada Jeremić & dr Dušan Todorvić)**

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 10: Regulation of arterial blood pressure (2 hours) (Dr Dragan Đurić, Full Professor)**

**Exercise XVI (4 hours); 07- 08.03.2022. (dr Jovana Jakovljević & dr Biljana Đurić)**

**Obtaining of blood samples for laboratory analysis from the finger tip**

1. Preparation and staining of the blood smear by Pappenheim's method
2. Identification of blood cells
3. Determination of reticulocyte count staining a slide using brilliant cresyl blue stain
4. Determination of erythrocyte sedimentation rate (ESR)

**Exercise XVII (4 hours); 14-15.03.2022. (dr Dušan Todorović & dr Nikola Šutulović)**

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

**Exercise XVIII (4 hours); 21-22.03.2022.(dr Dušan Todorvić & dr Biljana Đurić)**

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

**SEMINAR 11: Blood groups (OAB, Rh system), transfusion and transfusional reactions (2 hours) (Dr Marina Đelić, Associate Professor, Dr Dragan Hrnčić, Associate Professor)**

**Exercise XIX (4 hours); 28-29.03.2022.(dr Rada Jeremić & dr Nikola Topalović)**

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*

**Exercise XX (4 hours); 04-05.04.2022. (dr Biljana Đurić & dr Jovana Jakovljević)**

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)

**Exercise XXI (4 hours); 11-12.04.2022. (dr Nikola Šutulović & dr Nikola Topalović)**

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: Renal regulation of extracellular fluid volume and composition. Hormones of the kidney (2 hours). (Dr Zvezdana Kojić, Full professor)**

**Exercise XXII (4 hours); 18-19.04.2022. (dr Nikola Šutulović & dr Jovana Jakovljević)**

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 ( $VO_{2max}$ )

**SEMINAR 13: Chemistry in Medical Physiology: Acid-base balance. Body chemical buffers (2 hours)**

**Exercise XXIII (4 hours); 25-26.04.2021. (dr Nikola Topalović & dr Rada Jeremić)**

**(make up of 25.04.2021., for the 1<sup>st</sup> group (A and B) will be held according to a schedule wich will to be announced)**

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  $PCO_2$  values in the alveolar air and blood*
3. *Interactive video presentation of functions of the respiratory system (A.D.A.M.)*

**SEMINAR 14: Regulation of respiration (2 hours). (Dr Marija Stojanović, Assistant Professor)**

**Exercise XXIV (4 hours); 03. 05.2022. (dr Bilja Đurić & dr Rada Jeremić)**

**(make up of 02.05.2021., for the 1<sup>st</sup> group (A and B) will be held according to a schedule which will be announced)**

1. Spirometry: measuring dynamic lung volumes: FEV<sub>1</sub>, 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 15: Role of the hypothalamus in the control of homeostatic control systems of the body (2 hours), (Dr Igor Pantić, Associate Professor)**

**Exercise XXV (4 hours); 09-10.05.2022. (dr Nikola Topalović & dr Jovana Jakovljević)**

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 16: Physiology of the liver. Endocrine function of gastrointestinal system (2 hours) (Dr Predrag Brkić Associate Professor, Dr Igor Pantić Associate Professor)**

**Exercise XXVI (4 hours); 16-17.05.2022. (dr Nikola Šutulović, & dr Jovana Jakovljević)**

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 17: Homeostasis of calcium and magnesium; bone physiology (2 hours), (Dr Dejan Nešić)**

**Exercise XXVII (4 hours); 23-24.05.2022. (dr Nikola Topalović & dr Dušan Todorvić)**

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. Signatures, makeup of exercises and seminars

**SEMINAR 18: Life cycles of female reproductive system (Dr Predrag Brkić, Dr Marija Stojanović, Assistant Professor)**