Sveučilište u Rijeci
University of Rijeka

Sveučilište u Rijeci • Fakultet dentalne medicine
University of Rijeka • Faculty of Dental Medicine
Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

Course: Physiology and Pathophysiology III
Course Coordinator: Prof.Damir Muhvić,MD,PhD,Full professor
Course Collaborators: M. Marcelić,PhD,mag.pharm.inv, post doctoral Research assistant, H. Jakovac, MD,PhD, Associate professor, B. Ćurko Cofek, MD,PhD,Assistant Professor, V. Barac Latas, MD,PhD, Full Professor, T. Gulić, PhD, Assistant Professor, Z.Trobonjača,MD,PhD,Full Professor, K. Grabušić, PhD,AssociateProfessor, N. Kučić, MD,PhD,Full Professor, I. Mrakovčić-.Šutić,MD, PhD,Full Professor
Department: Physiology,Immunology and Pathophysiology
Study program: University Integrated Undergraduate and Graduate Study of Dental Medicine (in English)
Study year:second
Academic year: 2023./24.

SYLLABUS

Course description (a brief description of the course, general instructions, where and in what form the lessons are organized, necessary equipment, instructions for attendance and preparation for classes, student obligations, etc.):

The aim of th course is to enable student to know elementary life functions of whole organism, to define function of organs and tissues and to acquire basic knowledge about physiologic and pathophysiologic processes in organism which provoke ilness.
For better definition 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 course is to acquire the knowledge about basic and specific metabolic substances and their disturbances, endocine disturbances and functions of central nervous system. By vertical and horisontal integration of knowledge student will be able to define etiology of factors which lead to the development of physiologic and pathophysiologic processes which lead to ilness.
Course is performed in lectures, seminars. On seminars the student can discuss physiologic and pathophysiologic mechanisma at the molecular level and on the level of whole organism.
Students have to participate actively in all forms of the course and to learn in advance the material for senminars .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 and 30 hours of seminars. Corse PHYSIOLOGY AND PATHOPHISIOLOGY III has 6.5 ECTS points.

Assigned reading:

1. Guyton and Hall Textbook of Medical physiology,Elsevier, 13th 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 I-volume two.Medical edition. Medicinska naklada, Zagreb, 2014.

Optional/additional reading:

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

COURSE TEACHING PLAN:

The list of lectures (with topics and descriptions):

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

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

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

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

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 understand the consequences of hormonal hypersecretion and hyposecretion
To understand 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 understand thyroid gland disturbances (thyrotoxicosis, hyperthyroidism, hypothyroidism and goiter)

Lecture 8. Insulin, glucagon and their disturbances

Results of learning:
To understand 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 understand 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

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

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

The list of seminars with descriptions:

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

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

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

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

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

The list of practicals with descriptions:

Students' obligations:

Students have obligations to attend lectures and seminars. Students have to prepare course material for seminars in advance.
.

Assessment (exams, description of written / oral / practical exam, the scoring criteria):

Evaluationduring the course

Student grading is conducted according to the current University of Rijeka Studies and studying regulation.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 to attend the written exam. In the final test they have to earn minimally 50% of the 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 the 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 are expressed in achieved points on which the final evaluation is formed.

Final exam is consisted from the written exam and the oral exam. On the written part of the exam students can earn 7,5 - 15 points. On oral exam students can earn 7,5 - 15 points divided in 4 categories (7,5, 9, 12, 15).
To pass the final exam it is necessary that students 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 summed.

- **The number of earned points on final test of 80 questions are the following:**

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**

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 (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 integral part, therefore if the student does not achieve a positive assesment 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 (75-89,99 points)	Very good (4)
C (60-74,99 points)	Good (3)
D (50-59,99 points)	Sufficient (2)
E student which has not passed final test (less than 50% of test)	Insufficient (1)

Other important information regarding to the course:

There is possibility of performing the course on english language.

COURSE SCHEDULE (for the academic year 2023/2024)

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

Date	Lectures (time and place)	Seminars (time and place)	Practicals (time and place)	Instructor
08.01.2024.	L1 (08.15-10,00), **Lecture room 7**			D. Muhvić, MD,PhD, Full Professor.
08.01.2024.	L2 (10,15-12,00), **MS teams**			D. Muhvić, MD,PhD, Full Professor
08.01.2024.		S1 (12.15-13.45) **MS teams**		M. Marcelić,PhD,mag.pharm.inv, post doctoral Research assistant
09.01. 2024.	L3 (8,15-10,00), **MS teams**			D. Muhvić, MD,PhD, Full Professor
09.01.2024.	L4 (10,15-12,00), **MS teams**			.H. Jakovac, MD,PhD, Associate professor
09.01.2024.		S2(12.15-13.45) **MS teams**		B. Ćurko Cofek, MD,PhD,Assistant Professor
10.01.2024.	L5 (8,15-10,00), **MS teams**			D. Muhvić, MD,PhD, Full Professor
10.01.2024 11.01. 2024.		S3(10,15-11,45) **MS teams**		V. Barac Latas, MD,PhD, Full Professor
11.01.2024.	L6 (8,15-10,00), **MS teams**			D. Muhvić, MD,PhD, Full Professor
11.01.2024		S4(10.15-11.30) **Lecture room 5**		D. Muhvić, MD,PhD, Full Professor
12.01.2024	L7 (8,15-10,00) **Lecture room 5**			T. Gulić, PhD, Assistant Professor
12.01.2024.		S5(10.15-11,45) **Lecture room 5**		.Z.Trobonjača,MD,PhD,Full Professor
15.01 2024.	L8 (08,15-10,00) **Lecture room 7**			B. Ćurko Cofek, MD,PhD,Assistant Professor
15.01. 2024.		S6(10.15-11.00) **Lecture room 5**		D. Muhvić, MD,PhD, Full Professor
15.01.2024.	Midterm exam I (14,15-15,15), **MS teams**			
16.01. 2024.	L9 (8,15-10,00) **MS teams**			T. Gulić, PhD, Assistant Professor

16.01. 2024.		S7(10.15-11,45) **MS teams**		K. Grabušić, PhD,AssociateProfessor
17.01 2024.	L10 (8,15-10,00), **MS teams**			D. Muhvić, MD,PhD, Full Professor
17.01. 2024.		S8 (10.15-11.45) Lecture rooom 9	.	K. Grabušić, PhD,Associate Professor
18.01. 2024.	L11 (8,15-10,00), **Lecture room 9**			N. Kučić, MD,PhD,Full Professor.
18.01.2024 .		S9 (10.15-11,45) **MS teams**		T. Gulić, PhD, Assistant Professor
19.01.2024 .	L12 (08,15-10.00), **Lecture room 5**			D. Muhvić, MD,PhD, Full Professor
19.01.2024 .		S10 (10.15-11.45) **Lecture room 6**		N.Kučić, MD,PhD,Full Professor
22.01.2024 .	L13 (8,15-10,00) **MS teams**			D. Muhvić, MD,PhD, Full Professor
22.01.2024 .		S11(10.15-11,45) **Lecture room 5**		N. Kučić, MD,PhD,Full Professor
22.01.2024 .	Midterm exam II (15.-15.50) online (**P15)**			D. Muhvić, MD,PhD, Full Professor
23.01.2024	L14 (8,15-10,00) **Lecture room 1**			I. Mrakovčić-.Šutić,MD, PhD,Full Professor
23.01.2024 .		S12(10,15-11.45) **MS teams**		D. Muhvić, MD,PhD, Full Professor
24.01.2024 .	L15 (08,15-10,00), **MS teams**			D.Muhvić, MD,PhD,Full Professor
24.01.2024 .		S13(10.30-12,00) **Lecture room 5**		D. Muhvić, MD,PhD, Full Professor
25.01.2024 .		S14(08.15-09,45) **Lecture room 8**		I. Mrakovčić-.Šutić,MD, PhD,Full Professor
25.01.2024 .		S15(10.15-11,45) **Lecture room 8**	.	D. Muhvić, MD,PhD, Full Professor
25.01.2024 .	Midterm exam III			

	(12,30-13,30), Lecture hall **P 8**			
29.01.2024.	Exam first term (10-11.20) **P4**			
05.02.2024.	Midterm exam repair 10.00-12.00 **P4**			
12.02. 2024.	Exam second term (10-12)**P8**			
26.02. 2024.	Exam third term (10-12)**P8**			
05.09.2024	Exam fourth term (10-12)**P8**			
19.09-2024.	Exam fifth term (12,00-14,00)**P8**			

List of lectures, seminars and practicals:

	LECTURES (Topics)	Teaching hours	Location/Lecture room
L1	Metabolism of carbohydrates metabolism and creation of adenosine triphosphate	2	Lecture room 5
L2	Gastrointestinal tract physiology	2	MS teams
L3	Pathophysiology of gastrointestinal tract	2	MS teams
L4	Physiological function of the liver and disorders of the liver function	2	Lecture room 5
L5	Physiological functions of the pancreas and its disorders	2	Lecture room 6
L6	Overview of endocrine system functions Pituitary gland and its disorders	2	Lecture room 8
L7	Thyroid hormons and its disorders	2	Lecture room 7
L8	Insulin, glukagon,dijabetes mellitus	2	MS teams
L9	Parathyroid hormons, calcitonin,calcium and phosphate metabolism and its disorders	2	Lecture room 5
L10	Organisation of nervous system, synapse and neurotransmitters	2	Lecture room 9
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 brain metabolism	2	Lecture room P8

	SEMINARS (Topics)	Teaching hours	Location/Lecture room
S1	Carbohydrate metabolism and its disorder	2	Lecture room 15
S2	Movements in gastrointestinal tract	2	MS teams
S3	Secretory functions of gastrointestinal tract	2	Lecture room 5
S4	Patophysiology of gastrointestinal tract	2	Lecture room 2
S5	Liver and liver disorders	2	Lecture room 7
S6	General endocrinology. Pituitary hormons	2	Lecture room 2
S7	Thyroid gland and its disorders	2	Lecture room 15
S8	Insulin, glucagon and diabetes mellitus	2	Lecture room 5
S9	Parathyroid hormon,calcitonin, calcium and phosphate metabolism,Vitamin D, bones and teeth	2	Lecture room 7
S10	Organisation of central nervous system, synapse and neurotransmitters	2	Lecture room 6
S11	Sensory system and its disorders	2	Lecture room 7
S12	Motoric system and its disorders	2	Lecture room 9
S13	Autonomous system and its disorde	2	Lecture room 5
S14	Mechanism of pain appeareance and its disorders	2	Lecture room 7
S15	Blood flow in brain, cerebrospinal fluid and brain metabolism	2	Lecture room 7
	TOTAL TEACHING HOURS	**60**	

	FINAL EXAM DATES
29.01.2024.	Final exam first term (10-11.20) **P4**
06.02.2024.	Midterm exam repair 10.00-12.00 **P4**
13.02. 2024.	Exam second term (10-12)**P8**
26.02. 2024.	Exam third term (10-12)**P8**
05.09.2024	Exam fourth term (10-12)**P8**
19..09-2024.	Exam fifth term (12,00-14,00)**P8**

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

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

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;

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

	Lectures	**Seminars**	**Practicals**	**Total**
Total number	15	15	0	30
On-line	5	1	0	6
Percentage	30	6.66	0	36,66