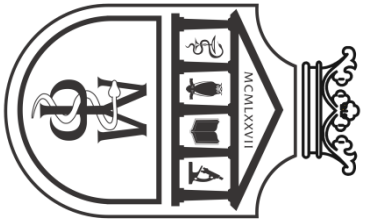

PHYSIOLOGY

Topic:

PHYSIOLOGY

18 ECTS
4 theorethical classes and 4 practical classes in the small group, weekly.

Members of Department

	Name and last name	e-mail address	Title
1.	Gvozden Rosic	grosic@medf.kg.ac.rs	Full Professor
2.	Vladimir Jakovljevic	drvladakgbg@yahoo.com	Full Professor
3.	Vladimir Zivkovic	vladimirziv@gmail.com	Full Professor
4.	Ivan Srejovic	ivan_srejovic@hotmail.com	Associate Professor
5.	Dragica Selakovic	dragica984@gmail.com	Associate Professor
6.	Jovana Joksimovic Jovic	jovana_joksimovic@yahoo.com	Assistant Professor
7.	Jasmina Sretenovic	drj.sretenovic@gmail.com	Assistant Professor
8.	Marina Nikolic	marina.nikolic.95@gmail.com	Teaching Assistant
9.	Maja Muric	majanikolickg90@gmail.com	Teaching Assistant

CURRICULUM

Week	Type	Topic Title	Lecturer
1	Theorethical	**Cell membrane physiology**	Gvozden Rosic
1	Practical	**Introduction to laboratory practice**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
1	Seminar	**Cell membrane physiology (recapitulation)**	
2	Theorethical	**Physiology of excitable tissues**	Ivan Srejovic
2	Practical	**The examination of membrane potentials**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
2	Seminar	**Physiology of excitable tissues (racapitulation)**	
3	Theorethical	**Physiology of the skeletal muscle**	Vladimir Zivkovic
3	Practical	**Ausculation of heart**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
3	Seminar	**Physiology of the skeletal muscle (racapitulation)**	

Week	Type	Topic Title	Lecturer
4	Theorethical	**Physiology of the smooth muscle**	Ivan Srejovic
4	Practical	**Qualities of pulse**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
4	Seminar	**Physiology of the smooth muscle (racapitulation)**	
5	Theorethical	**Physiology of the heart 1**	Vladimir Jakovljevic
5	Practical	**Arterial tension**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
5	Seminar	**Physiology of the heart 1 (racapitulation)**	
6	Theorethical	**Physiology of the heart 2**	Vladimir Jakovljevic
6	Practical	**ECG 1**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
6	Seminar	**Physiology of the heart 2 (racapitulation)**	
7	Theorethical	**Physiology of circulatory system 1**	Gvozden Rosic
7	Practical	**ECG 2**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
7	Seminar	**Physiology of circulatory system 1 (racapitulation)**	
8	Theorethical	**Physiology of circulatory system 2**	Gvozden Rosic
8	Practical	**The examination of cardiovascular system functions 1**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
8	Seminar	**Physiology of circulatory system 2 (racapitulation)**	
9	Theorethical	**Physiology of circulatory system 3**	Gvozden Rosic
9	Practical	**The examination of cardiovascular system functions 2**	Gvozden Rosic Vladimir Jakovljevic

Week	Type	Topic Title	Lecturer
9	Seminar	**Physiology of circulatory system 3 (racapitulation)**	Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
10	Theorethical	**Physiology of respiratory system 1**	Gvozden Rosic
10	Practical	**Static spirometry**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
10	Seminar	**Physiology of respiratory system 1 (recapitulation)**	
11	Theorethical	**Physiology of respiratory system 2**	Gvozden Rosic
11	Practical	**Dynamic spirometry**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
11	Seminar	**Physiology of respiratory system 2 (recapitulation)**	
12	Theorethical	**Physiology of urinary system 1**	Vladimir Zivkovic
12	Practical	**The examination of urinary system functions 1**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
12	Seminar	**Physiology of urinary system 1 (racapitulation)**	
13	Theorethical	**Physiology of urinary system 2**	Vladimir Zivkovic
13	Practical	**The examination of urinary system functions 2**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
13	Seminar	**Physiology of urinary system 2 (racapitulation)**	
14	Theorethical	**Physiology of urinary system 3**	Ivan Srejovic
14	Practical	**The bascic hematological tests 1**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
14	Seminar	**Physiology of urinary system 3 (racapitulation)**	

Week	Type	Topic Title	Lecturer
15	Theorethical	**Hematology**	Vladimir Zivkovic
15	Practical	**The bascic hematological tests 2**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
15	Seminar	**Hematology (racapitulation)**	
16	Theorethical	**Physiology of gastrointestinal system 1**	Jovana Joksimovic Jovic
16	Practical	**The bascic hematological tests 3**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
16	Seminar	**Physiology of gastrointestinal system 1 (recapitulation)**	
17	Theorethical	**Physiology of gastrointestinal system 2**	Jovana Joksimovic Jovic
17	Practical	**The bascic hematological tests 4**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
17	Seminar	**Physiology of gastrointestinal system 2 (recapitulation)**	
18	Theorethical	**Regulation of energy metabolism**	Gvozden Rosic
18	Practical	**Estimation of energy metabolism**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
18	Seminar	**Regulation of energy metabolism (recapitulation)**	
19	Theorethical	**Physiology of endocrine system 1**	Ivan Srejovic
19	Practical	**The examination of endocrine system function 1**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
19	Seminar	**Physiology of endocrine system 1 (racapitulation)**	
20	Theorethical	**Physiology of endocrine system 2**	Ivan Srejovic
20	Practical	**The examination of endocrine system function 2**	Gvozden Rosic Vladimir Jakovljevic

Week	Type	Topic Title	Lecturer
20	Seminar	**Physiology of endocrine system 2 (racapitulation)**	Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
21	Theorethical	**Physiology of endocrine system 3**	Jovana Joksimovic Jovic
21	Practical	**The examination of endocrine system function 3**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
21	Seminar	**Physiology of endocrine system 3 (racapitulation)**	
22	Theorethical	**Introduction to physiology of central nervous system**	Dragica Selakovic
22	Practical	**The examination of endocrine system function 4**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
22	Seminar	**Introduction to physiology of central nervous system (racapitulation)**	
23	Theorethical	**Physiology of sensory system 1**	Dragica Selakovic
23	Practical	**The examination of central and peripheral nervous system functions 1**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
23	Seminar	**Physiology of sensory system 1 (racapitulation)**	
24	Theorethical	**Physiology of sensory nervous system 2**	Dragica Selakovic
24	Practical	**The examination of central and peripheral nervous system functions 2**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
24	Seminar	**Physiology of sensory system 2 (racapitulation)**	
25	Theorethical	**Physiology of motor system 1**	Dragica Selakovic
25	Practical	**The examination of central and peripheral nervous system functions 3**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
25	Seminar	**Physiology of motor system 1 (racapitulation)**	

Week	Type	Topic Title	Lecturer
26	Theorethical	**Physiology of motor system 2**	Dragica Selakovic
26	Practical	**Tests for cognition estimation**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
26	Seminar	**Physiology of motor system 2 (racapitulation)**	
27	Theorethical	**Physiology of cortex and subcortical structures. Emotion control, and higher intellectual functions.**	Dragica Selakovic
27	Practical	**EEG**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
27	Seminar	**Physiology of cortex and subcortical structures. Emotion control, and higher intellectual functions. (racapitulation)**	
28	Theorethical	**Autonomic nerve system**	Ivan Srejovic
28	Practical	**Pupillary reflexes**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
28	Seminar	**Autonomic nerve system (racapitulation)**	
29	Theorethical	**Physiology of sensens 1**	Jasmina Sretenovic
29	Practical	**The examination of sensens 1**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
29	Seminar	**Physiology of sensens 1 (racapitulation)**	
30	Theorethical	**Physiology of sensens 2**	Jasmina Sretenovic
30	Practical	**The examination of sensens 2**	Gvozden Rosic Vladimir Jakovljevic Vladimir Zivkovic Ivan Srejovic Dragica Selakovic Jovana Joksimovic Jovic Jasmina Sretenovic Marina Nikolic Maja Muric
30	Seminar	**Physiology of sensens 2 (racapitulation)**	
	FINAL TEST		
	ORAL EXAM		

GRADING POLICY

The assessment of students takes into account the engagement during seminars, points collected on the final test (all points are recorded in personal student cards), and oral exam, as follows:

1. The activity during the course (up to 50 points):

A. Regular Attendance in Course and weekly examination (seminar) – 0-0.5 point weekly (up to 15 points)

B. Final Test Score (after completing the course):

Correct answers	Points
0-35	0
36-70	The number of correct answers/2

2. ORAL EXAM – response to five randomly chosen questions (up to 50 points)

Final course grade based upon total points

Total points	Grade
0 - 50	**5**
51 - 60	**6**
61 - 70	**7**
71 - 80	**8**
81 - 90	**9**
91 - 100	**10**

WEEKLY COURSE SCHEDULE

COURSE	WEDNESDAY
PHYSIOLOGY (4+4)	**LECTURES** **09:00- 12:15** (H44) **PRACTICE** **13:00 - 16:05** (H44)

Required textbooks:

TITLE	AUTHORS	PUBLISHER	AVAILABLE IN LIBRARY
Arthur C. Guyton & John E. Hall: Textbook of Medical Physiology, 14th edition.	Guyton AC, Hall JE	Elsevier, 2020.	Yes
William F. Ganong. Review of Medical Physiology. 25th ed.	Ganong William	The McGraw-Hill Companies, 2016.	Yes

Oral examination commissions:

Oral examination questions

A

1. Content and distribution of water in the human body.
2. Factors influencing the content and distribution of water in the human body.
3. Morpho-functional characteristics of the cell membrane.
4. Types of cell membrane junctions.
5. Tight junctions.
6. Gap junctions.
7. Types of cell membrane transports.
8. Factors influencing the cell membrane permeability.
9. Simple diffusion.
10. Common characteristics of carrier-mediated transports.
11. Stereospecific characteristics of carrier-mediated transports.
12. Saturability of carrier-mediated transports.
13. Competitivity of carrier-mediated transports.
14. Facilitated difusion.
15. The examples of facilitated diffusion.
16. Primary active transports.
17. The examples of primary active transports.
18. Secondary active transports.
19. Simport.
20. The examples of simport.
21. Antiport.
22. The examples of antiport.
23. Osmosis.
24. The impact of different medium osmolarity on cell volume.
25. Resting membrane potential.
26. Action potentials – types and mechanisms.
27. Action potentials – phases.

28. Refractory periods.
29. Neuromuscular junction.
30. Acetylcholine receptors in skeletal muscle and connection between the post-synaptic potential and excitation of skeletal muscle.
31. Action potentials propagation in skeletal muscle.
32. Sarcoplasmic reticulum and Ca2+ in skeletal muscles.
33. Functional structure of skeletal muscles.
34. Contractile filaments in skeletal muscles.
35. Sarcomera as the functional unit of skeletal muscle. The impact of sarcomere length on muscle contraction.
36. “Cross-bridge“ cycle.
37. Motor unit. Muscle contractions summation and tetanization mechanism.
38. Classification of smooth muscle fibers. The characteristics of multi- and single-unit smooth muscles.
39. Functional structure of smooth muscles.
40. Excitation and contraction of smooth muscle.
41. Cardiac conduction system.
42. Action potentials in hearts – ventricles, atria, and Purkinje’s system.
43. Action potentials in hearts – SA node.
44. Action potentials in hearts – AV node.
45. Conduction velocity in the heart.
46. Specifical structures of the myocardium.
47. The connection between the excitation and contraction in the heart.
48. Heart cycle (phases).
49. Heart cycle (duration) – the impact of frequency.
50. Ventricular isovolumetric contraction.
51. Ventricular ejection phase.
52. Ventricular isovolumetric relaxation.
53. Ventricular loading phase.
54. Pressure-volume loop in ventricles.
55. The alterations in the pressure-volume loop in ventricles.
56. Cardiac output and determinating factors.
57. Parasympathetic effects in the heart.
58. Sympathetic effects on the heart.
59. End-systolic and end-diastolic volume. Ejection fraction.
60. The impact of sympathetic and parasympathetic stimulation on cardiac output loop.
61. Functional classification of the circulatory system.

62. Roles and characteristics of the systemic circulation.
63. Blood flow velocity in different parts of the systemic circulation.
64. Pressures in different parts of the systemic circulation.
65. Significance of Ohm’s law in the circulatory system.
66. Blood flow types.
67. Reynolds number.
68. The differences in resistance for systemic and pulmonary circulation.
69. The factors influencing conductance (Poiseuille’s law).
70. The factors influencing viscosity in small blood vessels.
71. Vascular distensibility.
72. Vascular compliance.
73. Volume-pressure loop in the systemic circulation.
74. Typical reactions of arteries and veins to intraluminal pressure increase.
75. Pulse pressure and determining factors.
76. Mean arterial pressure.
77. Hemodynamic characteristics of veins in the systemic circulation.
78. The roles of the systemic venous system.
79. The factors influencing the pressure and flow in the venous system.
80. The functional importance of the capillary system structure.
81. The specific capillary wall structure in certain tissues.
82. Capillary membrane transports.
83. The forces determining the direction of liquid exchange through the capillary membrane.
84. Starling equilibrium for capillary exchange.
85. The roles and properties of the lymphatic system.
86. Local blood flow in certain tissues.
87. The mechanisms involved in the regulation of the local blood flow.
88. Acute control of the local blood flow.
89. Long-term control of the local blood flow.
90. Autoregulation of the local blood flow.
91. Vasoactive substances originate from the endothelium and bloodstream.
92. The humoral regulation of circulation.
93. The neural control of circulation.
94. Vasomotor centre.
95. The reflexes involved in maintaining normal blood pressure.

96. Baroreceptor reflex.
97. The role of the kidney in the long-term control of blood pressure.
98. The importance of the renin-angiotensin-aldosterone system.

B

1. Biomechanics of pulmonary ventilation.
2. Pleural, alveolar, and transpulmonary pressure.
3. Elastic lung properties and determining factors.
4. Anatomic dead space and minute alveolar ventilation.
5. The characteristics of pulmonary circulation. The pulmonary capillary dynamics and automatic control of blood distribution.
6. The zones of pulmonary blood flow.
7. The factors influencing the alveolar PO2.
8. The factors influencing the alveolar PCO2.
9. The net diffusion of gases through the respiratory membrane and diffusion coefficients.
10. The impact of ventilation/perfusion ratio (VA/Q) on alveolar PAO2 and PACO2.
11. Physiological shunt and physiological dead space.
12. The alterations of PO2 in the circulatory system.
13. The alterations of PCO2 in the circulatory system.
14. The factors influencing the interstitial fluid PO2.
15. The factors influencing the interstitial fluid PCO2.
16. Oxygen transport in the blood.
17. Oxygen–hemoglobin dissociation curve and determining factors.
18. CO2 transport in the blood.
19. Respiratory center.
20. Chemosensitive area and direct control of respiratory center activity.
21. Peripheral chemoreceptors and ventilation control.
22. The water distribution and body fluid compartments.
23. The content differences between body fluid compartments.
24. The blood composition.
25. The hematopoiesis.
26. Erythrocytes (characteristics and number).
27. The roles of erythrocytes.
28. The control factors for erythropoiesis and erythrocytes maturation.

29. The synthesis, structure, and functional characteristics of hemoglobin.
30. Reticulocytes.
31. Leukocytes (characteristics and number), types, and relative leukocyte formula.
32. Neutrophils.
33. Eosinophils.
34. Basophils.
35. T and B lymphocytes.
36. Antibodies.
37. Pro- and anti-coagulants.
38. The immunity.
39. Monocite-macrophage system.
40. Thrombocytes.
41. Hemostasis stages.
42. Coagulation factors.
43. Fibrinolysis.
44. The metabolic fate of iron.
45. The clinical tests of hemostasis.
46. Morpho-functional characteristics of kidney and renal circulation.
47. Nephron (types, roles, and characteristics).
48. Principal processes in urine formation.
49. Glomerulus - structure and functions. Specificity of the glomerular membrane.
50. Factors determining the glomerular membrane permeability.
51. Factors involved in the glomerular filtration regulation.
52. Tubular reabsorption.
53. Kidney transport maximum.
54. Tubular secretion.
55. Tubular transport mechanisms.
56. The proximal tubule functions.
57. The thin (descending and ascending) limb of Henle's loop functions.
58. The thick limb of Henle's loop functions.
59. The distal convoluted tubule and collecting duct functions.
60. The mechanisms for the formation of concentrated urine.
61. The role of *vasa recta* in the formation of concentrated urine.
62. The mechanisms for the formation of diluted urine.

63. Renin-angiotensin-aldosterone system.
64. Renal clearance (definition, formulas).
65. Clearance of inulin, para aminohippuric acid, and creatinine.
66. Osmolarity regulation in the human body.
67. The systems for maintaining of acid–base equilibrium.
68. The role of the chemical buffer systems in maintaining of acid–base equilibrium.
69. The role of the kidney in maintaining of acid–base equilibrium.
70. Electrical activity of gastrointestinal smooth muscles.
71. The enteric nervous system.
72. The role of the autonomic nervous system in gastrointestinal functions control.
73. Types of movement in the gastrointestinal system.
74. The swallowing and nervous control.
75. The stomach motoric functions.
76. The stomach emptying regulation.
77. The intestine's motoric functions and their control. The intestine emptying control – the role of the ileocecal valve.
78. The colon motoric functions and defecation reflexes.
79. The types of glands and daily secretion in the gastrointestinal system.
80. The salivation and its regulation.
81. The stomach secretion.
82. The control of stomach secretion.
83. The pancreatic secretion and its regulation.
84. The bile (content, roles, secretion and its regulation).
85. The intestine secretion and its regulation.
86. The carbohydrate digestion.
87. The lipids digestion.
88. The protein digestion.
89. The absorption of nutrients final digestion products.
90. The liver function.
91. The basic principles of nutrition and metabolism.

C

1. The examples of negative feedback mechanisms in the endocrine system.

2. The examples of positive feedback mechanisms in the endocrine system.
3. The basic principles of peptide hormones action.
4. The basic principles of steroid hormones action.
5. The basic principles of amino acid-derived hormones action.
6. The second messenger systems in the endocrine system.
7. The functional anatomy of the pituitary gland.
8. Vasopressin.
9. Oxytocin.
10. The physiological roles, mechanisms of action, and secretion regulation of growth hormone.
11. The metabolic effects of growth hormone.
12. The adenohypophysis hormones involved in other endocrine glands' regulation.
13. The synthesis, transport, and mechanism of action of thyroid hormones.
14. The physiological roles and metabolic effects of thyroid hormones.
15. The thyroid hormones secretion control.
16. The calcitonin.
17. The functional anatomy of the adrenal gland.
18. The circadian rhythm secretion and transport of cortisol.
19. The role of cortisol in stress and inflammation.
20. The metabolic effects of cortisol.
21. The glucocorticoid secretion regulation.
22. The aldosterone (physiological roles and secretion control).
23. The hormonal regulation of glycemia.
24. The synthesis, secretion, secretion regulation, and mechanism of insulin action.
25. The role of insulin in carbohydrate metabolism.
26. The role of insulin in protein metabolism and growth.
27. The role of insulin in lipids metabolism.
28. The synthesis, secretion, secretion regulation, and mechanism of glucagon action.
29. The metabolic effects of glucagon.
30. The hormonal regulation of calcium metabolism.
31. Neuroendocrine regulation of the reproductive system functions.
32. The spermatogenesis and hormones involved in its regulation.
33. The vegetative control of male sex act.
34. The physiological roles of testosterone.
35. The metabolic effects of testosterone.

36. FSH and LH secretion rhythms through the cycle.
37. Estrogen and progesterone secretion rhythms through the cycle.
38. Ovarian follicles stages and corpus luteum formation.
39. The effects of estradiol.
40. The effects of progesterone.
41. The endometrial cycle.
42. The vegetative control of female sex act.
43. The hormonal regulation of lactation.
44. The functional characteristics of certain parts of neurons.
45. The synapsis.
46. The excitation and inhibition mechanisms of neurons.
47. The fast-acting and slow-acting neurotransmitters.
48. The control of functions on the spinal cord level.
49. The control of functions on the subcortical level.
50. The control of functions on the cortical level.
51. The synaptic transmission in acidosis and alkalosis, and synaptic fatigue.
52. Spatial and temporal summation.
53. The sensory receptors classification.
54. The mechanisms for receptor potential formation (Pacinian corpuscle).
55. The receptors adaptation.
56. Tonic and phasic receptors.
57. The classification of nerve fibers.
58. Somatic sensory system.
59. The somatosensory pathways.
60. The functional anatomy of the anterolateral system pathway.
61. The functional anatomy of the medial lemniscus.
62. The somatosensory cortex map.
63. The functions of somatosensory area 1 and somatosensory association area
64. The spinal cord reflexes.
65. The brainstem functions.
66. The primary motor cortex.
67. The premotor area.
68. The supplementary motor area.
69. The specialized areas of the motor cortex (Broca's area and Wernicke's area).

70. The corticospinal tract.
71. The extrapyramidal system.
72. The higher intellectual functions of the prefrontal association area.
73. The physiological control of balance.
74. Morphofunctional characteristic of the cerebellum.
75. The roles of the cerebellum.
76. Vestibulocerebellum.
77. Spinocerebellum.
78. Cerbrocerebellum.
79. Morphofunctional characteristic of basal ganglia.
80. The dysfunctions of basal ganglia.
81. The association areas of the brain.
82. The dominant hemisphere.
83. The roles of the corpus callosum.
84. The memory - definition and classification.
85. Short-term memory.
86. Medium-term memory.
87. Long-term memory.
88. Memory consolidation and memory disorders.
89. Activation systems in the brain.
90. The physiological importance of the limbic system.
91. The physiological importance of the hypothalamus.
92. “Reward” and “punishment” function of the limbic system.
93. The physiological importance of the hippocampus.
94. Sleep - definition and classification.
95. Slow-wave sleep.
96. REM sleep.
97. Thee sleep regulation.
98. The functional organization sympathetic part of the autonomic nervous system.
99. The effects of stimulation of the sympathetic part of the autonomic nervous system.
100. The functional organization parasympathetic part of the autonomic nervous system.
101. The effects of stimulation of the parasympathetic part of the autonomic nervous system.
102. The receptors function of the retina.
103. The color vision.

104. The mechanisms for detection of auditory signals.
105. The sense of smell.