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**Federal State Autonomous Educational Institution for Higher Education  
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA (RUDN University)**

**Institute of Medicine**

(educational division-developer of the course syllabus)

**V.A. Frolov Department of General Pathology and Pathological Physiology**

(educational department-developer of the Ph.D program)

## COURSE SYLLABUS

**Pathological Physiology**  
(course/module)

**Scientific speciality:**

**3.3.3. Pathological Physiology**  
(code and name of the scientific speciality)

**The course is studies in the frame of Ph.D program implementation**

**Pathological Physiology**  
(Ph.D program)

## 1. COURSE GOAL

The goal of the course "Pathological Physiology" is to prepare for Ph.D examinations, as well as to gain broad knowledge and to acquire professional competences of a researcher in the field of Pathological Physiology.

Objectives of the Course:

- in-depth study of theoretical and methodological basis of Pathological Physiology;
- study of causes, mechanisms of development and outcomes of pathological processes underlying contemporary diseases;
- formation of skills to organize scientific research in the field of Pathological Physiology;
- formation of skills to carry out scientific research in the field of Pathological Physiology;
- formation of skills for critical analysis and evaluation of modern scientific achievements, generation of new ideas in solving research and practical problems including interdisciplinary areas;
- formation of skills and abilities of independent research and teaching activities in the field of Pathological Physiology.

## 2. REQUIREMENTS TO LEARNING OUTCOMES

The course "Pathological Physiology" is aimed at preparing for Ph.D examinations.

As a result of studying the course Ph.D students are expected:  
to know:

- etiology, pathogenesis and outcomes of non-specific pathological processes;
- etiology, pathogenesis and outcomes of non-specific disorders of metabolism;
- etiology, pathogenesis and outcomes of extremal conditions;
- etiology, pathogenesis and outcomes of diseases of the hematopoietic, cardiovascular, respiratory, gastro-intestinal, excretory, endocrine and nervous systems.

to be able to:

- to use educational, scientific, popular science literature, the Internet for professional activities;
- to carry out scientific research in the field of Pathological Physiology independently;
- to interpret the results of research in the field of Pathological Physiology obtained with the use of modern high-tech methods;
- to analyze issues of General Pathology and modern theoretical concepts and trends in medicine;

to master:

- the skill to interpret the results of functional, morphological, biochemical and molecular genetic investigations;
- the skill of comparing morphological and clinical manifestations of pathological processes;
- the skills of analysis, generalization and public presentation of results of scientific research in the field of Pathological Physiology in practical activities aimed at protecting human health and / or in the educational process.

### 3. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Workload of the course "Pathological Physiology" is 2 credits.

Table 3.1. Academic activities by the periods of Ph.D program

Academic activity	TOTAL, ac.h.	Year			
		1	2	3	
Contact work, academic hour	64		64		
Lectures	30		30		
Lab works					
Seminars	30		30		
Self-study, ac.h.	44		44		
Evaluating and assessment (pass/fail grading), ac.h.	4		4		
Course workload	ac.h.	108	108		
	credits	3	3		

### 4. COURSE CONTENT

Table 4.1. Content of the course (module) by academic activities

Unit of the course	Content of the unit (topic)	Type of academic activity
<b>Unit 1.</b> General nosology. Ecological pathophysiology.	<b>Topic 1.1.</b> The doctrine of health and disease. Sano- and pathogenesis. Diseases of civilization. <b>Topic 1.2.</b> Chronopathology.	Lectures
<b>Unit 2.</b> Cellular pathology.	<b>Topic 2.1.</b> Pathology of biomembranes and cell organelles. <b>Topic 2.2.</b> Types and mechanisms of cell death. <b>Topic 2.3.</b> Disorders of cell biorhythms.	Seminars
<b>Unit 3.</b> Non-specific pathological processes.	<b>Topic 3.1.</b> Disorders of local blood circulation. <b>Topic 3.2.</b> Inflammation. <b>Topic 3.3.</b> Immunity. Immunopathology. <b>Topic 3.4.</b> Allergy. <b>Topic 3.5.</b> Pathophysiology of tumor growth. <b>Topic 3.6.</b> Hypoxia.	Lectures, Seminars
<b>Unit 4.</b> Non-specific disorders of metabolism.	<b>Topic 4.1.</b> Pathology of heat exchange of the body. <b>Topic 4.2.</b> Pathology of water-salt metabolism. Oedema. <b>Topic 4.3.</b> Pathophysiology of acid-base balance. <b>Topic 4.4.</b> Pathophysiology of	Lectures, Seminars

	carbohydrate metabolism. <b>Topic 4.5.</b> Pathophysiology of lipid, protein and purine metabolism.	
<b>Unit 5.</b> Extremal conditions.	<b>Topic 5.1.</b> Pathophysiology of pain. Stress. <b>Topic 5.3.</b> Shock. Collapse. Coma. <b>Topic 5.4.</b> Tanatogenesis and resurrection of the body. <b>Topic 5.5.</b> Apparent and natural death. Principles of resuscitation.	Lectures
<b>Unit 6.</b> Pathophysiology of the hematopoietic system.	<b>Topic 6.1.</b> Anemia. Hemoglobinosis. Hemoglobinopathy. <b>Topic 6.2.</b> Leukocytosis. Leukopenia. Leukemia. <b>Topic 6.3.</b> Hemorrhagic diathesis.	Lectures
<b>Unit 7.</b> Pathophysiology of the cardiovascular system.	<b>Topic 7.1.</b> Cardiac arrhythmia. <b>Topic 7.2.</b> Coronary heart disease. Coronary and non-coronary myocardial necrosis. Complications of myocardial infarction. <b>Topic 7.3.</b> Heart defects. <b>Topic 7.4.</b> Cardiomyopathy. <b>Topic 7.5.</b> Myocarditis. Endocarditis. Pericarditis. <b>Topic 7.6.</b> Heart failure. <b>Topic 7.7.</b> Pathophysiology of vascular tone. Hypertension. <b>Topic 7.8.</b> Pathophysiology of the vascular wall. Atherosclerosis.	Lectures, Seminars
<b>Unit 8.</b> Pathophysiology of the respiratory system.	<b>Topic 8.1.</b> Non-specific disorders of the external respiratory system. <b>Topic 8.2.</b> Respiratory failure. Asphyxia. Emphysema of the lungs. Pulmonary edema. <b>Topic 8.3.</b> Bronchial asthma. <b>Topic 8.4.</b> Pneumothorax.	Lectures
<b>Unit 9.</b> Pathophysiology of the GIT.	<b>Topic 9.1.</b> Non-specific disorders of the GIT. <b>Topic 9.2.</b> Stomach and duodenal ulcer. Diseases of the operated GIT. <b>Topic 9.3.</b> Pathophysiology of the liver and biliary tract. Jaundice. Liver failure. Cholelithiasis. <b>Topic 9.4.</b> Pathophysiology of the pancreas.	Lectures, Seminars

	<b>Topic 9.5.</b> Intestinal obstruction.	
<b>Unit 10.</b> Pathophysiology of the excretory system.	<b>Topic 10.1.</b> Non-specific disorders of the excretory function of the kidneys. <b>Topic 10.2.</b> Nephrotic syndrome. Nephritic syndrome. Acute and chronic diffuse glomerulonephritis. <b>Topic 10.3.</b> Pyelonephritis. <b>Topic 10.4.</b> Urolithiasis disease. <b>Topic 10.5.</b> kidney failure. Uremia. Renal coma.	Seminars
<b>Unit 11.</b> Pathophysiology of the endocrine system.	<b>Topic 11.1.</b> General mechanisms of endocrine disorders. <b>Topic 11.2.</b> Pathophysiology of the hypothalamic-pituitary-adrenal system. <b>Topic 11.3.</b> Pathophysiology of the thyroid gland, parathyroid glands, thymus, epiphysis, gonads.	Seminars
<b>Unit 12.</b> Pathophysiology of the central nervous system and higher nervous activity.	<b>Topic 12.1.</b> Pathophysiology of functional neurosis. <b>Topic 12.2.</b> Pathological reflexes. <b>Topic 12.3.</b> Pathophysiology of sleep disorders. <b>Topic 12.4.</b> Pathophysiology of memory impairments.	Lectures

## 5. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 5.1. Classroom equipment and technology support requirements*

<b>Classroom for academic activity type</b>	<b>Classroom equipment</b>	<b>Specialized educational / laboratory equipment, software and materials for the course (if necessary)</b>
Laboratory	Classroom for laboratory lessons, individual consultations, current control and intermediate certification, equipped with a set of specialized furniture and devices. (Laboratory classrooms 214, 215)	Metabolic chambers of rats, AE0906 (3 units) Metabolic chambers for rats (2 units) Operating lamp ALFA-734 Cage for rodents (6 units) Exhaust module Lab-1500

Classroom for academic activity type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for the course (if necessary)
		Multimedia projector Epson EB-X03 LCD 2700Lm (1024x768) Laptop Dell Vostro 5581 Projection screen Projecta Elpro Electrol 200x200cm Matte White S
Seminars classroom	Classroom for seminars, group and individual classes, current control and intermediate certification equipped with a set of specialized furniture and devices for multimedia presentations (room 213)	Multimedia projector ViewSonic PA503S Laptop Dell Vostro 5581 LMC-100109, Projection screen Lumien Master Control LMC-100109 183x244 cm Matte White FiberGlass Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Skype
Computer lab classroom	Computer lab classroom for classes, group and individual consultations, current control and intermediate certification equipped with personal computers (10 units), projection screen and devices for multimedia presentations (room 212).	Multimedia projector ViewSonic PA503S Computer MATX Super Power QM 104A11500WP4 USB/AV, with Internet access. Projection screen Draper198X264 Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Skype System unit SPARK (10 units) Monitor 17" TFT Proview (10 units)
Self-studies classroom	Classroom for self-study work (may be used for seminars and	Multimedia projector ViewSonic PA503S

Classroom for academic activity type	Classroom equipment	Specialized educational / laboratory equipment, software and materials for the course (if necessary)
	consultations) equipped with a set of specialized furniture and computers with Internet access (room 212)	Computer MATX Super Power QM 104A11500WP4 USB/AV, with Internet access. Projection screen Draper198X264  Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Skype  System unit SPARK (10 units)  Monitor 17" TFT Proview (10 units)

## 6. RECOMMENDED SOURCES FOR COURSE STUDIES

*Main reading (sources):*

**Printed issues:**

1. Robbins & Cotran Pathologic Basis of Disease / editors V. Kumar, A.K. Abbas, J.C. Aster, J.R. Turner. – 10 ed. – Elsevier, 2021. – 1379 p. : il. – ISBN 978-0-323-53113-9 : 12184.04.

**Electronic and printed full-text editions:**

3. Khodorovich N.A., Eremina I.Z., Savrova O.B., Shevelev O.A. Pathophysiology of the Haemotopoietic System. Ethiology and Pathogenesis of Blood Disorders. Haemogram Diagnosing Algorithm. - Moscow : RUDN University, 2019. - 118 p.

electronic resource:

[http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn\\_FindDoc&id=476738&idb=0](http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn_FindDoc&id=476738&idb=0)

4. Khodorovich N.A., Velichko E.V. Disorders of Acid-Bases Balance. Algorithm and case studies. - Moscow: RUDN University, 2021, - 35 p. - ISBN 978-5-209-10332-5 : 64.51.

electronic resource:

[http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn\\_FindDoc&id=495172&idb=0](http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn_FindDoc&id=495172&idb=0)

5. Textbook of pathology / H. Mohan. – 7<sup>th</sup> ed. : - New Delhi : London : Jaypee, 2015. – 954 + 665. : II – Pathology quick review and MCQs: 4<sup>th</sup> ed.: Based on Textbook of pathology 7<sup>th</sup> ed. – ISBN 978-93-5152-369-7 : 8865.00.

*Additional (optional) reading (sources):*

***Electronic and printed full-text editions:***

1. Blagonravov M.L., Sklifasovskaya A.P. Pathophysiology of the Immune System. - Moscow : RUDN University, 2020. - 23 p. - ISBN 978-5-209-10443-8.  
electronic resource:

[http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn\\_FindDoc&id=497587&idb=0](http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn_FindDoc&id=497587&idb=0)

2. Blagonravov M.L., Sklifasovskaya A.P. Pathophysiology of the Lipid and Protein Metabolism. - Moscow : RUDN University, 2020. - 17 p. - ISBN 978-5-209-10589-3.

electronic resource:

[http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn\\_FindDoc&id=497588&idb=0](http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn_FindDoc&id=497588&idb=0)

The mentioned educational issues are available at the Scientific library of RUDN University and at the Department.

*Internet-based sources:*

1. Electronic libraries with access for RUDN students:
  - Electronic library of RUDN University <http://lib.rudn.ru/MegaPro/Web>
  - Electronic library «University library online» <http://www.biblioclub.ru>
  - Electronic library «Urait» <http://www.biblio-online.ru>
  - Electronic library «Student's consultant» [www.studentlibrary.ru](http://www.studentlibrary.ru)
  - Electronic library «Lan» <http://e.lanbook.com/>
  - Electronic library «Troitsky most»

2. Databases and search engines:

- electronic fund of legal and normative-technical documentation <http://docs.cntd.ru/>
- search engine Yandex <https://www.yandex.ru/>
- search engine Google <https://www.google.ru/>
- abstract database SCOPUS <http://www.elsevierscience.ru/products/scopus/>

*Learning toolkits for self-studies in the RUDN LMS TUIS\*:*

1. Lecture course «Pathological Physiology».
2. Guidelines for practical tasks of the course “Pathological Physiology”
3. Guidelines for self-study work for the course “Pathological Physiology”.

\* - All the educational and methodological materials for self-study work are uploaded on the course page in TUIS in accordance with the current procedure.



## 7. ASSESSMENT AND EVALUATION TOOLKIT AND GRADING SYSTEM FOR EVALUATING COMPETENCES OF THE COURSE

Assessment and evaluation toolkit and grading system for evaluating competences of the course are presented in the Supplement to the Ph.D program.

\* - Assessment and evaluation toolkit and grading system for evaluating the course are formed on the basis of the requirements of the corresponding local normative act of RUDN University.

### DEVELOPERS:

Associate professor, V.A. Frolov  
Department of General Pathology  
and Pathological Physiology

Position, Educational Department



Signature

V.A. Goryachev

Full name

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### HEAD OF EDUCATIONAL DEPARTMENT:

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