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ФИО: Ястребов Олег Александрович  
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**Federal State Autonomous Educational Institution Higher Education  
"Peoples' Friendship University of Russia"**

**Medical Institute**

(name of the main educational unit (PMO) - the developer of the postgraduate program)

**Department of General Pharmaceutical and Biomedical Technology**

(name of the basic educational unit (BUE) - the developer of the postgraduate program)

**WORKING PROGRAM OF THE DISCIPLINE**

**Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация**  
(name of discipline/module)

**Scientific specialty:**

**3.4.1. Industrial Pharmacy and Drug Technology**  
(code and name of scientific specialty)

**The development of the discipline is carried out as part of the implementation of the postgraduate program:**

**Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация**  
(name of postgraduate program)

## 1. THE PURPOSE OF MASTERING THE DISCIPLINE

The purpose of mastering the discipline "Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация" is to prepare for the candidate's examinations, as well as the development of in-depth knowledge and the acquisition of professional competencies of a researcher in the field of Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация.

Discipline tasks:

- in-depth study of the theoretical, methodological, practical foundations of drug production technology;
- formation and improvement of professional training of a pharmacist technologist with technological thinking, well-versed in the technology of various dosage forms, having in-depth knowledge of related disciplines;
- formation of skills in mastering the latest technologies and methods in the field of drug production technology;
- formation of skills and abilities of independent research and teaching activities in the field of industrial pharmacy and drug production technology.

## 2. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация" is aimed at preparing for the candidate's exams.

As a result of studying the discipline, a graduate student must know:

- fundamentals of general theoretical disciplines in the amount necessary to solve professional problems;
- the modern assortment and classification of medicines, the composition of dosage forms and the characteristics of excipients, the theoretical foundations of the production of medicines and the requirements of regulatory documentation for their quality.
- biopharmaceutical interpretation of drugs, the main directions of scientific research in the field of pharmacy;
- regularities of the relationship between the chemical structure of medicinal substances and their physical and pharmaceutical properties as the basis for a targeted search for biologically active substances and a conscious selection of technology methods and standardization of medicinal products;
- the main problems of social and biomedical spheres of society and modern approaches to their solution.
- normative documentation regulating the application of pharmaceutical concepts.

## 3. VOLUME OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total labor intensity of the discipline "Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация" is 4 credit units.

Table 4.1. Types of educational work by periods of mastering the postgraduate program

Type of study work	TOTAL, ac.h.	Course			
		1	2	3	
Contact work, ac.h.	60		60	-	-

Type of study work	TOTAL, ac.h.	Course			
		1	2	3	
including:					
Lectures (LL)	30		30	-	--
Laboratory work (LW)					
Practical/seminar classes (SP)	30		30	-	-
<i>Independent work of students, ac.h.</i>	48		48	-	-
<i>Control (credit with grade), ac.h.</i>	36		36	-	-
<b>Total labor input of the discipline</b>	acc.h.	<b>144</b>	<b>144</b>	-	-
	credit	<b>4</b>	<b>4</b>	-	-

## 5. CONTENT OF THE DISCIPLINE

Table 5.1. The content of the discipline (module) by type of educational work

Name of the discipline section	Contents of the section (topic)	Type of study*
<b>Section 1</b> Dosage forms with a solid dispersed phase	<b>Topic 1.1.</b> Grinding, screening, mixing of bulk solids, granulating, tableting, drageeing, pelletizing, coating	L,S
	<b>Topic 1.2.</b> Powders, granules - technological properties of bulk materials and indicators of dosage forms. Granulation methods.	L,S
	<b>Topic 1.3.</b> Tablets, production methods (molding, pressing). Obtaining tablets by direct compression and with preliminary granulation of tablet masses. Evaluation of the quality of tablets.	L,S
<b>Section 2</b> Dosage forms with a continuous liquid and viscous dispersion medium	<b>Topic 2.1.</b> Dissolution, filtration, mixing in liquid and viscous media, homogenization,	L,S
	<b>Topic 2.2.</b> Liquid dosage forms for internal use	L,S
	<b>Topic 2.3.</b> Ointment application dosage forms - principles of obtaining. Technological matrices of compositions. Quality standardization.	L,S
<b>Section 3</b> Variable dosage forms	<b>Topic 3.1.</b> Medical capsules, obtaining and quality standardization.	L,S
	<b>Topic 3.2.</b> Plasters.	L,S
	<b>Topic 3.3.</b> Suppositories. Production technology and standardization	L,S
<b>Section 4</b> Extraction preparations	<b>Topic 4.1.</b> Principles and methods of extracting materials of the cellular structure on the example of obtaining tinctures, liquid extracts, total phytosubstances, maceration (fractional), percolation (direct and countercurrent), circulation extraction, two-	L,S

	phase extraction.	
	<b>Topic 4.2.</b> Recovery of extractants. Standardization of phytopreparations.	<b>L,S</b>
<b>Section 5</b> Dosage forms for parenteral use	<b>Topic 5.1.</b> Preparation, stabilization and sterilization of sterile solutions.	<b>L,S</b>
	<b>Topic 5.2.</b> LF for the eyes.	<b>L,S</b>

## 6. LOGISTICS AND TECHNICAL SUPPORT OF THE DISCIPLINE

Table 6.1. Logistics of discipline

<b>Audience type</b>	<b>Audience equipment</b>	<b>Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)</b>
Teaching laboratory (943)	Audience for laboratory work, individual consultations, current control and intermediate certificationequipped with a set of specialized furniture and equipment.	A set of specialized furniture; hardware: Notebook Lenovo ThinkPad E15-IML; multimedia projector Epson EB-X31, there is Internet access.  Software: Microsoft products (OS, office suite, including MS Office / Office 365, Teams, Skype) list of specialized equipment, etc.
Teaching laboratory (944)	Audience for laboratory work, individual consultations, current control and intermediate certificationequipped with a set of specialized furniture and equipment.	A set of specialized furniture; technical means: video projector Epson EMP-S1 sch.1257, laptop Dell Vostro 7500, Internet access.  Software: Microsoft products (OS, office suite, including MS Office / Office 365, Teams, Skype) list of specialized equipment, etc.
Teaching laboratory (946)	Audience for laboratory work, individual consultations, current control and intermediate certificationequipped with a set of specialized furniture and equipment.	Set of 3 heating mantles for 250, 500 and 1000 ml flasks manufactured by Labtex Set of hydrometers AON-1 GOST 18481-81 Analytical balance I class ViBRA HT 224RCE Moisture Analyzer Vibra MD-83 Ultrasonic cleaner SONOREX DIGITEC DT 156 VH manufactured by Bandelin Bath water laboratory STEGLER WB-6

Audience type	Audience equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)
		<p>Dry oven with forced ventilation  LOIP LF 120/300-VS1  Box of abacterial air environment for working with crops of bacteriological cultures that do not pose a threat to health operators BAVnp-01-“Laminar-S.”  Vibrodrive VP-30T  Scales ATILON ATL 120d4-1 analytical germanium  Bath water double L N-2LABTEX  Heidolph overhead laboratory stirrer with USB interface Hei-TORQUE 400 Precision  Vacuum pump Germany  Switch for 3 Heidoiph vaporizers  Vacuum control unit Heidolp  Vacuum valve Heidoiph  AV-50Halogen moisture analyzer 0.02-50  Laborota 4002 control HB/G1.  Heidolph programmable rotary evaporator  Dish dryer STL 56 by Gerhardt  Exhaust cabinet No. 1 IIIB-20</p>
Teaching laboratory (947)	An auditorium for laboratory work, individual consultations, current control and intermediate certification, equipped with a set of specialized furniture and equipment.	<p>ND, orders, GF, GOSTs, scales with weights and electronic, measured laboratory glassware, mortars with pestles, scales with weights and electronic, evaporation cups, small laboratory equipment, heating devices, filters, hydrometers, electric stoves, water and sand baths, laboratory thermostat, mold for pouring out suppositories, pill machines, homogenizer, laboratory stirrer, steam sterilizer GK-10-1-“TZMOI”  Box of abacterial air environment BAVnp-01-”Laminar-S”-1.2  Refractometer IRF-454  Bath water laboratory 8-seater H 19 V Hydro  Refractometer with backlight and additional scale IRF-454 B2M  Refrigerator pharmaceutical Pozis XB-140-1</p>



Audience type	Audience equipment	Specialized educational / laboratory equipment, software and materials for mastering the discipline (if necessary)
		Exhaust cabinet No. 2 ShV-202 Scales electronic laboratory Adam NSV-302 Cap crimping machine POK-1 Dish dryer STL 56 by Gerhardt Bath water laboratory four-seater LT-4 production Tare scales on column VA-4M Water bath - thermostat WB-4MS Dish dryer STL 56 by Gerhardt Analytical balance I class ViBRA HT 224RCE Water bath - thermostat WB-4MS Exhaust cabinet No. 2.ShV-202
For independent work of students (926)	An auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to the EIOS.	

## 7. EDUCATIONAL-METHODOLOGICAL AND INFORMATION SUPPORT OF THE DISCIPLINE

### *Printed publications:*

1. State Pharmacopoeia of the Russian Federation 14th edition.
  2. Pharmaceutical Technology/K.V. Alexeev, S.A. Kedyk. - M.: IFT JSC, 2019.- 570s.
- b) additional literature

### *Electronic and printed full-text materials:*

1. State Pharmacopoeia of the Russian Federation XIV edition;

### *Additional literature:*

#### *Printed publications:*

1. Pharmaceutical technology. High Molecular Compounds in Pharmacy and Medicine: Tutorial/Ed. I.I. Krasnyuk (art.) - M.: Geotar-Media, 2017. - 560s.
2. Pharmaceutical technology. Industrial production of medicines: in 2 volumes: textbook. Volume 1/I.I. Krasnyuk, N.B. Demina, E.O. Bakhrushin, M. N. Anurova; edited by I.I. Krasnyuk, N.B. Demina. - Electronic text data. - Moscow: Geotar-Media, 2020. - 352 p.: il. - ISBN 978-5-9704-5535-7.

### *Resources of the information and telecommunications network "Internet":*

1. RUDN ELS and third-party ELS, to which university students have access on the basis of concluded agreements:

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

## 2. Databases and search engines:

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

*Educational and methodological materials for independent work of students in the course of mastering the discipline/module\*:*

1. A course of lectures on the discipline "Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация."
2. Guidelines for the implementation of practical tasks in the discipline "Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация."
3. Guidelines for independent work on the discipline "Drug Technology: Biopharmacy / Технология получения лекарств: Биофармация".





\* - all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the page of the discipline in TUIS!

## 8. EVALUATION MATERIALS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF FORMATION OF COMPETENCES IN THE DISCIPLINE

Evaluation materials and a point-rating system for assessing the development of the discipline are presented in the Application to this Work Program of the discipline.

\* - OM and BRS are formed on the basis of the requirements of the relevant local normative act of the Peoples' Friendship University of Russia.

### DEVELOPERS:

Head Department of General Pharmaceutical and Biomedical Technology		S.N. Suslina
Position, BUP	Signature	Surname I.O.
Docent, Department of General Pharmaceutical and Biomedical Technology		R. Mussa
Position, BUP	Signature	Surname I.O.
Assistant of the Department of General Pharmaceutical and Biomedical Technology		D.V. Radeva
Position, BUP	Signature	Surname I.O.
<b>HEAD OF BUP:</b> Head Department of General Pharmaceutical and Biomedical		S.N. Suslina