

Документ подписан простой электронной подписью
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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA named after P. Lumumba
(RUDN University)
Science faculty**

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

COURSE SYLLABUS

Chemistry of heterocyclic compounds

course title

**Recommended by the Didactic Council for the Education Field of:
04.04.01 «Chemistry»**

field of studies / speciality code and title

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

«Fundamental and applied chemistry»

higher education programme profile/specialisation title

1. COURSE GOAL(s)

The goal of the course of «Chemistry of heterocyclic compounds» is in the formation of the system of knowledge about the laws in the chemical behavior of the main classes of organic compounds in relation to their structure in order to use this knowledge as a basis for study at the molecular level, the processes occurring in the living organisms.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the discipline "Chemistry of heterocyclic compounds" is aimed at developing the following competences/competences in part:

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

Competence code	Competence descriptor	Competence formation indicators (within this course)
M-PC-1-s	The ability to plan work and choose adequate methods for solving research problems in the chosen field of chemistry, chemical technology or sciences related to chemistry	M-PC-1-s-1. Draws up a general research plan and detailed plans for individual stages
		M-PC-1-s-2. Selects experimental and computational-theoretical methods for solving the problem based on the available material and time resources
M-PC-2-s	Ability to conduct patent information research in the chosen field of chemistry and/or related sciences	M-PC-2-s-1. Searches for specialized information in patent information databases
		M-PC-2-s-2. Analyzes and summarizes the results of a patent search on the subject of the project in the selected field of chemistry (chemical technology)

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the elective component of (B1) block of the higher educational programme curriculum.

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

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
M-PC-1-s	The ability to plan work and choose adequate methods for solving research problems in the chosen field of chemistry, chemical technology or sciences related to chemistry	Methods of Organic Chemistry Theoretical organic chemistry The method of working with databases Fundamentals of biotechnology Domino reactions in the synthesis of heterocycles Research work Experimental methods in the chemistry NMR of organic	Undergraduate practice

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
		compounds Molecular spectral analysis	
M-PC-2-s	Ability to conduct patent information research in the chosen field of chemistry and/or related sciences	Methods of Organic Chemistry Theoretical organic chemistry The method of working with databases Fundamentals of biotechnology Domino reactions in the synthesis of heterocycles Research work Experimental methods in the chemistry NMR of organic compounds Molecular spectral analysis	Undergraduate practice

* 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 is 5 credits

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	Semester(-s)			
		1	2	3	4
<i>Contact academic hours</i>	180			72	
including:					
Lectures (LC)	36			36	
Lab Works (LW)	36			36	
Seminars (workshops/tutorials) (S)					
<i>Self-studies</i>	108			108	
<i>Evaluation and assessment (exam/passing/failing grade)</i>					
Course workload	academic hours	180		180	
	credits	5		5	

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Section 1. Introduction. Nomenclature of	Theme 1.1. Classification of heterocycles	LC

Course module title	Course module contents (topics)	Academic activities types
heterocyclic compounds. Small cycles.	Theme 1.2. Heterocycle nomenclature	LC, LW
	Theme 1.3. Small cycles	LC
Section 2. Five-membered heterocyclic compounds with one heteroatom	Theme 2.1. Pyrrole, furan, thiophene	LC, LW
	Theme 2.2. Indole, indolizine	LC, LW
Section 3. Five-membered heterocycles with two heteroatoms	Theme 3.1. 1,3-Azoles: imidazole, oxazole, thiazole	LC, LW
	Theme 3.2. 1,2-Azoles: pyrazole, isoxazole, isothiazole	LC, LW
Section 4. Six-membered heterocyclic compounds	Theme 4.1. Six-membered hetarenes: pyridine, azines and benzazines	LC, LW
	Theme 4.2. Quinoline, isoquinoline	LC, 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.	rotary evaporator, heating mantle, magnetic stirrer without heating, magnetic stirrer with heating, electronic weighers, vacuum pump
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

Main readings:

1. J. Joule, M. Mills Chemistry of heterocyclic compounds, Moscow, Mir, 2004
2. T. Gilchrist Chemistry of heterocyclic compounds, Moscow, Mir, 1996.

Additional readings:

1. LA Gaivoronskaya Five-membered heterocycles. Text of lectures on the special course "Chemistry of heterocyclic compounds", Moscow, RUDN, 1981.

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
- EL "Lan" <http://e.lanbook.com/>
- EL "Trinity Bridge"

2. Databases and search engines:

- Yandex search engine <https://www.yandex.ru/>
- Google search engine <https://www.google.ru/>
- Scopus abstract database <http://www.elsevierscience.ru/products/scopus/>
- database Reaxys <https://www.reaxys.com/#/search>

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

1. Course of lectures on the discipline "Chemistry of heterocyclic compounds".
2. Guidelines for laboratory works

* 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 (competences in part) 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:

**Head of the Department of
Organic Chemistry**

Position, Department



Signature

L. G. Voskressensky

name and surname

HEAD OF EDUCATIONAL DEPARTMENT:

Organic Chemistry Department

Name of Department

Signature

L. G. Voskressensky

name and surname

HEAD OF HIGHER EDUCATION PROGRAMME:

Dean of Science faculty,

Head of the Department of

Organic Chemistry

Position, Department



Signature

L. G. Voskressensky

name and surname

