

Course: Medical physiology

53 hours of lectures, 87 hours of seminars, 40 hours of exercises, total 180 hours

Week 1 – General physiology, muscles

Date	Time	Class type and topic	Group	Hall	Lecturer
Monday 15. 2. 2021.	13.00-13.30	Introduction: Physiology course plan and examination procedure	ALL	LH	D. Pravdić
	13.30-15.00	(L1) Functional organization of human body; transport through cell membranes	ALL	LH	T. Kelava
	15.30-16.15	(L2) Basic physics of membrane potentials	ALL	LH	T. Kelava
	16.30-18.00	(S1) Membrane and action potentials	ALL	LH	T. Kelava
Tuesday 16. 2. 2021.	14.30-15.15	(L3) Excitation of skeletal muscle	ALL	LH	T. Kelava
	15.30-17.00	(L4) Contraction of skeletal muscle	ALL	LH	T. Kelava
	17.30-19.00	(L5) Excitation and contraction of smooth muscle	ALL	LH	T. Kelava
Wednesday 17. 2. 2021.	14.30-16.00	(L6) Physiology of cardiac muscle	ALL	LH	T. Kelava
	16.30-18.00	(S2) Cardiac cycle, regulation of heart pumping	ALL	LH	T. Kelava
Thursday 18. 2. 2021.	14.30-16.45	(E1) Prosig	ALL	PP	Assistants
	17.15-20.15	(S3-S4) Rhythmical excitation of the heart; ECG	ALL	LH	T. Kelava
Friday 19. 2. 2021.	14.30-16.45	(S5) Integration (general physiology, potentials, muscles and heart)	ALL	LH	T. Kelava
	17.00-20.45	(E2) Recording and vectorial analysis of ECG	ALL	PP	Assistants

Week 2 – Circulation

Date	Time	Class type and topic	Group	Hall	Lecturer
Monday 22. 2. 2021.	12.30-13.00	TEST 1	ALL	LH	
	13.30-15.00	(L7) Overview of the circulation: physics of pressure, flow and resistance	ALL	LH	D. Pravdić
	15.30-17.00	(L8) Vascular distensibility, functions of the arterial and venous systems, the structure of microcirculation	ALL	LH	D. Pravdić
Tuesday 23. 2. 2021.	14.00-15.30	(S6) Capillary fluid exchange, local control of tissue blood flow	ALL	LH	I. Čavar
	16.00-17.30	(S7) Humoral and nervous regulation of circulation, rapid control of arterial pressure	ALL	LH	D. Pravdić
Wednesday 24. 2. 2021.	14.00-15.30	(L9) Long-term control of arterial pressure: integrated system for arterial pressure regulation	ALL	LH	D. Pravdić
	16.00-17.30	(S8) Cardiac output and venous return	ALL	LH	D. Pravdić

	17.45-19.15	(S9) Muscle blood flow and coronary circulation	ALL	LH	I. Čavar
Thursday 25. 2. 2021.	14.00-15.30	(L10) Hemorrhagic shock and physiological principles of treatment	ALL	LH	D. Pravdić
	15.45-18.00	(E3) Interactive physiology 9.0: Cardiovascular system	ALL	PP	Assistants
Friday 26. 2. 2021.	13.30-15.45	(S10) Integration (circulation)	ALL	LH	D. Pravdić
	16.00-19.00	(E4) Measuring of the arterial pressure and peripheral pulse rate, heart sounds	ALL	PP	Assistants

Week 3 - Body fluids and kidneys

Date	Time	Class type and topic	Group	Hall	Lecturer
2. 3. 2021.					
Holiday (BiH Independence Day)					
Tuesday 2. 3. 2021.	13.30-14.00	TEST 2	ALL	LH	
	14.30-15.15	(L11) Kidneys: physiological anatomy and function	ALL	LH	I. Čavar
	15.30-17.00	(S11) The body fluid compartments and volumes and their balance; edema	ALL	LH	I. Čavar
	17.15-18.45	(S12) Glomerular filtration, renal blood flow and their control	ALL	LH	D. Pravdić
Wednesday 3. 3. 2021.	12.00-13.30	(S13) Tubular reabsorption and secretion	ALL	LH	I. Čavar
	14.00-15.30	(S14) Regulation of reabsorption in tubules	ALL	LH	D. Pravdić
	15.45-16.30	(L12) Micturition and diuretics	ALL	LH	I. Čavar
Thursday 4. 3. 2021.	13.30-15.00	(S15) Regulation of extracellular fluid osmolarity and sodium concentration	ALL	LH	D. Pravdić
	15.30-17.00	(S16) Regulation of renal potassium, calcium and magnesium excretion	ALL	LH	I. Čavar
	17.15-18.45	(L13) Thirst, integration of renal mechanisms for control of blood volume and extracellular fluid volume	ALL	LH	I. Čavar
Friday 5. 3. 2021.	14.00-17.00	E5 – Electrocardiogram repetition, orthostatic test	ALL	PP	Assistants
	17.30-20.30	(S17) Acid-base regulation: respiratory and renal regulation, acidosis and alkalosis	ALL	LH	I. Čavar
Saturday 6. 3. 2021.	14.00-16.15	(S18) Integration (kidneys and body fluids)	ALL	LH	I. Čavar
	16.30-19.30	(E6) Kidneys problem solving, ABS cases and problems	ALL	PP	Assistants
Monday 8. 3. 2021.	8.30-9.00	TEST 3			

Partial Exam (P1): Saturday, March 13, 2021 at 9am

Week 4 – Respiratory system

Date	Time	Class type and topic	Group	Hall	Lecturer
Monday 15. 3. 2021.	14.00-14.45	(L14) Mechanics of lungs, Laplace's law, functions of the respiratory passageways	ALL	LH	Vesna LŠ
	15.00-16.30	(S19) Pulmonary ventilation	ALL	LH	Vesna LŠ
Tuesday 16. 3. 2021.	14.00-15.30	(S20) Pulmonary circulation, pulmonary edema and pleural fluid	ALL	LH	Vesna LŠ
	16.00-18.15	(S21) Physical principles of gas exchange; diffusion of gases through the respiratory membrane	ALL	LH	D. Pravdić
Wednesday 17. 3. 2021.	13.00-14.30	(S22) Transport of oxygen and carbon dioxide in blood and tissue fluids	ALL	LH	Vesna LŠ
	15.00-16.30	(L15) Regulation of respiration	ALL	LH	D. Pravdić
Thursday 18. 3. 2021.	12.00-12.45	(L16) Methods for studying respiratory abnormalities	ALL	LH	Vesna LŠ
	13.00-14.30	(L17) Physiological problems of high-altitude and deep-sea diving	ALL	LH	Vesna LŠ
Friday 19. 3. 2021.	14.00-16.15	(S23) Integration (respiratory system)	ALL	LH	D. Pravdić
	16.30-19.30	(E7) Spirometry test	ALL	PP	Asistenti

Week 5 – Gastrointestinal system, metabolism, body temperature

Date	Time	Class type and topic	Group	Hall	Lecturer
Monday 22. 3. 2021.	13.30-14.00	TEST 4	ALL	LH	
	14.00-15.30	(L18) The autonomic nervous system and the adrenal medulla	ALL	LH	D. Pravdić
	15.45-16.30	(L19) General principles of gastrointestinal function	ALL	LH	I. Čavar
	17.00-18.30	(L20) Propulsion and mixing of food in the alimentary tract	ALL	LH	D. Pravdić
Tuesday 23. 3. 2021.	14.00-15.30	(S24) Secretory functions of the alimentary tract: secretion of saliva, gastric and pancreatic secretion	ALL	LH	I. Čavar
	16.00-17.30	(S25) Secretory functions of the alimentary tract: bile secretion and intestinal secretion; absorption of water and ions	ALL	LH	D. Pravdić
	17.45-19.15	(L21) Review and regulation of carbohydrate metabolism, formation of ATP	ALL	LH	D. Pravdić
Wednesday 24. 3. 2021.	14.00-15.30	(L22) Review and regulation of lipid and protein metabolism	ALL	LH	D. Pravdić
	15.45-16.30	(L23) The liver as an organ	ALL	LH	D. Pravdić
	17.00-18.30	(L24) Dietary balance, regulation of feeding, obesity and starvation, vitamins and minerals	ALL	LH	I. Čavar
Thursday 25.3.2021.	12.30-14.00	(S26) Energetics and metabolic rate	ALL	LH	D. Pravdić
	14.30-16.00	(L25) Body temperature regulation	ALL	LH	D. Pravdić
Friday 26.3.2021.	14.00-16.15	(S27) Integration (alimentary tract and metabolism)	ALL	LH	D. Pravdić
	16.30-19.30	(E8) The Astrand cycle test; Effect of exercise on arterial pressure	ALL	PP	Asistenti

Week 6 - Endocrinology

Date	Time	Class type and topic	Group	Hall	Lecturer
Monday 29. 3. 2021.	12.00-12.30	TEST 5			
	13.00-14.30	(L26) Introduction to endocrinology; principles of secretion, transport, action and clearance of hormones	ALL	LH	I. Čavar
	14.45-16.15	(L27) Pituitary gland-hypothalamus relation, posterior pituitary hormones	ALL	LH	I. Čavar
Tuesday 30. 3. 2021.	12.00-13.30	(S28) Anterior pituitary hormones	ALL	LH	I. Čavar
	14.00-15.30	(S29) Thyroid hormones	ALL	LH	D. Pravdić
Wednesday 31.3. 2021.	12.00-13.30	(S30) Insulin and glucagon	ALL	LH	I. Čavar
	14.00-15.30	(S31) Blood glucose regulation, diabetes mellitus	ALL	LH	D. Pravdić
Easter (1.4. – 5.4. 2021.)					
Tuesday 6. 4. 2021.	14.00-16.15	(S32 + S33) Calcium and phosphate metabolism, Bone and teeth physiology. Parathyroid hormone, calcitonin and vitamin D	ALL	LH	I. Čavar
	16.30-18.45	(S34 + S35) Synthesis of adrenocortical hormones, functions of mineralocorticoids; adrenocortical hormones; stress	ALL	LH	D. Pravdić
Wednesday 7. 4. 2021.	14.00-16.15	(S36) Integration (endocrinology)	ALL	LH	I. Čavar
	16.30-19.30	(E9) OGTT- Oral Glucose Tolerance Test	ALL	FP	Assistants

Week 7 – Reproductive system and Blood

Date	Time	Class type and topic	Group	Hall	Lecturer
Thursday 8. 4. 2021.	13.30–15.45	(S37) Reproductive and hormonal function of the male	ALL	LH	D. Pravdić
	16.00-18.15	(S38) Female physiology before pregnancy and female hormones	ALL	LH	I. Čavar
Friday 9. 4. 2021.	12.30-14.00	(L28) Pregnancy, parturition, lactation	ALL	LH	I. Čavar
	14.30-16.00	(L29) Erythrocytes and blood types	ALL	LH	D. Pravdić
Monday 12. 4. 2021.	11.00-11.45	(L30) Resistance of the body to infection; leucocytes	ALL	LH	I.Čavar
	12.00-13.30	(L31) Hemostasis and blood coagulation	ALL	LH	I. Čavar
	13.45-15.15	(E10) Blood typing	ALL	PP	Assistants
Tuesday 13. 4. 2021.	11.00-12.30	(S39) Integration (reproduction)	ALL	LH	I.Čavar
	13.00-13.30	TEST 6	ALL	LH	
	14.00-16.15	(V11) Hematology (erythrocyte count, hemoglobin and hematocrit; hematological indices)	ALL	PP	Assistants

Partial Exam (P2): Monday, April 19, 2021 at 9am

Practical and Final Exam: Thursday and Friday, April 29-30, 2021 at 9am

II. PHYSIOLOGY

A. TEACHING STAFF AND COLLABORATORS

1. **Professor Danijel Pravdić, MD, Head of the Department**
2. **Professor Ivan Ćavar, MD, Deputy head of the Department**
3. **Professor Vesna Lukinović-Škudar, MD**
4. **Professor Tomislav Kelava, MD**
5. **Antonio Markotić, MD, Secretary of the Department**
6. **Ante Bogut, MD**
7. **Antea Pervan, MD**
8. **Ana Božić, MD**

B. TEACHING MATERIAL

1. A. C. Guyton. J. E. Hall: Medical physiology. 13th. Edition. Elsevier, Philadelphia, USA, 2016.
2. Exercises in physiology. Internal edition. Faculty of Medicine in Mostar, 2021.
3. Lecture notes (synopsis).

C. LECTURE TOPICS (A. C. Guyton. J. E. Hall: Medical physiology. 13th. Edition. Elsevier, Philadelphia, USA, 2016.). Lectures last 1 or 2 hours. Ch.=Chapter

- L1 - Functional organization of human body (Ch. 1); transport through cell membranes (Ch. 4)
- L2 - Basic physics of membrane potentials (Ch. 5)
- L3 - Excitation of skeletal muscle (Ch. 7)
- L4 - Contraction of skeletal muscle (Ch. 6)
- L5 - Excitation and contraction of smooth muscle (Ch. 8)
- L6 - Physiology of cardiac muscle (Ch. 9)
- L7 - Overview of the circulation: physics of pressure, flow and resistance (Ch. 14)
- L8 - Vascular distensibility, functions of the arterial and venous systems, the structure of microcirculation (Ch. 15, 16)
- L9 - Long-term control of arterial pressure: integrated system for arterial pressure regulation (Ch. 19)
- L10 - Hemorrhagic shock and physiological principles of treatment (Ch. 24)
- L11 - Kidneys: physiological anatomy and function (Ch. 26)
- L12 - Micturition and diuretics (Ch. 26 pp. 327-332, Ch. 32 pp. 427-429)
- L13 - Thirst, integration of renal mechanisms for control of blood volume and extracellular fluid volume (Ch. 29, 30)
- L14 - Mechanics of lungs, Laplace's law, functions of the respiratory passageways (Ch. 38)
- L15 - Regulation of respiration (Ch. 42)
- L16 - Methods for studying respiratory abnormalities (Ch. 40 and Ch. 43 pp. 549-551)
- L17 - Physiological problems of high-altitude and deep-sea diving (Ch. 44, 45)
- L18 - The autonomic nervous system and the adrenal medulla (Ch. 61)
- L19 - General principles of gastrointestinal function (Ch. 63)
- L20 - Propulsion and mixing of food in the alimentary tract (Ch. 64)
- L21 - Review and regulation of carbohydrate metabolism, formation of ATP (Ch. 68)
- L22 - Review and regulation of lipid and protein metabolism (Ch. 69, 70)
- L23 - The liver as an organ (Ch. 71)
- L24 - Dietary balance, regulation of feeding, obesity and starvation, vitamins and minerals (Ch. 72)
- L25 - Body temperature regulation (Ch. 74)
- L26 - Introduction to endocrinology; principles of secretion, transport, action and clearance of hormones (Ch. 75)
- L27 - Pituitary gland-hypothalamus relation, posterior pituitary hormones (Ch. 76)
- L28 - Pregnancy, parturition, lactation (Ch. 83)
- L29 - Erythrocytes and blood types (Ch. 33, 36)
- L30 - Resistance of the body to infection; leucocytes (Ch. 34)
- L31 - Hemostasis and blood coagulation (Ch. 37)

Halls: LH – Large Hall

D. SEMINAR TOPICS (A. C. Guyton. J. E. Hall: Medical physiology. 13th. Edition. Elsevier, Philadelphia, USA, 2016.). Seminars last 2 or 3 hours.

- S1 - Membrane and action potentials (Ch. 5)
- S2 - Cardiac cycle, regulation of heart pumping (Ch. 9)
- S3 - Rhythmical excitation of the heart (Ch. 10)
- S4 - ECG (Ch. 11 and Ch. 12 pp. 139-150)

- S5 - Integration (general physiology, potentials, muscles and heart)
- S6 - Capillary fluid exchange, local control of tissue blood flow (Ch. 16, 17)
- S7 - Humoral and nervous regulation of circulation, rapid control of arterial pressure (Ch. 17, 18)
- S8 - Cardiac output and venous return (Ch. 20)
- S9 - Muscle blood flow and coronary circulation (Ch. 21)
- S10 - Integration (circulation)
- S11 - The body fluid compartments and volumes and their balance; edema (Ch. 25)
- S12 - Glomerular filtration, renal blood flow and their control (Ch. 27)
- S13 - Tubular reabsorption and secretion (Ch. 28)
- S14 - Regulation of reabsorption in tubules (Ch. 28)
- S15 - Regulation of extracellular fluid osmolarity and sodium concentration (Ch. 29)
- S16 - Regulation of renal potassium, calcium and magnesium excretion (Ch. 30)
- S17 - Acid-base regulation: respiratory and renal regulation, acidosis and alkalosis (Ch. 31)
- S18 - Integration (kidneys and body fluids)
- S19 - Pulmonary ventilation (ch. 38)
- S20 - Pulmonary circulation, pulmonary edema and pleural fluid (Ch. 39)
- S21 - Physical principles of gas exchange; diffusion of gases through the respiratory membrane (Ch. 40)
- S22 - Transport of oxygen and carbon dioxide in blood and tissue fluids (ch. 41)
- S23 - Integration (respiratory system)
- S24 - Secretory functions of the alimentary tract: secretion of saliva, gastric and pancreatic secretion (Ch. 65)
- S25 - Secretory functions of the alimentary tract: bile secretion and intestinal secretion; absorption of water and ions (Ch. 65, 66)
- S26 - Energetics and metabolic rate (Ch. 73)
- S27 - Integration (alimentary tract and metabolism)
- S28 - Anterior pituitary hormones (Ch. 76)
- S29 - Thyroid hormones (Ch. 77)
- S30 - Insulin and glucagon (Ch. 79)
- S31 - Blood glucose regulation, diabetes mellitus (Ch. 79)
- S32 - Calcium and phosphate metabolism, Bone and teeth physiology (Ch. 80)
- S33 - Parathyroid hormone, calcitonin and vitamin D (Ch. 80)
- S34 - Synthesis of adrenocortical hormones, functions of mineralocorticoids (Ch. 78)
- S35 - Adrenocortical hormones; stress (Ch. 78)
- S36 - Integration (endocrinology)
- S37 - Reproductive and hormonal functions of the male (Ch. 81)
- S38 - Female physiology before pregnancy and female hormones (Ch. 82)
- S39 - Integration (reproduction)

Students should study the materials carefully before the seminar.

Halls: LH – Large Hall

E. EXERCISE TOPICS (A. C. Guyton. J. E. Hall: Medical physiology. 13th. Edition. Elsevier, Philadelphia, USA, 2016.) +(Exercises in physiology. Internal edition. Faculty of Medicine in Mostar, 2021.). Exercises last 2-5 hours.

- E1 - Transport through cell membranes (EP; GH: Ch. 4); Basic physics of membrane potentials (Ch. 5)
- E2 - Recording and vectorial analysis of ECG (EP; GH: Ch. 11, 12)
- E3 - Interactive physiology 9.0: Cardiovascular system (EP; GH Ch. 9 and 10)
- E4 - Measuring of the arterial pressure and peripheral pulse rate, heart sounds (EP. GH: Ch. 15)
- E5 - Electrocardiogram repetition, orthostatic test (EP. GH: Ch. 17)
- E6 - Kidneys problem solving, ABS cases (EP. GH: Ch. 31)
- E7 - Spirometry test (EP. GH: Ch. 38)
- E8 - The Astrand cycle test; Effect of exercise on arterial pressure (EP. GH: Ch. 21)
- E9 - OGTT- Oral Glucose Tolerance Test (EP; GH: Ch. 79)
- E10 - Blood typing (EP. GH: Ch. 33 and 36)
- E11 - Hematology (erythrocyte count, hemoglobin and hematocrit; hematological indices) (EP: GH: Ch. 33)

Halls: Physiological practicum (PP)

Students should study the material carefully before the exercise!

THE LIST OF CHAPTERS AND PAGES FROM THE TEXTBOOK (A. C. Guyton. J. E. Hall: Medical physiology. 13th. Edition. Elsevier, Philadelphia, USA, 2016.) THAT ARE NOT AN EXAMINATION MATERIAL.

Chapter 2 in full.*

Chapter 3 in full.*

Chapter 12 from “Coronary Ischemia as a Cause of Injury Potential” (p. 150) until the end of Chapter.

Chapter 13 in full.

Chapter 19 from “Other Types...” (p. 238) until “Primary (Essential) Hypertension” (p. 240).

Chapter 21 from “Ischemic Heart Disease” (p. 264) until the end of Chapter.

Chapter 22 in full.

Chapter 23 from “Valvular Lesions” (p. 285) until the end of Chapter.

Chapter 24 from “Neurogenic shock...” (p. 299) until “Physiology of treatment...” (p.301).

Chapter 32 from “Kidney Diseases” (p. 429) until the end of Chapter.

Chapter 35 in full.

Chapter 36 from “Transplantation of Tissues and Organs” (p. 481) until the end of Chapter.

Chapter 43 in full.

Chapter 50-60 in full.

Chapter 62 in full.

Chapter 67 in full.

Chapter 69 from “Atherosclerosis” (p. 872) until the end of Chapter.

Chapter 77 from “Diseases of the Thyroid” (p. 960) until the end of Chapter.

Chapter 78 from “Abnormalities of Adrenocortical Secretion” (p. 979) until the end of Chapter.

Chapter 80 from “Pathophysiology of Parathyroid Hormone...” (p. 1014) until the end of Chapter.

Chapter 84 from “Special Functional Problems in the Neonate” (p. 1076) until the end of Chapter.

Chapter 85 in full.

* It is recommended to read these Ch’s. before studying the mandatory material.

All changes and announcements, including additional materials for the Exercises, can be found on the web page:
<http://212.39.115.163/fizio/>

Head of the Department: Professor Danijel Pravdić, MD