[Medicinski fakultet u Rijeci]

Curriculum
2022/2023

[Za kolegij]

Physiology and Pathophysiology II

Study program:	**Medical Studies in English (R)** [Sveučilišni integrirani prijediplomski i diplomski studij]
Department:	**[Katedra za fiziologiju, imunologiju i patofiziologiju]**
Course coordinator:	**prof. dr. sc. Ravlić Gulan Jagoda, dr. med.**
Year of study:	**2**
ECTS:	**11**
Incentive ECTS:	**0 (0.00%)**
Foreign language:	**Possibility of teaching in a foreign language**

Course information:

PHYSIOLOGY AND PATHOPHYSIOLOGY II is a compulsory course in the second year of the Integrated Undergraduate and Graduate University Study of Medicine in English, taking place in the IV semester. It consists of 45 hours of lectures, 35 hours of seminars, and 40 hours of laboratory practicals, which overalls in 120 hours (11 ECTS). Lectures and seminars are held in lecture halls of the Faculty of Medicine according to the course schedule.

The aim of the integrated course is to enable the student to, by applying previously acquired knowledge of physics, chemistry, biology, biochemistry, and normal morphology (anatomy and histology), primarily acquires knowledge of the normal function of the organism, and then to acquire knowledge of pathophysiological mechanisms that lead to disease. This is followed by a review of a clinical correlation, i.e. a computer simulation of different pathophysiological conditions, which prepares the student for an independent troubleshooting of a health care problem. There is an attempt to explain individual functions at a molecular level, as well as at a level of an organism as a whole, and to analyze it in the processes of an organism adapting to changing external environmental conditions. The emphasis of the course is on learning basic and "applicable" physiology, i.e. on the vertical upgrade of the knowledge acquired during the explanation of basic physiological functions.

Content of the course Physiology and Pathophysiology II:

Physiology and Pathophysiologies of the Heart and the Circulation: Heart – structure and function. Creating and spreading impulses. Creating a normal electrocardiogram. Cardiac arrhythmias and their electrocardiographic interpretation. Heart sounds. Overview of the circulation. Cardiac output regulation. Arterial pressure regulation. Arterial and venous pulse. Microcirculation and lymphatic system. Hypertension and hypotension. Coronary circulation and ischemic heart disease. Cardiac failure. Syncope. Circulatory shock and the basics of its treatment. Physiology and Pathophysiology of the Kidney: Kidney – structure and function. Filtration and reabsorption.Creating concentrated and diluted urine. Prerenal, renal, and postrenal kidney disorders. Disorders of water and electrolytes turnover. Acute and chronic renal insufficiency. Physiology and Pathophysiology of Respiration: Respiratory system – structure and function. Pressures and volumes. Pulmonary ventilation. Gas exchange through the respiratory membrane. Regulation of respiration. Pulmonary function tests. Obstructive and restrictive respiration disorders. Acid-base Balance Regulation and Disorders: Pathophysiological factors of acid-base balance disorders. Metabolic and respiratory acidosis and alkalosis. Compensation mechanisms and consequences of acid-base balance disorders.

LEARNING OUTCOMES FOR THE COURSE:

I. COGNITIVE DOMAIN - KNOWLEDGE

1. to describe and explain a normal function of the cardiovascular, uropoetic, and respiratory organic system, and to describe and explain interrelations of certain organic systems in a healthy human

2. to describe control mechanisms responsible for a normal function and maintenance of homeostasis of the cardiovascular, uropoetic, and respiratory system, to analyze it according to the activation rate, strength, and duration of action, to match its effects in maintaining homeostasis, to analyze the principles of the feedback mechanism

3. to describe and classify the most important etiologic factors that cause disorders in the cardiovascular, uropoetic, and respiratory system, and to analyze mechanisms of its harmful effects on organs and organic systems, to describe and explain general patterns of organism’s reactions to noxious stimuli, and to describe and analyze branching of basic pathophysiological processes in an organism’s systemic reaction

4. to describe and analyze pathogenetic mechanisms of principal systemic and organ-specific diseases, and to match it with etiologic factors and basic clinical signs of a disease, to classify diseases of the cardiovascular, uropoetic, and respiratory system according to etiopathogenesis

5. to explain and define the functional reserve of the organic system and to describe tests for the detection of latent organ insufficiency, to explain mechanisms of organ decompensation

6. to describe principles of basic functional and laboratory tests and to distinguish deviations from normal values, to analyze it within individual pathophysiological conditions in these organic systems

7. to describe and interpret the mechanisms of the most important clinical signs in the most common disorders in the function of the cardiovascular, uropoetic, and respiratory system

II. PSYCHOMOTOR DOMAIN - SKILLS

1. to record a normal ECG by means of the simulation system, to read and to interpret a normal ECG, to analyze basic heart rhythm disturbances, to perform vectorial analysis, and to analyze disturbances of a mean electrical axis in the most common disorders of electrical activity or the heart structure

2. to measure arterial blood pressure and to analyze the causes of blood pressure disorders, to palpate the arterial pulse and to explain the reasons for possible pulse changes,

3. to analyze the composition of normal urine, to determine the presence of pathological components in the urine by applying basic qualitative and quantitative methods, to calculate clearances according to the given parameters

4. to determine individual pulmonary volumes and capacities, to compare the given values with the expected ones, to perform basic static and dynamic pulmonary function tests, to interpret pathogenic mechanisms that cause its changes,

5. to elaborate pathogenesis algorithmically in certain examples of diseases of the cardiovascular, uropoetic, and respiratory system (according to the problem-solving assignments from the additional literature)

Class organization:

Teaching is performed in the form of lectures, seminars, and laboratory practicals. Active participation of the student within the curriculum may be achieved by performing practicals on computer programs (Biopack), as well as by the application of computer Physio-ex programs that simulate pathological conditions and provide clinical correlates of certain diseases. Part of the seminars is conducted as problem-based classes so that students can, based on typical anamnestic and diagnostic data, solve complex physiological and pathophysiological problems with the help of the teacher. At seminars and practicals, the student actively discusses with the teacher about the physiological and pathophysiological mechanisms. During the course classes, the student obtains credits/grade points, which make up 50% of the final grade on the exam. A student who obtains 25 grade points or more may access the final exam that is organized immediately after the completion of the classes.

List of assigned reading:

1. Guyton A. C. and Hall J. E. Textbook of Medical Physiology , thirteenth edition, Elsevier Inc., 2016.

2. Gamulin S., Marušić M., Kovač Z. (Eds). Pathophysiology – basic mechanisms of disease - textbook (book one: volume one and volume two), Medicinska naklada, Zagreb, 2014.

3. Ravlić-Gulan J. et al. Textbook „Practicals of Physiology and Pathophysiology II“ (first edition), University od Rijeka, Faculty of Medicine, Department of Physiology, Immunology and Pathophysiology; Rijeka, 2018.

List of optional reading:

Kovač Z., Gamulin S (Eds). Pathophysiology, study guide algorhythms – problem solver, Medicinska naklada Zagreb, 2014

Curriculum:

Student obligations:

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

ECTS grading system:

Student grading will be conducted according to the current Ordinance on Studies of the University of Rijeka and the Ordinance on Student Grading at the Faculty of Medicine in Rijeka. Student work will be assessed and graded during the course and on the final exam. During the course, students may obtain a total of 100 grade points. Students may achieve up to 50 grade points during classes, and up to 50 grade points at the final exam.

I. The following components are evaluated during the course (maximum of 50 grade points):

a) Acquired knowledge (up to 50 grade points)

During classes, acquired knowledge will be evaluated on two tests:

Test 1 (1st midterm exam): Heart and Circulation – a student may obtain a maximum of 25 grade points

Test 2 (2nd midterm exam): Kidney, Respiration, and Acid-base Balance – a student may obtain a maximum of 25 grade points

Students may access the correction of the first and the second midterm exam if they did not obtain a minimum number of grade points for accessing the final exam, if they did not access the midterm exam, or if they are not satisfied with the obtained grade points. If a student retakes the midterm exam because they are not satisfied with the obtained grade points, only the grade points obtained from the retaken midterm will be considered. Correction of the midterm exams will be held in the period between the 1st and the 2nd exam date.

Correct answers	Grade points
59,60	25
57,58	24
55,56	**23**
52,53,54	**22**
49,50,51	**21**
46,47,48	**20**
43,44,45	**19**
40,41,42	**18**
38,39	**17**
36,37	**16**
34,35	**15**
32,33	**14**
31	**13**

30	**12,5**

II. Final exam (up to 50 grade points)

The final exam evaluates specific competencies that are established for each section, and it consists of a written and an oral part.

a) Final exam consists of 70 questions, and grade points (minimum of 11 – maximum of 20) are obtained if the student solves correctly more than 50% of questions as shown in the table

Correct answers	Grade points
67,68,69,70	**20**
63,64,65,66	**19**
59,60,61,62	**18**
55,56,57,58	**17**
51,52,53,54	**16**
47,48,49,50	**15**
43,44,45,46	**14**
39,40,41,42	**13**
36,37,38	**12**
35	**11**

b) Students may access the oral part of the final exam if they obtain a minimum of 11 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:

Grade obtained at the oral part of the final exam	**Number of grade points obtained at the oral part of the final exam**
excellent A	**26-30**
very good B	**21-25**
good C	**16-20**
sufficient D	**5-15**

insufficient F	**0**

In order to pass the final exam, a student must achieve a minimum of 11 grade points at the written part and a minimum of 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 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.

Who may access the final exam:

Students who obtained 25-50 grade points during classes are obligated to access the final exam at which they may obtain a maximum of 50 grade points.

Who **may not** access the final exam:

Students who obtained 0-24,9 grade points during classes or those who were absent for more than 30% of all forms of classes. Such a student is graded as unsuccessful/failed (1) F and may not access the final exam, which means they have to re-enter the course in the next academic year.

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

Final grade at the final exam	
excellent A (90-100%)	5
very good B (75-89,9%)	4
good C (60-74,9%)	3
sufficient D (50-59,9%)	2
F (students who obtained less than 25 grade points during all course classes or did not pass the final exam)	1

Exam terms during classes:

(a)Test (Heart and Circulation):02/05/2025 (Friday) at 16-17h (60 questions)

(b)Test (Kidney, Respiration, and Acid-base Balance): 13/06/2025 (Friday) at 16.00 to 17.00h (60 questions)

	FINAL EXAM DATES
1.	17/06/2025
2.	01/07/2025
3.	15/07/2025
4.	05/09/2025
5.	19/09/2025

Other notes (related to the course) important for students:

Course content and all the notifications regarding the course may be found on the platform “Merlin”. In some cases, teaching could be performed online (using the MS teams platform), and the writing of tests could be carried out via the Merlin system. Students will be notified of any changes to the Syllabus on time. On the first lecture we will give you detailed instructions.

COURSE HOURS 2022/2023

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List of lectures, seminars and practicals:

EXAM DATES (final exam):
