



COURSE SYLLABUS

Academic discipline for Master's degree training:
BIOPHARMACY

Specialty	226 Pharmacy, Industrial Pharmacy
Educational Programme	EPP “Pharmacy” (2023)
Higher Education Level	Second (Master's)
Academic Year	2026-2027
Status of the Discipline	Mandatory
Language of Instruction	Ukrainian / English
Total Workload	(1,5 of ECTS credits)
Year of Study / Semester	V / 9
Developer	H. Kramar, Associate Professor, Candidate of Pharmaceutical Sciences
Instructor(s), Guest Lecturers	O. Kryvoviaz, Professor, Doctor of Pharmaceutical Sciences; Yu. Tomashevskaya, Associate Professor, Candidate of Pharmaceutical Sciences; O. Toziuk, Associate Professor, Candidate of Pharmaceutical Sciences; H. Kramar, Associate Professor, Candidate of Pharmaceutical Sciences
Venue and Contact Details	pharmacy@vnmu.edu.ua , 56 Pyrohova Street, Vinnytsia; tel. +380 432 55-39-52

1. DESCRIPTION OF THE ACADEMIC DISCIPLINE

ABSTRACT

Brief course overview and relevance. The course “Biopharmacy” is one of the stages in the process of training specialists. The main objective of the course is to ensure students successfully acquire the knowledge required to master the subjects of their professional training, namely: the theoretical foundations of biopharmacy, and the exogenous, endogenous, pharmaceutical, biological and other factors affecting the bioavailability of medicinal products.

The subject of this course is the study of how various factors influence the bioavailability of active pharmaceutical ingredients when developing new medicines and improving existing ones, with the aim of ensuring their appropriate therapeutic activity.

Alongside other pharmaceutical disciplines and the social sciences, Biopharmacy plays a vital role in shaping the worldview of specialists in the field of pharmacy and in providing them with the specialist technical training required to carry out their professional activities, with the aim of supplying the public and healthcare facilities with medicinal products. The discipline also develops practical skills relating to the key stages in the formation and development of the pharmaceutical industry and professional practice in Ukraine and abroad, as well as the general requirements for the manufacture of medicinal products. Biopharmacy helps to build knowledge of the entire journey of a medicinal product, from production to its action within the patient’s body, which is critically important for pharmacy practice, pharmaceutical manufacturing and scientific research.

Prerequisites for the Educational Component.

The course builds on the study of physics and chemistry undertaken during secondary education, and also requires prior knowledge of the following subjects from the curriculum:

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- general and inorganic chemistry (knowledge of the physical and chemical properties of compounds, the structure of matter, concepts relating to states of matter, solutions, concentration, etc.);
- physical and colloidal chemistry (basic knowledge of chemical thermodynamics, surface chemistry, the structure and organisation of molecules in macromolecular compounds, and the structure and properties of colloidal particles);
- biophysical chemistry with physical methods of analysis (knowledge of the fundamentals of thermodynamics and mechanics, as well as basic knowledge of solid-state physics and materials science);
- biology with the fundamentals of genetics (understanding of the cellular structure of living matter, basic knowledge of its chemical composition, knowledge of the differences in the structure of plant and animal cells);
- pharmaceutical technology: pharmacy technology (knowledge of the technology for the manufacture of solid, liquid and soft dosage forms in a pharmacy setting);
- pharmaceutical technology: industrial pharmaceutical technology (knowledge of the technology for the manufacture of solid, liquid and soft dosage forms in an industrial setting);
- theoretical foundations of dosage form technology (knowledge of the classification of technological processes and biopharmaceutical factors affecting the efficacy of medicinal products; the ability to identify homogeneous and heterogeneous systems; knowledge of the theoretical foundations of the grinding and dissolution of substances, the stabilisation and distribution of heterogeneous systems, and extraction);
- pharmacology (knowledge of the biotransformation of medicines and the mechanisms by which medicines act on cells, organs and organ systems);
- pharmacotherapy and pharmacokinetics (knowledge of the scientifically sound use of medicines for the treatment, prevention and diagnosis of diseases);

- clinical pharmacy and pharmaceutical care (knowledge of the rational use of medicines in individual patients, taking into account their specific characteristics, with the aim of achieving maximum therapeutic efficacy whilst minimising the risk of adverse effects).

PURPOSE AND OBJECTIVES

Purpose and objectives of the course, competencies (general and specific), and relevance to professional practice: To enable students of higher education to master the theoretical and practical foundations of biopharmacy, in order to provide a scientific basis for the formulation and manufacturing of new medicinal products and the improvement of existing ones, using modern excipients and new technologies, thereby enhancing their efficacy and reducing their side effects on the body.

Post-requisites for the Educational Component.

- *integrated*: the ability to solve tasks and to comprehend and address practical problems of a research and/or innovative nature in the field of pharmacy.

- *general*:

GC 02. Ability to think abstractly, analyse and synthesise.

GC 03. Knowledge and understanding of the subject area and understanding of professional practice.

GC 04. Ability to adapt and act in new situations. Ability to show initiative.

GC 06. Skills in the use of information and communication technologies.

GC 07. Ability to select communication strategies; ability to work in a team and with experts from other fields of knowledge or types of economic activity.

GC 08. Ability to assess and ensure the quality of work performed.

GC 09. Ability to conduct research at the appropriate level.

- *specialised (professional, subject-specific) competences (PC)*:

PC 01. The ability to collect, interpret and apply data required for professional practice, conducting research and implementing innovative projects in the field of pharmacy.

PC 02. The ability to integrate knowledge and solve complex pharmaceutical problems in broad or multidisciplinary contexts.

PC 03. The ability to solve pharmaceutical problems in new or unfamiliar environments where information is incomplete or limited, whilst taking into account aspects of social and ethical responsibility.

PC 06. The ability to communicate one's own knowledge, conclusions and arguments in the field of pharmacy clearly and unambiguously to professionals and non-professionals, including learners.

PC 09. The ability to provide advice on prescription and over-the-counter medicines and other pharmacy products, as well as on aspects of healthy eating, and to provide pharmaceutical care during the selection and dispensing of medicines of natural and synthetic origin by assessing the risk-benefit ratio and compatibility, taking into account their biopharmaceutical, pharmacokinetic, pharmacodynamic, physicochemical and chemical properties, as well as indications and contraindications for use, guided by data on the specific patient's state of health.

PC 10. The ability to monitor the efficacy and safety of the use of medicines by the general public in accordance with data on their clinical and pharmaceutical characteristics.

Post-requisites (*How will this be useful in your future studies and professional career?*)

This module forms the basis for the study of the following modules: 'Pharmaceutical Management and Marketing', 'Pharmaceutical Biotechnology', and the elective module 'Therapeutic Cosmetics'. The teaching programme involves integrating instruction with the above-mentioned subjects and developing the skills to apply this knowledge in further studies and professional practice.

2. LEARNING OUTCOMES

PLO 01. Apply specialised knowledge and skills from general and specialist disciplines in professional practice.

PLO 02. Critically analyse scientific and applied problems in the field of pharmacy.

PLO 03. Assess and ensure the quality and effectiveness of activities in the field of pharmacy.

PLO 07. Demonstrate the ability to independently search for, analyse and synthesise information from various sources, including specialist literature, patents and databases; to evaluate it, in particular using statistical analysis; and to apply these results to solve typical and complex specialised tasks in professional practice, including those relating to the development and manufacture of medicinal products.

PLO 08. To develop and make effective decisions to resolve complex/comprehensive pharmaceutical problems, both independently and following joint discussion; to formulate objectives for one's own work and that of the team, taking into account societal and industrial interests, the overall strategy and existing constraints; and to determine the optimal ways of achieving these objectives.

PLO 09. Develop and implement innovative projects in the field of pharmacy, as well as related interdisciplinary projects, taking into account technical, social, economic, ethical, legal and environmental aspects.

PLO 14. Identify the advantages and disadvantages of medicinal products from various pharmacological groups, taking into account their chemical, physicochemical, biopharmaceutical, pharmacokinetic and pharmacodynamic characteristics. Recommend over-the-counter medicinal products and other pharmacy goods to consumers

3. FORMS OF ORGANISATION OF THE EDUCATIONAL PROCESS AND THEIR SCOPE

Type of Learning Activity	Hours
Lectures:	6
Practical Classes:	30
Independent Study (IS):	9
Total	45

4. THEMATIC PLAN

Nº	Topic Titles
1	Key concepts and terms in biopharmacy.
2	The influence of pharmaceutical factors on the therapeutic efficacy of medicinal products.
3	Influence of the route of administration on the therapeutic efficacy of medicinal products. Absorption of medicinal products in the body.
4	Bioavailability of medicinal products and methods for determining it.
5	The influence of exogenous and endogenous factors on the bioavailability of medicinal products.
6	Biotransformation, excretion and metabolism of substances in the body.
7	Bioequivalence and its role in assessing the quality of medicinal products.
8	Biopharmaceutical studies – in vitro and in vivo.
9	Biopharmaceutical aspects of dosage form development. The influence of the dosage form and the nature of excipients on the therapeutic efficacy of medicinal products.
10	The influence of simple chemical modification of the active pharmaceutical ingredient (API) on the therapeutic efficacy of medicinal products.
11	Pharmaco-technological methods for assessing the release of the API from medicinal products.
12	Development of medicinal products with controlled release of ingredients. Solid therapeutic systems.
13	Macromolecular therapeutic systems with controlled release of active pharmaceutical ingredients.
14	Solubilisation and micelle formation. Targeted delivery therapeutic systems.
15	Differentiated assessment

5. FORMS AND METHODS OF ASSESSMENT OF LEARNING OUTCOMES

Ongoing Assessment during Practical Classes	Methods: oral and/or written assessment and testing, computer-based assessment and testing, completion of situational tasks.
Final Assessment of the Academic Discipline – Pass/Fail Assessment	It is conducted during the final practical class and is determined on the basis of the student's ongoing academic performance in accordance with the Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia: General Information / Key Documents https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf
*Final Assessment of the Academic Discipline – differentiated assessment	It is conducted during the final practical class and is assessed in accordance with the Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia: General Information / Key Documents https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf
Assessment Tools for Learning Achievement	Theoretical questions, tests, clinically oriented situational tasks, practical assignments, demonstration of practical skills.

6. ASSESSMENT CRITERIA

Assessment of students' knowledge is carried out in accordance with the current Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia. ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf))

Type of Assessment	Assessment Criteria / Scale
Ongoing Assessment	According to the traditional grading scale: 5 – “Excellent”, 4 – “Good”, 3 – “Satisfactory”, 2 – “Unsatisfactory”
Interim Assessments	According to the traditional grading scale
Final Grade of the Academic Discipline	The sum of points for the examination test (12–20 points) and oral assessment (38–60 points). Examination grade: 71–80 points – “Excellent”; 61–70 points – “Good”; 50–60 points – “Satisfactory”; fewer than 50 points – “Unsatisfactory” / Failed.
Overall Assessment for the Academic Discipline	Ongoing academic performance – 72–120 points (conversion of the average traditional grade for practical classes to the 120-point scale): 60% of the final grade for the academic discipline. Final Assessment – 50–80 points: 40% of the final grade for the academic discipline. Individual Assignments– 1–12 points. Total: 122–200 points.

GRADING SCALE: NATIONAL AND ECTS

Total Score for All Learning Activities	ECTS Grade	National Grade: Examination, Course Project (Paper), Practical Training	National Grade: Pass
180–200	A	Excellent	Passed
170–179.99	B	Good	Passed
160–169.99	C	Good	Passed
141–159.99	D	Satisfactory	Passed
122–140.99	E	Satisfactory	Passed
60–121.99	FX	Unsatisfactory, with the possibility of retaking	Failed, with the possibility of retaking
0–59.99	F	Unsatisfactory, with mandatory repetition of the discipline	Failed, with mandatory repetition of the discipline

Criteria for Assessing Students' Knowledge ***Assessment of Oral/Written Responses during Ongoing Assessment***

The grade “Excellent” is awarded when a student demonstrates comprehensive knowledge of the topic, illustrating responses with a variety of relevant examples; provides complete, accurate, and clear answers without prompting or leading questions; presents the material without errors or inaccuracies; confidently solves problems and completes practical tasks of varying levels of complexity; and independently generates innovative ideas.

The grade “Good” is awarded when a student demonstrates good knowledge and understanding of the topic and provides correct, coherent, and well-structured answers, although they may not be fully comprehensive. The student answers additional questions correctly and without significant errors; successfully solves problems and completes practical tasks, experiencing difficulties only with the most complex assignments.

The grade “Satisfactory” is awarded when a student demonstrates knowledge of the overall content of the topic and a satisfactory level of understanding. With the help of guiding questions, the student is able to solve modified (simplified) problems; solves problems and completes practical tasks, although experiencing difficulties even with relatively simple assignments; is unable to formulate a coherent and systematic response independently but provides correct answers to direct questions.

The grade “Unsatisfactory” is awarded when a student’s knowledge and skills do not meet the requirements for the grade “Satisfactory”.

The assessment criteria for all other types of students’ academic work are based on the requirements of the Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsya,

([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)) and are specified in the programme of the academic discipline.

Assessment of Students’ Independent Study

Students’ independent study undertaken as part of a topic alongside contact hours is assessed as part of the ongoing assessment of that topic during the relevant practical class.

The maximum number of points a student may receive upon completion of the discipline is 200 points. The minimum passing score is 122 points.

7. METHODOLOGICAL SUPPORT

Teaching and learning materials (lecture notes or extended lecture outlines), thematic plans for lectures, practical classes and independent study, assignments for ongoing assessment, methodological guidelines, and teaching manuals.

8. ACADEMIC DISCIPLINE POLICIES

The completion of learning activities and all academic work within the discipline must comply with the requirements of the Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsya; ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)), the Regulations on the Organisation of the Educational Process for Higher Education Students Pursuing the Degree of Doctor of Philosophy at National Pirogov Memorial Medical University, Vinnytsya (https://www.vnmu.edu.ua/downloads/other/pologPhD_org.pdf); the Law of Ukraine “On Education” (Article 42); the Law of Ukraine “On Academic Integrity”; and the Code of Academic Integrity of National Pirogov Memorial Medical University, Vinnytsya (https://www.vnmu.edu.ua/downloads/other/kodex_akad_dobr_edit%202026.pdf)

Students are entitled to high-quality educational services and a safe learning environment under martial law, emergency situations and states of emergency; access to up-to-date scientific and educational information; and qualified academic guidance and support in studying the discipline and acquiring practical skills.

The Department’s policy on the provision of educational services is student-centred and is based on the regulatory documents of the Ministry of Education and Science of Ukraine and the

Ministry of Health of Ukraine, the University Statute, the procedures governing the provision of educational services, including in emergency situations, as stipulated by the principal regulations and administrative directives governing the organisation of the educational process at National Pirogov Memorial Medical University, Vinnytsya, as well as on the principles of academic integrity.

Academic Integrity. When studying the discipline and completing all types of learning assignments and/or research activities, students must comply with the Law of Ukraine “On Education” (Article 42), the Law of Ukraine “On Academic Integrity”, and the Code of Academic Integrity of National Pirogov Memorial Medical University, Vinnytsya ([University website → General Information → Key Documents → Code of Academic Integrity](#)). In the event of a violation of academic integrity principles, appropriate measures shall be taken in accordance with the applicable regulatory documents.

Compliance with VNMU Internal Regulations and Safety Requirements during Practical Classes. At the first practical class, the instructor provides a safety briefing on appropriate conduct on the Department premises, informs students of the location of the shelter and the evacuation route to the shelter in accordance with the approved evacuation plan, explains the rules of conduct while proceeding to and remaining in the shelter, and provides instructions on all actions stipulated by the Emergency Response Plan (pursuant to Order No. 505 dated 30 August 2023). In the event of an air raid alert or any other emergency warning signal, the instructor suspends the class. The instructor and students proceed together to the shelter and remain there until the warning signal is cancelled. Once the alert has been lifted, the instructor and students either resume the class in the Department’s classrooms or students independently complete the remaining learning material, which is subsequently assessed at the next class.

Requirements for Preparation for Practical Classes

Students are required to participate actively in the educational process: attend classes and come adequately prepared; complete the test tasks related to the current topic in their workbooks and fill in the required diagrams and tables; actively participate in discussions of the class topic; complete all assignments specified in the programme; search for additional information relevant to the topic and present it to their peers.

Students are expected to arrive at classes on time. Late arrival is not permitted in accordance with the Internal Regulations for Students of VNMU. A student who arrives more than 10 minutes late is not admitted to the class and is required to make up the missed class in accordance with the established procedure.

Students are expected to be polite, courteous, and respectful in their interactions with teaching staff, other University employees, fellow students, and other persons studying at VNMU. Students must maintain a quiet and orderly environment and demonstrate appropriate conduct on the Department premises.

In its activities, the Department adheres to the principles of mutual respect and tolerance. Students are expected to uphold the same principles.

Students must comply with safety regulations while on the Department premises.

When working in teaching and research laboratories, students must comply with the applicable safety regulations (published on the website of the Pharmacy Department). When completing practical assignments, students must keep their workstations clean and orderly and leave them tidy upon completion of the practical work.

Use of Mobile Phones and Other Electronic Devices. The use of mobile phones and other electronic devices during classes is not permitted, except for emergency calls or when such devices are used to present supplementary materials relevant to the topic of the class.

Absence from Classes. Missed classes must be made up in accordance with the procedure established by the current Regulations on the Organization of the Educational Process at National Pirogov Memorial Medical University, Vinnytsya ([https://www.vnmdu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmdu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)), at the times specified in the make-up schedule published on the website of the Pharmacy Department ([VNMU website](#)), either with the instructor on duty or with the student’s regular instructor. Making up a

missed class involves completing the assignments related to the topic of the missed class in accordance with the specific requirements of the discipline.

Mastery of lecture topics is assessed during practical classes, seminars (including the assessment of practical skills), and final assessment, in accordance with the Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsya ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf))

Admission to Final Assessment. The procedure for admission to final assessment in the discipline is set out in the current Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsya ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)).

Students are admitted to final assessment provided that they have no outstanding academic requirements: the average grade for ongoing assessment must be at least 3.0 (72 points on the 120-point scale); all final sessions for the content modules must have been completed with a passing grade ("3" or higher); and all missed practical classes must have been made up with a passing grade ("3" or higher). Otherwise, the student must improve their average grade by making up unsatisfactory grades and must make up all missed classes.

Additional Points for Individual Assignments. Students may receive additional points in the discipline for the successful completion of individual assignments, the content of which is published on the Department's website as part of the teaching and learning materials for the discipline. The number of points awarded is determined based on the results of the individual assignment in accordance with the current Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsya. ([https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf)).

Resolution of Conflict Situations

In the event of misunderstandings or concerns regarding the quality of educational services, assessment of academic performance, or other conflict situations involving an instructor, students should first raise their concerns directly with the instructor. If the issue remains unresolved, the student has the right to submit an appeal to the Head of the Department in accordance with the Regulations on the Consideration of Appeals from Higher Education Students at National Pirogov Memorial Medical University, Vinnytsya ([VNMU website → General Information → Key Documents](#)).

Students also have the right to contact the student self-government bodies, the administration of the Faculty (Institute), or the University administration, either directly or through the designated feedback channels ("trust boxes"), links and addresses for which are available on the official VNMU website.

The Department recognises that a student-centred approach entails students' responsibility for the conscious and active acquisition of knowledge and for proper compliance with the rules and requirements established by applicable legislation and VNMU regulatory documents. The Department reserves the right to inform the relevant University bodies of any violations committed by students.

Policy on Blended Learning

The organisation of blended learning is governed by the Regulations on the Introduction of Elements of Distance Learning at National Pirogov Memorial Medical University, Vinnytsya ([VNMU website → General Information → Key Documents](#)). The main online learning platforms used for classes are Microsoft Teams and Google Meet.

The procedures for conducting practical classes, lectures, make-up classes, and consultations in the distance learning format are published on the Department's webpage ([VNMU website → Pharmacy Department → For Students/Postgraduate Students → Mode of Study → Year of Study → Teaching and Learning Materials](#)).

Communication with the Instructor. Students may contact the instructor via Microsoft Teams chat, messaging applications (Viber, Telegram, WhatsApp), or email, as determined by the instructor, during working hours.

9. LEARNING RESOURCES

Teaching and learning materials for the discipline are available on the Department's website. The materials can be accessed via: [VNMU website](#) → [\[Pharmacy Department\]](#) → [For Students/Postgraduate Students](#).

LITERATURE

Core Literature for Biopharmacy:

1. Biopharmacy. Textbook for pharmaceutical higher education institutions and faculties. 2nd ed. / edited by V. V. Hladyshev; Hladyshev V. V., Davtian L. L., Biriuk I. A. et al. Lviv: Publisher Marchenko T. V., 2023. 176 p.
2. Practicum in biopharmacy: study guide for higher education students / O. I. Tykhonov, T. H. Yarnykh, L. I. Vyshnevskaya et al. 2nd ed., revised and expanded. Stand-alone electronic ed. Kharkiv: National University of Pharmacy, 2023. 104 p.
3. Medicinal products. Bioanalytical method validation and study sample analysis (ICH M10): Guideline ST-N MOHU 42-7.6:2026. URL: https://www.dec.gov.ua/wp-content/uploads/2026/07/nastanova_validacziya-bioanalychnoyi-metodyky-ta-analiz-doslidzhuvanyh-zrazkiv_ich-m10.pdf (date of access: 22.09.2026).
4. Medicinal products. Demonstration of bioequivalence by the biowaiver procedure based on the Biopharmaceutics Classification System: Guideline ST-N MOHU 42-7.5:2023. URL: https://www.dec.gov.ua/wp-content/uploads/2024/02/nakaz-%E2%84%96-207-vid-07.02.2024-nastanova_biowejver_2024.pdf (date of access: 22.09.2026).
5. Medicinal products. Bioequivalence studies: Guideline ST-N MOHU 42-7.4:2022. URL: <https://www.dec.gov.ua/wp-content/uploads/2022/12/nastanova-z-bioekvivalentnosti-st-n-mozu-42-7.42022.pdf> (date of access: 22.09.2026).

Supplementary Literature for Biopharmacy:

1. Ducharme, M. P., Shargel, L. Shargel and Yu's Applied Biopharmaceutics & Pharmacokinetics, 8th ed. McGraw Hill, 2022. ISBN 978-1-260-14299-0.
 2. Sinko, P. J. Martin's Physical Pharmacy and Pharmaceutical Sciences: Physical Chemical and Biopharmaceutical Principles in the Pharmaceutical Sciences. Wolters Kluwer, 2023. ISBN 978-1-975174-81-1.
 3. Allen, L. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems. Wolters Kluwer, 2023. ISBN 978-1-975171-77-3.
 4. Batchelor H., ed. Biopharmaceutics: From Fundamentals to Industrial Practice. Wiley, 2021. DOI: <https://doi.org/10.1002/9781119678366>. URL: <https://onlinelibrary.wiley.com/doi/book/10.1002/9781119678366> (дата звернення: 16.10.2026).
 5. Tekade R. K., ed. Biopharmaceutics and Pharmacokinetics Considerations. Academic Press, 2021. DOI: <https://doi.org/10.1016/C2017-0-01071-6>. URL: <https://www.sciencedirect.com/book/edited-volume/9780128144251/biopharmaceutics-and-pharmacokinetics-considerations> (дата звернення: 16.10.2026).
 6. Taylor K. M. G., Aulton M. E., eds. Aulton's Pharmaceutics: The Design and Manufacture of Medicines. 6th ed. Elsevier, 2021. ISBN: 978-0-7020-8154-5. URL: <https://shop.elsevier.com/books/aultons-pharmaceutics/taylor/978-0-7020-8154-5> (дата звернення: 16.10.2026).
 7. Ajmal G., Diwan A. Biopharmaceutics and Pharmacokinetics. 1st ed. Noble Science Press, 2022. 170 p. DOI: <https://doi.org/10.52458/9789391842451.nsp2022.eb.asu>. URL: <https://noblesciencepress.org/book/biopharmaceutics-and-pharmacokinetics> (дата звернення: 16.10.2026).
 8. Dash A., ed. Pharmaceutics. 2nd ed. Elsevier, 2023. ISBN: 978-0-323-99796-6. URL: <https://shop.elsevier.com/books/pharmaceutics/dash/978-0-323-99796-6> (дата звернення: 16.10.2026).
- Talevi A., Quiroga P. A., eds. ADME Processes in Pharmaceutical Sciences: Dosage, Design, and Pharmacotherapy. 2nd ed. Springer, Cham, 2024. 493 p. ISBN: 978-3-031-50419-8.

DOI: <https://doi.org/10.1007/978-3-031-50419-8>.
<https://link.springer.com/book/10.1007/978-3-031-50419-8> (дата звернення: 16.10.2026).

URL:

ELECTRONIC RESOURCES

1. University website: [National Pirogov Memorial Medical University, Vinnytsya](#)
2. Department website: [VNMU Departments](#) — Pharmacy Department
3. University Library website: [VNMU Library](#)
4. National Scientific Medical Library of Ukraine: [National Scientific Medical Library of Ukraine](#)
5. World Health Organization: [World Health Organization \(WHO\)](#)
6. Ministry of Health of Ukraine: [Ministry of Health of Ukraine](#)
7. Public Health Center of the Ministry of Health of Ukraine: [Public Health Center of Ukraine](#)
8. English-language database of medical and biomedical literature: [PubMed](#)
9. English-language online resource for physicians and other healthcare professionals: [Medscape](#)
10. State Expert Center of the Ministry of Health of Ukraine: [State Expert Center of the Ministry of Health of Ukraine](#)
11. State Service of Ukraine on Medicines and Drugs Control: <https://www.dls.gov.ua/>
12. Ukrainian Pharmaceutical Quality Institute: [Home page](#)
13. Verkhovna Rada of Ukraine: [Legislation of Ukraine](#)

The course syllabus for the academic discipline “Biopharmacy” was discussed and approved at the meeting of the Department of Pharmacy (Protocol No. 1, dated "26" August 2026).

Course Coordinator

Candidate of Pharmaceutical Sciences, Associate Professor
 (Academic degree and title)

(Signature)

Hanna KRAMAR

Acting Head of the Department of Pharmacy

Candidate of Pharmaceutical Sciences,
 Associate Professor
 (Academic degree and title)

(Signature)

Yuliia TOMASHEVSKA