

Course: Physiology and Pathophysiology III Course Coordinator: Damir Muhvić, MD,PhD, Full professor Department: Department of Physiology, Immunology and Pathophysiology Study: Integrated Undergraduate and Graduate University Study of Dental Medicine Year of study: 2 Academic year: 2022./2023.

#### **Course Syllabus**

## Course informations (basic description of course, general information, teaching overview, required equipment and preparation, etc.)

The aim of th course is to enable student to know elementary life functions of whole organism, to know function of organs and tissues and to acquire basic knowledge about physiologic and pathophysiologic processes in organism which provoke ilness.

For better understanding course is divided in two parts, PHYISIOLOGY AND PATHOPHYSIOLOGY I which is performed on the first year of study and PHYSIOLOGY AND PATHOPHYSIOLOGY II and III which takes translation exam on second year of study.

The main purpose of this course is to enable student the knowledge about physiologic and pathophysiologic mechanisms of gastrointestinal tract, hepatobiliary tract, metabolism and regulation of body temperature, endocrine and nervous system. The aim of this corse is to acquire the knowledge about basic and specific metabolic substances and their disturbances, endocrine disturbances and functions of central nervous system. By vertical and horisontal integration of knowledge student will be able to know etiology of factors which lead to the development of physiologic and pathophysiologic processes which lead to ilness.

Course is performed in lectures, seminars and exercises. On seminars and exercise student can discuss physiologic and pathophysiologic mechanisma at the molecular level and on the level of whole organism. Student has ability to actively participate in performing of exercises in laboratory and in computer programmes which simulate pathologic conditions and give clinical corelates of ilnesses.

Students have to participate actively in all forms of the course and to learn in advance the material for senminars and exercises. Teacher is controling the knowledge of student and seminars and lectures which comprise the knowledge about morphologic, ultrastructural, biochemical and functional factors and their disturbances which lead to the development of ilness.

The knowledge of students is controled by thre partial test on which students earn points..

Course PHYSIOLOGY AND PATHOPHYSIOLOGY III has 30 hours of lectures, 30 hours of seminar and 30 hour of exercise. Corse PHYSIOLOGY AND PATHOPHISIOLOGY III has 7.5 ECTS points.

#### **Compulsory literature:**

1. Guyton and Hall Textbook of Medical physiology, Elsevier, 13<sup>th</sup> edition, 2016. 2. Gamulin S, Marušić M, Kovač Z editors, Pathophysiology. Basic mechanisms of disease-Textbook. Book I-volume one. Medicinska naklada, Zagreb 2014.

3.Gamulin S, Marušić M, Kovač Z editors: Pathophysiology. Basic mechanism of disease. Book Ivolume two.Medical edition. Medicinska naklada, Zagreb, 2014.

#### Additional literature:

1. Kovač Z, Gamulin, S i editors.Study guide algorhytms-problem solver, Book two, Medical edition, Zagreb 2014

#### Course teaching plan:

#### List of lectures (with titles and explanations):

## Lecture 1. Metabolism of carbohydrates and formation of adenosine triphospate

**Results of learning:** 

To explain physiology of carbohydrate metabolism and formation of adenosine triphosphate To explain etiologic mechanisms and consequences of disturbed carbohydrate metabolism

To describe causes and effects of hyperglycemia.

To describe te causes and effects of hypoglycemia

To describe glycogen metabolism disturbances.

#### Lecture 2. Gastrointestinal tract-physiology

**Results of learning:** 

To describe basic principles of structure of gastrointestinal wall

To describe electric activity of smooth gastrointestinal muscle.

To desribe blood flow of digestive tract

To describe functional movement of digestive tract

To describe nervous control of gastrointestinal tract (enteric nervous system)

To describe food intake, chewing and swallowing

To describe gastric function, movement of small intestine and colon

To define general and local principles of secretion in digestive tract

To define digestion and apsorption of different nutirients (carbohydrates, proteins and lipids

#### Lecture 3. Gastrointestinal tract-pathophysiology

**Results of learning:** 

To describe disturbed function of pharynx, esophagus and stomach

To describe disorder of exocrine pancreas

To describe.disorder of small intestine and colon

To describe patophysiologic forms and consequences of diarrhea

To describe mechanisms and consequences of vomit

To describe causes and consequences of ileus

#### Lecture 4. Physiologic functions of liver

Results of learning:

To describe macro and micro anantomy of liver

To describe basic functional unit of the liver-liver lobule

To explain blood flow through the liver and system of liver macrophages.

To explain lymphatic system in the liver.

To describe liver metabolism of carbohydrates, aminoacids and ammonia

To explain syntheses and degradation of proteins (glycoproteins, angiotensin, coagulation factors, hematopietic factors, acute phase proteins).

To describe mechanisms of detoxification (drugs, toxic substances)

To describe metabolism of hormons, lipids and cholesterol

To describe metabolism of bilirubin

To describe bile tree and forming, excretion and role of bile in digestion and lipid apsorption

To describe storage of iron and vitamins in the liver

### **Disorders of liver function**

Results of learning:

To describe general etiopathogenesis of liver disorders

To describe disorders of liver metabolic function

To desribe disturbances of composition, excretion and bile function

To describe protective function of the liver (neutralisation of toxin)

.To describe disturbances of salt and water transport

To describe pathogenesis of ascites

To describe distubances of liver blood flow

To describe pathogeneis of portal hypertension

To describe the effect of liver disturbances on other organs and organic systems

### Lecture 5. Physiologic functions of pancreas and its disturbances

Results of learning:

To describe physiologic structure of exocrine pancreas

To describe secretion of water and elecdtrolites

To describe secretion of pancreatic digestive enzymes

To describe the control over pancreatic secretion

To describe etiopathogenetic factors, flow and complications of acute pancreatitis

To describe etiopathogenetic factors of chronic pancreatitis

Lecture 6. Overview of endocrine system function

Results of learning:

Hypophysis and their disturbances

To explain structure of endocrine system and to explain the mechanisms of hormonal action To explain the mechaisms hormonal creation and of action and their control by hypothalamus To describe and explain the consequences of hormonal hypersecretion and hyposecretion To describe adn explain the consequences of hormonal disturbances in target tissues To describe the disturbances of hormonal metabolism and disturbances of hormonal regulation To explain disturbances of anterior and posterior lobe of hypophysis.

#### Lecture 7. Thyroid hormons and its disturbances

Results of learning:

To explain creation, secretion and physiologic functions of thyroid gland To classify thyroid gland disturbances (thyrotoxicosis, hyperthyroidism, hypothyroidism and goiter)

#### Lecture 8. Insulin, glucagon and their disturbances

Results of learning:

To describe mechanisms of creation, secretion and metabolic effects of insulin, glucagon and somatostatin

To explain the causes and consequences of disturbed action of insulin, glucagon and ssomatostain

To describe and explain etiopathogeneis of different types of diabetes mellitus.

To explain the course of acute and chronic consequences of diabetes mellitus

#### **Lecture 9. Parathyroid hormon, calcitonin, calcium and phosphate metabolism** Results of learning:

To understand creation and secretion of parathyroid hormon and calcitonin To understand mechanism ofcalcium and phosphate concentration maintenance To explain disturbances of calcium, magnesium and phosphate traffic

To explain disturbances with hypoproduction and hyperproduction of parathyroid hormone To explain disturbances with hypoproduction and hyperproduction of calcitonin

## Lecture 10 . Organisation of central nervous system, synapse, neurotramitters Results of learning

To define the organisation of central nervous system, basic functions of synapse and neurotransmitters

To define main levels in central nervous system function To define central nervous system synapse

#### Lecture 11. Sensory system and its disturbances

Results of learning: To define sensory system and its disturbances

#### Lecture 12. Motoric system and its disorders

Results of learning To define motoric system and its disturbances

#### Lecture 13. Autonomus system and its disorders

Results of learning To describe device of autonomus system To describe disturbances of autonomous system

### Lecture 14. Mechanisms of pain origin and its disorder

Results of learning To describe mechanisms of pain origin and its disturbances

#### Lecture 15. Blood flow in the brain, cerebrospinal liquid and brain metabolism

Results of learning To describe brain bllod flow To describe composition of cerebrospinal fluid To describe brain metabolism

#### List of seminars with explanations:

#### Seminar 1. Carbohydrate metabolism

**Results of learning:** 

To explain the physiology of carbohydrate metabolism and formation of adenosin triphoshate To explain etiologic mechanism and consequences of disturbed carohydrate metabolism.

To describe causes and effects of hyperglycemia.

To describe te causes and effects of hypoglycemia

To explain distubences of glycogen metabolism

#### Seminar 2. Movements in gastrointestinal tract

Results of learning:

To describe repression and mixing of food in gastrointestinal tract

To explain general principle of structure of gastrointestinal wall, blood circulation and motility of gastrointestinal tract

To explain nervous control of gastrointesinal function

To explain functional movements, repression and mixing of food in gastrointestinal tract

#### Seminar 3. Secretory functions of gastrointestinal tract

To define general and local principles of secretion in gastrointestinal tract

To describe secretion in gastrointestinal tract

To describe the salivation

To describe secretion in stomach

To describe pancreatic secretion

To describe bile secretion

To describe small intestine and colon secretion

#### Seminar 4. Patophysiology of gastrointestinal tract

Results of learning:

To describe disturbances of pharynx, esophagus, stomach, exocrine pancreas, small intestine and colon

To explain pathophysiologic forms of diarrhea and mechanism of vomit

To explain causes and consequences of ileus

#### Seminar 5. Liver and liver disorders

Results of learning: To explain liver function and its disorder

Seminar 6. General endocrinology. Pituitary hormons Results of learning: To explain mechanism of creation and action of hormons of anterior and posterior lobe of pituiary gland and its control by hypothalamus To understand physiologic function of growth hormon

To explain disorder of function of anterior nad posterior lobe of pituitary gland

#### Seminar 7: Thyroid gland

To explain creation and secretion of thyroid gland To explain thyroid gland disorders

#### Seminar 8. Insulin, glucagon and diabetes mellitus

Results of learning:

To understand mechanisms of creation, secretion and metabolic effects of insulin, glucagon and somatostatin

To explain causes and consequences disturbed insulin, glucagon and somatostatin

To understand different types of diabetes mellitus

To explain acute and chronic consequences of diabetes mellitus

## Seminar 9. Parathyroid hormon, calcitonin, calcium and phosphate metabolism, Vitamin D, bones and teeth

Results of learning

To explain creation, secretion and action of parathyroid hormon and calcitonin

To understand calcium and phosphate metabolism

To understand disturbed traffic of calcium, phoshate and manesium

To explain disturbances with increases and decresed secretion of parathyroid hormon

To explain disturbences with increased and dereased creation of calcitonin

To explain the teeth physiology

## Seminar 10. Organisation of central nervous system, synapse and neurotransmitters

Results of learning

To define organisation of central nervous system, basic synapse function and neurotransmiters To describe main levels in the organisation of central nervous system To define central nervous system synapse

#### Seminar 11. Sensory system and its disorders

Results of learning To define sensory system and its disorders

#### Seminar 12. Motoric system and its disorders

Results of learning To define motoric system and its disorders

#### Seminar 13. Autonomous system and its disorders

Results of learning To describe device of automomous system To describe disorders of autonomous system

#### Seminar 14. Mechanism of pain appeareance and its disorders

Results of learning To define mechanisms of pain origin and its disorders

#### Seminar 15. Blood flow in brain, cerebrospinal fluid and brain metabolism

Results of learning

To describe blood flow in brain

To describe composition of cerebrospinal liquid

To describe brain metabolism

#### List of practicals with explanations:

#### Practical 1. Metabolism of carbohydrates

Results of teaching

To define carbohydrate, lipid and protein metabolism

To describe physiology of protein metabolism

To describe etiologic mechanisms and consequences of disturbed protein metabolim

To describe causes and consequences of protein deficit

To describe mechanisms of primary and secondary undernutrition

To describe physiology of carbohydrate metabolism and formation of adenosin triphoshate

To describe etiologic mechanisms and consequences of disturbed carbohydrate metabolism

To describe etiologic mechanisms and consequences of disturbed carbohydrate metabolism

To describe causes and effects of hyperglycemia.

To describe te causes and effects of hypoglycemia

To describe glycogen metabolism disturbance

# Practical 2. Balance in nutition, regulation of food intake, obesity, starving, vitamins and minerals

Results of teaching

To describe energetic value of food

To describe regulation of food intake and storage of energy

To describe nervous centers for regulation of food intake

To describe obesity and treatment of obesity

To describe the functions of vitamins and minerals

#### Practical 3. Physiology of gastrointestinal tract

Results of teaching

To describe structure of gastrointestinal wall

To describe electric activity od gastrointestinal smooth muscle

To describe blood flow in gastrointestinal tract

To describe functional movements of gastrointestinal tract

To describe nervous control of gastrointectinal tract (enteric nervous system)

To describe food intake, chewing and swalowing

To describe function of stomach and movement of small intestine and colon

To define general and local porinciples of secretion in gastrointestinal tract

To describe digestion and absorption of different nutritional substances (carohydrates, proteins and lipids) in different parts of gastrointestinal tract

### Practical 4. Liver physiology and pathophysiology of digestion

**Results of teaching** 

Physiology of liver and pathophysiology of digestion

To describe disorders of pharynx, esophagus, stomach, exocine pancreas, smal intestine and colon

To describe pathopysiologic causes of diarrea and mechanism of vomitus

To unerstand causes and consequences of ileus

### Practical 5. Pituitary gland, thyroid gland and suprarenal gland

Results of teaching

To explain structure od endocrine system and mechanisms of hormonal action

To explain mechanisms of creation and action of hormons of anterior and posterior lobe of pituitary gland hormons and their control by hypothalamus

To understand causes and consequences of increased and decreased secretion of hormons

To unerstand causes and consequences of hormonal disorder at target tissue

To understand disorder of hormonal metabolism and regulation

To explain hormonal disorder of anterior and posterior lobe of pituitary gland

To describe pituitary gland hormons and their control by hypothalamus

To describe creation, secretion and physiolgic functions of thyroid gland hormons

To name disorders of thyroid gland function: (hyperthyroidism, hypothyroidism and goiter)

To explain creation, secretion and phaysiological functions of suprarenal gland cortex

To name causes, course and consequences of hyperfunction or hypofunction of suprarenal gland

To name disorders of suprarenal gland core

### Practical 6. Insulin, glucagon and diabetes mellitus

Results of teaching:

To describe insulin and its metabolic effects

To describe glucagon and its metabolic effects

To describe diabetes mellitus type I and type II

To describe treatment of diabetes mellitus

# Practical 7. Parathyroid hormon, calcitonin, metabolism of calcium and phosphate, vitamin D, bones and teeth

Results of teaching:

To explain creation, secretion and impact of parathyroid hormon and calcitonin

To explain disorder of calcium, phoshate and magnesium traffic

To explain disorder with increased and decreased creation of parathyroid hormon

To describe the role of vitamin D

To describe the physiology of teeth

### Practical 8. Reproductive tract

Results of teaching:

To describe and explain functional anatomy of female and male sexual organs

To know female and male sexual hormones

To describe female ovarian cycle and function of gonadotropic hormons

To explain function of ovarian hormons, estrogen and progesteron

To explain connection between ovary hormons and hypothalamo-pituitary hormons

To explan sexual act in male and female

To explain pregnancy, lactation and fetal and newborn physiology

**Practical 9. Organisation of nervous system, motoric axis and motoric nervous disorders** Results of teaching:

To describe organisation of nervous system

To describe motoric function of spinal cord

To describe control of cortex and brainstem over motoric functions

To describe the role of cerebellum and basal ganglia in control of motoric functions

To describe disorders od motoric system

**Practical 10.** Physiology of eye, sense of hearing, sense of taste and sense of smell Results of teaching:

To describe eye optic

To describe receptor and neural function of retina

To describe central neurophysiology od sight

To describe sense of hearing

To describe chemical senses-taste and smell

#### **Student obligations:**

Students have obligations to attend all forms of course:lectures, seminars and exercises. Student have to prepare course material for seminars and exercises in advance.

## Exam (exam taking, detailed exam, description of the oral/practical part, point distribution, grading criteria:

**Evaluationduring the course** 

Student assessment is carried out according to the current Regulations on Studies of the University of Rijeka.

The students work will be evaluated and scored during performong of course and on final exam. From hundrede points in total, during the course student can earn **70 points** and **30 points** on final exam

I. During the course the score of 70 points can be earned by the following;

**1) 70 points** student can earn on three partial exams (partial exam I, partial exam II and partial exam III) which will be held at the and of every course whole. At each partial exam student can earn maximaly 23,33 points.

The points scale is the following:

Right answers	Number of points
49, 50	23,33
46,47, 48	22
43, 44, 45	20
40, 41, 42	18
3, 38, 39	16
31,32,33,34 35, 36	14
25,26,27,28,29,30,	12

#### II Final exam (till 30 points)

On final written exam the key and specific competences for each course part are tested **Who can approach to the final exam:** 

The students which are during the course earn 35-70 points obligatory approach to the final *multiple choice question (MCQ)* test-on which they can earn additional points.

- Students, which during the course earned 35 and more points, have a right attend written exam. In final test, they have to earn minimally 50% of test.
- Students which earned less of 35 points and students which were absent more than 30% of course do not have the right to attend final exam (unsuccessful E)
- Passed partial exams are not condition for attendance of final exam.

## The work of students is evaluated during the course (70%) and on final exam (30%). The students work and attainment is expressed in achieved points on which the final evaluation is formed.

Final exam is consisted from written exam and oral exam. On written exam student can earn 7,5 - 15 points. On oral exam student can earn 7,5 - 15 points divided in 4 categories (7,5, 9, 12, 15). To pass the final exam it is necessary that student earn minimally 7,5 points on written exam and minimally 7,5 points on oral part of final exam. The points earned on written exam and oral exam are added..

Correct answers	Grade points
76,77,78,79,80	15
71,72,73,74,75	14
66,67,68,69,70	13
61,62,63,64,65	12
56,57,58,59,60	11
50,51,52,53,54, 55	10
46,47,48,49	9
43,44,45	8
40,41,42	7,5

#### • The number of earned points on final test of 80 questions are the following:

A student may access the oral part of the final exam if they obtained a minimum of 7.5 grade points at the written part of the final exam. At the oral part of the final exam, a student may obtain grade points as shown in the table:

The grade on oral exam	The number of points
Excellent (5)	15
Very good dobar (4)	12
Good (3)	9
Sufficient (2)	7,5
Insufficient (1)	0

In order to pass the final exam, a student must achieve a minimum of 7,5 grade points at the written part and the minimum of 7,5 grade points at the oral part of the exam. The final exam is an integraql part, therfore if the student does not achieve a positive assessment of the oral part of the final exam, the results of the written part of the final exam are invalid in the following final exam terms.

The final grade represents a sum of all grade points (ECTS credits) obtained during classes and at the final exam:

A (90-100 points)	Excellnt (5)
<b>B</b> (75-89,99 points)	Very good (4)
<b>C</b> (60-74,99 points)	Good (3)
<b>D</b> (50-59,99 points)	Sufficient (2)
E student which has	
not passed final test	Insufficient (1)
(less than 50% of test)	

#### Possibility for performing of course on english language:

There is possibility of performing the course in croatian language.

#### Other informations connected to the course important for students:

## COURSE SCHEDULE for academic year 2022-2023

Date	Lectures (time and place)	Seminars (time and place )	Practicls (Time and place)	Nastavnik
09.01.2023.	L1 (0815-10,00), Lecture room 7			D. Muhvić, MD, PhD, Full Professor.
09.01.2023.	L2 (10,15-12,00),			D. Muhvić, MD,PhD, Full Professor
09.01.2023.		S1 (12.15-13.45) MS teams		M. Marcelić,PhD,mag.pharm.inv, post doctoral Research assistant
10.01. 2023.	L3 (8,15-10,00),			D. Muhvić, MD,PhD, Full Professor
10.01.2023.	L4 (10,15-12,00),			. H. Jakovac, MD, PhD, Full professor
10.01.2023.		S2(12.15-13.45)		B. Ćurko Cofek, MD, PhD, Assistant Professor
10.01.2023.			P1 (18.00-20.15 ) Practical room	Lj. Karleuša, ,PhD, Post doctoral Research assistant
11.01.2023	L5 (8,15-10,00), Lecture room 5			D. Muhvić, MD, PhD, Full Professor
11.012023.		S3(10,15-11,45) Lecture room 5		.V. Barac Latas, MD,PhD, Full Professor
11.01. 2023.			P2(17.00-19.15) Practical room	Lj. Karleuša, ,PhD, Post doctoral Research assistant
12.01.2023	L6 (8,15-10,00), Lecture room 9			D. Muhvić, MD, PhD, Full Professor
12.01.2023.		S4(10.15-11.45) Lecture room 2		D. Muhvić, MD,PhD, Full Professor
12.012023.			P3 (18.00-20.15) Practical room	I. MrakovčićŠutić,MD, PhD,Full Professor.
16.01 2023.	L7 (8,15-10,00) Lecture room 5			T. Gulić, PhD, Assistant Professor
16.01. 2023.		S5(10.15-11,45) Lecture room 7		Z. Trobonjača, MD,PhD,Full Professor.
16.01.2023.	Midterm exam I (14,15-15,15),			
17.01. 2023.	L8 (08,15-10,00)			B. Ćurko Cofek, MD,PhD,Assistant Professor

17.01. 2023.		S6(10.15-11.45)		D. Muhvić, MD,PhD, Full Professor
		Lecture room 2		
17.01 2023.			P4 (16.00-18.15)	I.MrakovčićŠutić,MD, PhD, Full Professor
			Practical room	
18.01. 2023.	L9 (8,15-10,00)			T. Gulić, PhD, Assistant Professor.
	MS teams			
18.01. 2023.		S7(10.15-11,45)		.K. Grabušić, PhD, Associate Professor
40.04.0000		Lecture room 15		
18.01.2023.			P5 (17.15-19.30 Practical room	S.Lukanović Jurić,MD,Teaching Assistant
19.01.2023.	L10 (8,15-10,00), <b>Lecture room 8</b>			D. Muhvić, MD,PhD, Full Professor
19.01.2023.		S8 (10.15-11.45)		K. Grabušić, PhD, Associate Professor
		Lecture room 5		
			P6 (13.00-15.15)	I. MrakovčićŠutić,MD, PhD,Full
19.01.2023.			MS teams	Professor
				N. Kučić MD BbD Full Professor
20.01.2023.	Lecture room 7			N. Rucic, MD, FIID, Full FIOTESSOL
20.01.2023.		S9 (10.15-11,45)		T. Gulić, PhD, Assistant Professor
		Lecture room 7		
20.01.2023			P7 (14.00-16.15)	B. Ćurko Cofek, MD,PhD,Assistant
			Practical room	Professor
23.01.2023.	L12 (08,15-10.00),			D. Muhvić, MD,PhD, Full Professor
	Lecture room 6			
23.01.2023.		S10 (10.15-11.45) Lecture room 6		N.Kučić, MD,PhD,Full Professor
23.01.2023.			P8 (12.00-14.15	T. Gulić, PhD, Assistant Professor
22.01.2022			MS teams	
23.01.2023.	(1515.50) online			D. Munvic, MD, PhD, Full Professor
	(P15)			
24.01.2023.	L13 (8,15-10,00)			V.Barac-Latas, MD,PhD,Full Professor
24.01.2023.		S11(10.15-11,45)		N. Kučić, MD,PhD,Full Professor
		Lecture room 7		
24.01.2023.			P9 (12.00-14.15)	B. Ćurko Cofek, MD,PhD,Assistant
			Practical room	Professor.

25.01.2023.	L14 (8,15-10,00) Lecture room 9			I. MrakovčićŠutić,MD, PhD,Full Professor
25.01.2023.		S12(10,15-11.45) Lecture room 9		D. Muhvić, MD,PhD, Full Professor
25.01.2023.			P10 (17.00-19.15) Practical room	T. Gulić, PhD, Assistant Professor
26.1.2023.	L15 (08,15-10,00), Lecture room 9			D.Muhvić, MD,PhD,Full Professor
26.1.2023.		S13(10.15-11,45) Lecture room 5		V.Barac-Latas, MD,PhD,Full Professor
27.1.2023		S14(08.15-09,45) Lecture room 7		I. MrakovčićŠutić,MD, PhD,Full Professor
27.01.2023		S15(10.15-11,45) Lecture room 7		D. Muhvić, MD,PhD, Full Professor
27.01.2023	Midterm exam III (12,30-13,30), Lecture hall <b>P6 i P7</b>			
03.02.2023.	Exam first term (10-11.20) <b>P4</b>			
10.02.2023.	Midterm exam repair 10.00-12.00 <b>P4</b>			
17.02. 2023.	Exam second term (10-12) <b>P8</b>			
03.03. 2023.	Exam third term (10-12) <b>P8</b>			
06.09.2023	Exam fourth term (10-12) <b>P8</b>			
20.09.2023.	Exam fifth term (12,00-14,00) <b>P8</b>			

#### List of lectures, seminars and practicals:

	Lectures topics	Number of hours of the course	Lecture room
L1	Metabolism of carbohydrates metabolism and	2	Lecture room 5
	creation of adenosine triphosphate		
L2	Gastrointestinal tract physiology	2	MS teams

L3	Pathophysiology of gastrointestinal tract	2	MS teams
L4	Physiological function of the liver and disorders of	2	Lecture room 5
	the liver function		
L5	Physiological functions of the pancreas and its	2	Lecture room 6
	disorders		
L6	Overview of endocrine system functions	2	Lecture room 8
	Pituitary gland and its disorders		
L7	Thyroid hormons and its disorders	2	Lecture room 7
L8	Insulin, glukagon, dijabetes mellitus	2	MS teams
L9	Parathyroid hormons, calcitonin, calcium and	2	Lecture room 5
	phosphate metabolism and its disorders		
L10	Organisation of nervous system, synapse and	2	Lecture room 9
	neurotransmitters		
L11	Sensory system and its disorders	2	MS teams
L12	Motoric system and its disturbances	2	Lecture room 5
L13	Autonomus system and its disorders	2	Lecture room 1
L14	Mechanism of pain appeareance and its disorders	2	MS teams
L15	Blood flow in the brain, cerebrospinal liquid and	2	Lecture room P8
	brain metabolism		
	Total number of lectures	30	

	Seminar topics	The number of course hours	Lecture room
\$1	Carbohydrate metabolism and its disorder	2	Lecture room 15
S2	Movements in gastrointestinal tract	2	Lecture room 8
S3	Secretory functions of gastrointestinal tract	2	Lecture room 6
S4	Patophysiology of gastrointestinal tract	2	Lecture room 8
S5	Liver and liver disorders	2	MS teams
S6	General endocrinology. Pituitary hormons	2	MS teams
S7	Thyroid gland and its disorders	2	Lecture room 5
S8	Insulin, glucagon and diabetes mellitus	2	Lecture room 2
S9	Parathyroid hormon,calcitonin, calcium and phosphate metabolism,Vitamin D, bones and teeth	2	Lecture room 6
S10	Organisation of central nervous system, synapse and neurotransmitters	2	Lecture room 7
S11	Sensory system and its disorders	2	Lecture room 2

S12	Motoric system and its disorders	2	Lecture room 15
S13	Autonomous system and its disorde	2	MS teams
S14	Mechanism of pain appeareance and its disorders	2	Lecture room 7
S15	Blood flow in brain, cerebrospinal fluid and brain	2	Lecture room 6
	metabolism		
	Total number of seminars	30	

	Practical topics	The number of the course hours	Lecture room
V1	Metabolism of carbohydrates, lipids and proteins	3	Practical room
V2	Balance in nutition, regulation of food intake, obesity, starving, vitamins and minerals	3	Practical room
V3	Gastrointestinal motility.Repression and mixing of food,secretory functions of gastrointestinal tract, digestion and apsorption in gastrointestinal tract	3	Practical room
V4	Liver as organ.Pathophysiology of digestion.	3	Practical room
V5	Pituitary gland, thyroid gland and suprarenal gland	3	Practical room
V6	Innsulin, glucagon, diabetes mellitus. Disorders of pancreas.	3	Practical room
V7	Parathyroid hormon, calcitonin, calcium and phosphate.Disorders of parathyroid glands.	3	Practical room
V8	Reproductive functions of male and female Sexual hormons.	3	Practical room
V9	Organisation of central nervous system. Motoric axis. Disorders of motoric axis.	3	Practical room
V10	The eye and its function. The sense of hearing. The sense of taste. The sense of smell.	3	Practical room
	Total number of exercise hours	30	

	Final exams
03.02.2023.	Exam first term
	(10-11.20) <b>P4</b>

17.02. 2023.	Exam second term (10-12) <b>P8</b>
03.03. 2023.	Exam third term
	(10-12) <b>P8</b>
06.09.2023	Exam fourth term
	(10-12) <b>P8</b>
20.09. 2023.	Exam fifth term
	(12,00-14,00) <b>P8</b>

#### **Course syllabus by teaching units**

Teaching material
L1: Metabolism of carbohydrates and formation of ATP
L2: Gastrointestinal tract-physiology
L3: Gastrointestinal tract-pathophysiology
L4: Liver physiology and pathophysiology
L5: : Physiology and pathophysiology of pancreas
L6 Overview of endocrine system function
LP7: Thyroid hormons and its disturbances
L8: Insulin, glucagonand their disturbances
L9 P Parathyroid hormons, calcitonin,calcium and phosphate metabolism and its disorders
L10: Organisation of central nervous system, synapse, neurotramitters
L11: . Sensory system and its disorders
L12: Motoric system and its disorders
L13: Autonomus system and its disorders
L14: Mechanisms of pain origin and its disorder
L15: Blood flow in the brain, cerebrospinal liquid and brain metabolism

#### Seminar schedule

S1

Guyton Chapter 68. Metabolism of carbohydrates and formation of adenosine triphosphate pp 853-862

Gamulin 6.1 Disorders of carbohydrate metabolism pages 250-265

S2:

Guyton Chapter 64. Propulsion and mixing of food in the alimentary tract pp 807-816;

S3:

Guyton Chapter 65. Secretory functions of the alimentary tract pp 817-832

S4: Gamulin Chapter 31.Pathophysiology of gastrointestinal system pp 1453-1491

S5: Guyton Chapter 71. The liver as an organ pp.881-886 Gamulin Chapter 32. Disorders of hepatobiliary system1493-1537

S6:Guyton Chapter 75.Introduction to endocrinology pp 925-937 Guyton Chapter 76. Pituitary hormones and their control by the hypothalamus pp 939-950

S7:

Guyton Chapter 77. Thyroid metabolic hormones pp 951-963 Gamulin 10.7 Thyroid gland disorders p 517-526

S8:

Guyton Chapter 79. Insulin, glucagon and diabetes mellitus pp 983-999

S9:

Guyton 79. Parathyroid hormone, calcitonin, calcium and phosphate Metabolism,vitamin D, bones and teeth i fosfata;str.1001-1019;

Gamulin 10.10. Disorder of parathyroid gland functions p 536-539

S10:

Guyton 46. Organisation of the nervous system, function of synapses and neurotransmitters pp 577-593;

S11:

Guyton 47. Sensory receptors ,neuronal circuits for processing information Pp 595-606

Gamulin 34.5. Sensation nerve disorders 1578-1594

S12:

Guyton 55. Motor functions of the spinal cord; the cord reflex pp 695-706;

Guyton 56. Cortical and brain stem control of motor function pp 707-719

Guyton 57. Contributions of the cerebellum and basal ganglia to overall motor control pp.721-736

Gamulin 34.3 Motor nerve disorders 1569-1574

S13:

Guyton 61. The autonomic nervous system and the adrenal medulla pp 773 -785

Gamulin 12 Disorders of neurovegetative regulation 614-635

S14:

Guyton 48. Somatic sensations: II Pain, Headache and thermal sensations pp 621-632 Gamulin Chapter 13 Pathophysiological foundations of pain 638-659.

S15: Guyton 62 Cerebral blood flow, cerebrospinal fluid and brain metabolism pp787-794;

## Practical schedule

#### **Teaching material**

#### P1

Guyton Chapter 68. Metabolism of carbohydrates and formation of adenosine triphosphate pp 853-862 Guyton Chapter 69. Lipid metabolism pp 863-874;

Guyton Chapter70. Protein metabolism bjelančevina;str.875-880;

#### P2

Guyton Chapter 72. Dietary Balance;;regulation of Feeding; obesity and Starvation; vitamin and minerals pp 887-902

Guyton Chapter 73 Energetics and metabolic rate pp 903-909

Gamulin Chapter 6.1 Disorders of carbohydrate metabolism 250-265

Manual 53.exercise The effect of thyroid hormone on oxygen consumption

#### **P3**

Guyton Chapter 63 General principles of gastrointestinal function-motility ,nervous control and blood circulation pp 797-806

Guyton 64 Propulsion and mixing of food in the alimentary tract pp 807-816 Guyton Chapter 65 Secretory functions of the alimentary tract pp 817-832

#### P4

Guyton 70. The liver as an organ pp 881-886

Gamulin 31. Pathophysiology of gastrointestinal system 1453-1491

Hand book for exercise-Exercise manual-Exercise 50 The effect of vagal stimulation and histamine application on stomach secretion; Exercise 51 Brom-sulftalein test in rat; Exercise 52 consequences of ligation of ductus choledochus

#### Ρ5

Guyton Chapter 76. Pituitary hormones and their control by the hypothalamus pp 939-950 Guyton Chapter 77. Thyroid metabolic hormones pp 951-963 ; Guyton Chapter 78. Adrenocortical hormones pp-965-981 Gamulin 10.7. Thyrotoxicosis and hyperthyroidism 10.7.519-526 Gamulin 10.8.Functional disorders of the adrenal gland pp 526-536

#### P6

Guyton Chapter 79.Insulin, glucagon and diabetes mellitus pp983-999 Gamulin 10.9. Disorder of endocrine pancreas pp 536 Exercise 57 Glucose tolerance test (GTT). Exercise 58 Insulin hypoglycemia in rat

P7 Guyton Chapter 80. Parathyroid hormone, calcitonin, calcium and phosphate metabolism, vitamin D, bone and teeth
Pp 1001-1018
Gamulin 10.10. Disorders of parathyroid gland functions pp 536-539
Exercise handbook 54 Provocation of hypocalcaemia and tetany in rat Exercise 55 Thorns test in rat;
Exercise 56 Bilateral adrenalectomy in rat
P8

Guyton Chapter 81. Reproductive and hormonal functions of the male (and function of pineal gland) pp 1021-1035

Guyton 82.Female physiology before pregnancy and female hormone pp 1037-1054 Gamulin 10.12.Endocrine function tests pp 544-549;

Handbook Exercise 59 Proofing od chorionic gonadotropin in urine of pregnant woman by Aschheim-Zondek test;

Exercise 60 The effect of sexual hormones on cytology finding of vaginal spread in female rats

#### P9

Guyton Chapter 46. Organisation of the nervous system, function of synapses and neurotransmitters pp 577-593

Guyton Chapter 55 Motor functions of the spinal cord ;the cord reflexes pp 695-706 Guyton 56. Cortical and brain stem control of motor function pp 707-719 Guyton 57. Contributions of the cerebellum and basal ganglia to overall motor control pp 721-736 Gamulin 34.3. Motoric nerve disorders 1569-1574

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4.1 Spinal reflexes p.95-100

4.2 Reaction time p.100-107.

4.3.Decerebrate rigidity p. 107-111.

1.1.Electromyography (EMG) I p. 9-18

1.2. Electromyography (EMG) II p 7-26

4.4. Electroencephalography (EEG) p.112-118

#### P10

Guyton Chapter 50.The eye I. Optics of vision pp 635-646 Guyton Chapter51.The eye :II. Receptor and neural function of the retina pp 647-660 Guyton Chapter The eye III Central neurophysiology of vision pp 661-670; Guyton Chapter 53. The sense of hearing pp 673-683 Guyton Chapter 54 The chemical senses-Taste and smell pp 685-692 Guyton Chapter 55.Cortical and brain stem control of motor function pp 707-719

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2.1 Ocular motility ;p-31-35;

2.2 Pupillary light reflex; p.36-40;

2.3 Corneal reflex;p.41-43;

2.4 Visual Acuity p-41-47;

2.5 Perimetry p.48-55;

2.6.Color blindness p-56-58;

2.7. Electrooculogram (EOG) p.59-67;

3.1.Sense of hearing p 69-74;

3.2 Sense of balance p 75-79;

3.3.Sense of taste p.81-88;

3.4.Sense of smell p 89-93;