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ФИО: Ястребов Олег Александрович  
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**Federal State Autonomous Educational Institution of Higher Education  
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA  
RUDN University named after Patrice Lumumba**

**Institute of Medicine**

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educational division (faculty/institute/academy) as higher education programme developer

**COURSE SYLLABUS**

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**Medical Elementology**

course title

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**Recommended by the Didactic Council for the Education Field of:**

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**31.05.01 General Medicine**

field of studies / speciality code and title

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**The course instruction is implemented within the professional education programme of higher education:**

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**General Medicine**

higher education programme profile/specialisation title

## 1. COURSE GOAL(s)

The goal of the course “Medical Elementology” is to equip students with knowledge of biological role of macro- and trace elements and their significance for human health; formation in students of clinical thinking for diagnosis, assessment of disease prognosis and successful treatment; application of new methods and schemes of correction of various metabolic disorders and pathological processes.

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course (module) “Medical Elementology” is aimed at the development of the following competences /competences in part:

(GC-1), general professional (GPC-7) and special professional (PC- 1, PC-5, PC-11, PC-15, PC-16) competences

*Table 2.1. List of competences that students acquire through the course study*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
GC-1	Be able to abstract thinking, analysis and synthesis	Students should be able to abstract thinking, analysis and synthesis
GPC-7	Be able to analyze the results of their own activities to prevent professional errors; readiness to use basic physical, chemical, mathematical and other natural science concepts and methods in solving professional problems	Students should be able to analyze the results of their own activities to prevent professional errors; readiness to use basic physical, chemical, mathematical and other natural science concepts and methods in solving professional problem
PC-1	Be able to implement a set of measures aimed at maintaining and strengthening health, including the formation of a healthy lifestyle, preventing the occurrence and (or) spread of diseases, their early diagnosis, identifying the causes and conditions for their emergence and development, as well as	Students should be able to be able to implement a set of measures aimed at maintaining and strengthening health, including the formation of a healthy lifestyle, preventing the occurrence and (or) spread of diseases, their early diagnosis, identifying the causes and conditions for their emergence and development, as well as aimed at elimination of harmful environmental effects on human health

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
	aimed at elimination of harmful environmental effects on human health	
PC-5	Be able to conduct preventive medical examinations, medical examination and dispensary observation; readiness for collecting and analyzing patient complaints, data of his medical history, examination results, laboratory, instrumental and other studies for the purpose of recognizing the condition or establishing the fact of the presence or absence of a disease	Students should be able to conduct preventive medical examinations, medical examination and dispensary observation; readiness for collecting and analyzing patient complaints, data of his medical history, examination results, laboratory, instrumental and other studies for the purpose of recognizing the condition or establishing the fact of the presence or absence of a disease
PC-11	Be able to determine the patient's basic pathological conditions, symptoms, disease syndromes, nosological forms in accordance with the International Statistical Classification of Diseases and Health Problems, X revision; willingness to participate in the provision of emergency medical care in conditions requiring urgent medical intervention	Students should be able to determine the patient's basic pathological conditions, symptoms, disease syndromes, nosological forms in accordance with the International Statistical Classification of Diseases and Health Problems, X revision; willingness to participate in the provision of emergency medical care in conditions requiring urgent medical intervention
PC-15	Be able to determine the need for natural therapeutic factors, drug, non-pharmacological therapy and other methods in patients in need of medical rehabilitation and sanatorium treatment	Students should be able to determine the need for natural therapeutic factors, drug, non-pharmacological therapy and other methods in patients in need of medical rehabilitation and sanatorium treatment

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
PC-16	Be able to provide educational work on elimination of risk factors and formation of skills of a healthy life	Students be able to provide educational work on elimination of risk factors and formation of skills of a healthy life

### **3.COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE**

The course refers to the core/variable/elective\* component of (B1) block of the higher educational programme curriculum.

\* - Underline whatever applicable.

Within the higher education programme students also master other (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the course study.

*Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Previous courses/modules*</b>	<b>Subsequent courses/modules*</b>
GC-1	Be able to abstract thinking, analysis and synthesis		
GPC-7	Be able to analyze the results of their own activities to prevent professional errors; readiness to use basic physical, chemical, mathematical and other natural science concepts and methods in solving professional problems		
PC- 1	Be able to implement a set of measures aimed at maintaining and strengthening health, including the formation of a healthy lifestyle, preventing the occurrence and (or) spread of diseases, their early diagnosis, identifying the causes and conditions for		

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	their emergence and development, as well as aimed at elimination of harmful environmental effects on human health		
PC-5	Be able to conduct preventive medical examinations, medical examination and dispensary observation; readiness for collecting and analyzing patient complaints, data of his medical history, examination results, laboratory, instrumental and other studies for the purpose of recognizing the condition or establishing the fact of the presence or absence of a disease		
PC-11	Be able to determine the patient's basic pathological conditions, symptoms, disease syndromes, nosological forms in accordance with the International Statistical Classification of Diseases and Health Problems, X revision; willingness to participate in the provision of emergency medical		

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	care in conditions requiring urgent medical intervention		
PC-15	Be able to determine the need for natural therapeutic factors, drug, non-pharmacological therapy and other methods in patients in need of medical rehabilitation and sanatorium treatment		
PC-16	Be able to provide educational work on elimination of risk factors and formation of skills of a healthy life		

\* To be filled in according to the competence matrix of the higher education programme.

#### 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course “Medical Elementology” is 2 credits (72 academic hours).

Table 4.1. Types of academic activities during the periods of higher education programme mastering (**full-time training**)\*

Type of academic activities	Total academic hours	Semesters/training modules
		6
<i>Contact academic hours</i>	<b>30</b>	<b>30</b>
<i>Including:</i>		
Lectures (LC)		
Lab work (LW)	28	28
Seminars (workshops/tutorials) (S)		
<i>Self-studies</i>	<b>36</b>	<b>36</b>
<i>Evaluation and assessment (exam/passing/failing grade)</i>	6	6
<b>Course workload</b>	academic hours	<b>72</b>
	credits	<b>2</b>

\* To be filled in according to the competence matrix of the higher education programme.

#### 5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1 Introduction to Medical Elementology	1. Subject of medical elementology. Biological classification of chemical elements. The concept of bioelements.	LW
	2. Biogeochemistry and factors affecting the elemental status of the population.	LW
	3. A new paradigm of nutrition and therapy.	LW
Module 2 General Elementology	4. Factors affecting the homeostasis of trace elements. Interaction between trace elements.	LW
	5. Elemental status of a person. Personalized assessment of human elemental status.	LW
Module 3 Special Elementology	6. Essential trace elements (iron, zinc, copper, manganese, chromium, cobalt, molybdenum, selenium, iodine): role in the body; absorption; excretion; deficiency and toxicity; associated diseases; sources.	LW
	7. Conditionally essential trace elements (lithium, strontium, vanadium, nickel, tin, silicon, fluorine): role in the body; absorption; excretion; deficiency and toxicity; associated diseases; sources.	LW
	8. Toxic and potentially toxic trace elements (arsenic, aluminum, lead, cadmium, mercury): role in the body; absorption; excretion; toxicity; associated diseases; sources.	LW
	9. Macroelements (potassium, sodium, calcium, magnesium, phosphorus, sulfur, chlorine): role in the body; absorption; excretion; deficiency and excess; toxicity; associated diseases; sources.	LW
	10. Elements-organogenes (carbon, oxygen, nitrogen, hydrogen): a role in the body; absorption; excretion; associated diseases; sources.	LW LW
Module 4 The role of chemical elements in the diagnosis and treatment of human diseases	11. Imbalances of chemical elements in various diseases: diseases of the skin, diseases of the musculoskeletal, broncho-pulmonary, immune, endocrine, cardiovascular systems, childhood diseases, trace elements in oncology and hematology.	LW

\* - to be filled in only for **full**-time training: *LC* - lectures; *LW* - lab work; *S* - seminars.

## 6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 6.1. Classroom equipment and technology support requirements*

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
Lecture	A lecture hall for lecture-type classes, equipped with a set of specialised furniture; board (screen) and technical means of multimedia presentations.	
Lab work	A classroom for laboratory work, individual consultations, current and mid-term assessment; equipped with a set of specialised furniture and machinery.	List of specialised laboratory equipment, machinery, stands, etc.
Seminar	A classroom for conducting seminars, group and individual consultations, current and mid-term assessment; equipped with a set of specialised furniture and technical means for multimedia presentations.	List of specialised equipment, stands, visual posters, etc.
Computer Lab	A classroom for conducting classes, group and individual consultations, current and mid-term assessment, equipped with personal computers (in the amount of ____ pcs), a board (screen) and technical means of multimedia presentations.	List of specialised software installed on computers for mastering the discipline
Self-studies	A classroom for independent work of students (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the electronic information and educational environment.	

\* The premises for students' self-studies are subject to **MANDATORY** mention

## 7. RESOURCES RECOMMENDED FOR COURSE STUDY

a) Software: OS Windows XP, Windows Vista, Windows 7, a set of office programs OpenOffice.org (or MS Office 2003, 2007), Internet search engines FireFox or Internet Explorer, Opera, or other software tools for knowledge control. Databases Medline, PubMed, etc.

b) The site of the RUDN library - Access: <http://lib.rudn.ru/> - from desktop computers of the PFUR

University library ONLINE - Access: <http://www.biblioclub.ru/>

Book collections of SPRINGER publishing. - Access: [www.springerlink.com](http://www.springerlink.com)

Vestnik RUDN (Series "Medicine") - Access: <http://www.elibrary.ru/defaultx.asp>

Universal database East View . - Access: <http://online.ebiblioteka.ru/>

Full-text collection of Russian scientific journals. eLibrary.ru - Access: <http://elibrary.ru/defaultx.asp?>

On-line access to journals. Information database on all branches of science and electronic delivery of documents. SwetsWise. - Access: <https://www.swetswise.com>

<http://quakes.globalincidentmap.com/> ,



<http://www.globalincidentmap.com/> ,  
[http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/quakes\\_all.php](http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/quakes_all.php) ,  
[http://www.thesis.lebedev.ru/forecast\\_activity.html](http://www.thesis.lebedev.ru/forecast_activity.html)  
Electronic Library System RUDN - EBS RUDN: <http://lib.rudn.ru:8080/MegaPro/Web>  
The educational portal of RUDN ( <http://web-local.rudn.ru> );  
University library online: <http://www.biblioclub.ru>  
National digital resource "RUKONT": <http://rucont.ru>  
IQlib: <http://www.iqlib.ru>  
Science Direct: <http://www.sciencedirect.com>  
EBSCO: <http://search.ebscohost.com>  
Sage Publications: <http://online.sagepub.com>  
Springer / Kluwer: <http://www.springerlink.com>  
Taylor & Francis: <http://www.informaworld.com>  
Web of Science: <http://www.isiknowledge.com>  
University information system RUSSIA: <http://www.cir.ru/index.jsp>  
The portal of the RUDN: <http://web-local.rudn.ru/>  
Consultant of the student <http://www.studmedlib.ru>

#### *Internet sources*

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:

- RUDN Electronic Library System (RUDN ELS) <http://lib.rudn.ru/MegaPro/Web>
- EL "University Library Online" <http://www.biblioclub.ru>
- EL "Yurayt" <http://www.biblio-online.ru>
- EL "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)
- EL "Lan" <http://e.lanbook.com/>
- EL "Trinity Bridge"
- .....

2. Databases and search engines:

- electronic foundation of legal and normative-technical documentation <http://docs.cntd.ru/>
- Yandex search engine <https://www.yandex.ru/>
- Google search engine <https://www.google.ru/>
- Scopus abstract database <http://www.elsevier.com/locate/scopus/>

#### *Training toolkit for self- studies to master the course* \*:

1. The set of lectures on the course "Medical Elementology"

\* The training toolkit for self- studies to master the course is placed on the course page in the university telecommunication training and information system under the set procedure.

## **8. ASSESSMENT TOOLKIT AND GRADING SYSTEM\* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL UPON COURSE COMPLETION**

The assessment toolkit and the grading system\* to evaluate the competences formation level (GC-1, GPC-7, PC- 1, PC-5, PC-11, PC-15, PC-16) upon the course study completion are specified in the Appendix to the course syllabus.

\* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

**DEVELOPERS:**

Senior Lecturer of  
Department  
of Medical Elementology

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position, department

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signature

A.A. Skalny

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name and surname

Head of the Department  
of Medical Elementology

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position, department

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signature

A.V. Skalny

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name and surname

**HEAD OF EDUCATIONAL DEPARTMENT:**

of Medical Elementology

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name of department

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signature

A.V. Skalny

---

name and surname

**HEAD**

**OF HIGHER EDUCATION PROGRAMME:**

First Deputy Director of the

Medical Institute for academic

affairs

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position, department

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signature

I. V Radysh

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name and surname