

<b>Subject</b>	<b>PHYSIOLOGY AND PATHOPHYSIOLOGY</b>
<b>Study program</b>	<b>Three years of graduate studies for graduate radiological technologist</b>
<b>Code</b>	SRT-125
<b>Academic year</b>	First (I)
<b>Semester</b>	Second(II)
<b>Classes, total</b>	45
<b>Credits</b>	3.5
<b>Subject type</b>	Obligatory
<b>Prerequisites</b>	No
<b>Held by</b>	Institute of physiology and anthropology Institute of pathophysiology
<b>Professor-Lecturer in charge</b>	Prof d-r Vesela Maleska - Ivanovska Prof. d-r Suzana Loparska
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<b>Key words</b>	Professional studies for radiological technologist, basic subjects, physiology, pathophysiology
<b>Study goals</b>	<p><b>Introduction to:</b></p> <ul style="list-style-type: none"> <li>▪ Physiological mechanisms of homeostasis.</li> <li>▪ Physiology of blood</li> <li>▪ Cardiovascular physiology.</li> <li>▪ Physiology of the respiratory system.</li> <li>▪ Physiology of gastrointestinal system.</li> <li>▪ Physiology of metabolism, liver and thermoregulation.</li> <li>▪ Physiology of the urinary system.</li> <li>▪ Physiology of the nervous system.</li> <li>▪ Physiology of the endocrine system.</li> </ul> <p><b>Introducing the pathophysiological mechanisms of:</b></p> <ul style="list-style-type: none"> <li>▪ haemostatic disorders.</li> <li>▪ cardiovascular disorders.</li> <li>▪ gastrointestinal disorders</li> <li>▪ liver disorders</li> <li>▪ urinary disorders</li> <li>▪ endocrine disorders.</li> </ul>
<b>Brief description</b>	<p><b>Theoretical classes (30 classes):</b></p> <p><b>Physiology (21 classes):</b></p> <ul style="list-style-type: none"> <li>▪ Homeostasis: mechanisms to maintain the constancy of the internal environment.</li> <li>▪ Blood: red cells, white cells and platelets; blood groups ABO and Rh system; hemostasis coagulation and fibrinolysis.</li> <li>▪ Heart: electrical activity of the heart muscle; cardiac cycle and heart tones; regulation of heart rate; rhythmic excitation of heart; normal ECG.</li> <li>▪ Circulation: physical properties of the circulation; venous system; microcirculation; lymphatic system; Local flow control; regulation of blood pressure and heart output.</li> <li>▪ Respiratory System: Pulmonary ventilation, pulmonary circulation, diffusion of oxygen and carbon dioxide, oxygen and carbon dioxide</li> </ul>

	<p>transport; regulation of breathing.</p> <ul style="list-style-type: none"> <li>▪ Gastrointestinal system; common principles of functioning of the gastrointestinal system, the motor activity of the gastrointestinal system, secretory activity, digestion of food, absorption of nutrients.</li> <li>▪ Liver, metabolism and thermoregulation: metabolic energy substances, physiological regulation of energy balance and body temperature.</li> <li>▪ Urinary system; creating urine - the process of filtration, reabsorption and secretion; renal blood flow and its control; regulation of osmolarity and volume of extracellular fluid; regulation of potassium, calcium, phosphate and magnesium; process of urination; regulation of acid-base balance; body fluids: body water compartments, the composition of body fluids and their regulation.</li> <li>▪ Nervous system: general organization and functions of the nervous system; physiology of sensory systems and senses: general principles of organization, somatic sensations, specialized senses; physiology of the motor system and muscles: motor cortex, basal ganglia, cerebellum, brainstem, spinal cord, vegetative nervous system; higher cortical functions: learning, memory, speech.</li> <li>▪ Endocrine system: introduction to the endocrine system; hormone production, secretion, regulation and mechanisms of action; pituitary hormones; thyroid metabolic hormones; adrenal hormones; pancreatic endocrine function; hormones of parathyroid gland; reproductive and hormonal functions in women and men.</li> </ul> <p><b>Pathophysiology (9 classes)</b></p> <ul style="list-style-type: none"> <li>▪ System for hematopoiesis: leukocyte lineage, leukemias; haemostasis disorders.</li> <li>▪ Disorders of cardiac output; cardiac decompensation; heart defects; coronary circulation disorders; syncope; disorders pericardium; arterial hypertension.</li> <li>▪ Respiratory system: Disorders of ventilation; hypo- and hyperventilation, restrictive and obstructive disorders; diffusion lung disorders; dyspnea, cyanosis, atelectasis; emphysema; pneumothorax; asphyxia; pulmonary hypertension; respiratory failure.</li> <li>▪ Urinary system: disorders of the volume and composition of urine; renal failure; glomerulopathies; tubulopathies; nephrotic syndrome; nephrosclerosis; edema; urolithiasis.</li> <li>▪ Digestive system: disruption of the act of sucking, chewing, swallowing and oesophageal motorics; disruption of gastric and intestinal motorics; disorder saliva secretion (hypo and hypersecretion), gastric, pancreatic and intestinal secretions; disruption of intestinal reabsorption.</li> <li>▪ Liver: acute and chronic liver failure; disturbance of the hepatic circulation; icterus.</li> <li>▪ Endocrine system: disorder hypothalamus, adenohipophysis and neurohypophysis, cortex and adrenal medulla, thyroid, parathyroid glands and male and female sex glands.</li> </ul> <p><b>Laboratory practice (15 classes):</b> Laboratory exercises of theoretical knowledge.</p>
<b>Organization</b>	Theory lectures: 30 (physiology 21classes + pathophysiology 9 classes) Laboratory practice lectures: 15 (physiology 10classes + pathophysiology 5 classes)
<b>Learning methods</b>	Interactive lectures, laboratory practice and seminars.
	<b>Knowledge and understanding:</b> The student will be able to know the

<b>Expected results</b>	<p>functional characteristics and processes of organic systems and will be able to learn about the interrelationships and influences the control and regulation mechanisms of the human organism and can adopted the basic pathophysiological mechanisms of changes in disease and pathological processes in organic systems..</p> <p><b>Key skills:</b> The student will be able to indicate the physiological processes and their regulatory mechanisms that take place in organic systems, will highlight their mutual influences and will indicate the basic etio-pathological characteristics of the starting and throughout the disorders of organ systems.</p>																							
<b>Specific recommendations</b>	<p>The student is obliged to actively monitor all the activities, including participating in continuous knowledge checks to get a signature.</p> <p><b>Scoring the student activities:</b></p> <table border="1" data-bbox="502 667 1378 1014"> <thead> <tr> <th rowspan="2">Type of activity</th> <th colspan="2">Points</th> </tr> <tr> <th>Min</th> <th>Maks</th> </tr> </thead> <tbody> <tr> <td>Theoretical classes (physiology + pathophysiology)</td> <td>6 (3+3)</td> <td>9 (5+4)</td> </tr> <tr> <td>Practical classes(physiology + pathophysiology)</td> <td>12 (9+3)</td> <td>21 (15+6)</td> </tr> <tr> <td>Seminar (physiology)</td> <td>6</td> <td>10</td> </tr> <tr> <td>Continuous checks -</td> <td>24</td> <td>40</td> </tr> <tr> <td>Final exam</td> <td>12</td> <td>20</td> </tr> <tr> <td><b>Total:</b></td> <td><b>60</b></td> <td><b>100</b></td> </tr> </tbody> </table> <p><b>Knowledge assessment criteria:</b></p> <ol style="list-style-type: none"> <li>1. A 60% Point Score Minimum (per examination) is needed in order to attend final exam</li> <li>2. If PSM (Point Score Minimum) not obtained, the student is allowed a complete final exam (the colloquial exam and final exam included).</li> </ol>	Type of activity	Points		Min	Maks	Theoretical classes (physiology + pathophysiology)	6 (3+3)	9 (5+4)	Practical classes(physiology + pathophysiology)	12 (9+3)	21 (15+6)	Seminar (physiology)	6	10	Continuous checks -	24	40	Final exam	12	20	<b>Total:</b>	<b>60</b>	<b>100</b>
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<b>Contiuous knowledge assesment</b>	<p><b>Continuous checks of knowledge - 1 tests (written)</b></p> <p>Physiology 24-40 points</p> <p><b>Final exam: test (written)</b></p> <p>Phatophysiology 12-20 points</p> <p><b>Complete final exam*:</b> test is a combination of continuous check which has not been passed and final exam.</p> <p>* Student completed and / or complete the final examination may occur only after receiving credits (passed) on the subject anatomy.</p> <p>*Assessment of the overall exam is obtained according to the table grades, based on the sum of points from all activities, including continuous checks and points from every part of the final or complete the final exam.</p>																							
<b>Recommended literature</b>	<ol style="list-style-type: none"> <li>1. Guyton AC, Hall JE. Textbook of Medical Physiology 12<sup>th</sup> edition. Elsevier, London, 2011</li> <li>2. Dejanova B, Petrovska S, Todorovska L. Physiology of certain organ systems. Skopje, 2012</li> <li>3. Selected chapters of physiology (internal script of Institute of physiology), Skopje,2009</li> <li>4. Efremovska Lj and all. Practicum in Physiology. Skopje 2012</li> <li>5. Despopoulos A, Silbernagl S. Color atlas of Physiology. New York, 2003</li> </ol>																							

	<ol style="list-style-type: none"><li>6. Costanzo LS. Physiology Elsevier, London, 2006</li><li>7. Vaskova O, Miceva Ristevska S, Pop Gjorceva D, Miladinova D, Loparska S, Majstorov V. Basic pathophysiology of systems (textbook and practicum), Skopje, 2013</li></ol>
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