



NATIONAL PIROGOV MEMORIAL MEDICAL UNIVERSITY, VINNYTSIA

COURSE SYLLABUS

For the training of bachelor's / master's / doctor of philosophy (PHD) students

CURRENT ISSUES IN MOLECULAR BIOLOGY

Specialty	I 8 Pharmacy
Educational Programme	“Pharmacy, Industrial Pharmacy”, (2025, as amended in 2026)
Higher Education Level	Second (Master's)
Academic Year	2026–2027
Status of the Discipline	Elective
Language of Instruction	Ukrainian, English
Total Workload	3 ECTS credits (90 hours)
Year of Study / Semester	First year of study / Semester 2
Developer(s)	V.V. Rodinkova, Doctor of Biological Sciences, Professor
Instructor(s), Guest Lecturers	V.V. Rodinkova, Doctor of Biological Sciences, Professor S.D. Kryklyva, Candidate of Biological Sciences, Associate Professor
Venue and Contact Details	Department of Pharmacy [address, telephone, email – to be specified]

1. DESCRIPTION OF THE ACADEMIC DISCIPLINE

ABSTRACT

The elective course is an elective component of the educational and professional programme “Pharmacy” within the general training cycle of the Master of Pharmacy. It is worth 3 credits, which students complete during the second semester of the first year of study.

The main focus of the programme is the acquisition of knowledge in the elective course “Current Issues in Molecular Biology”, the study of which is necessary for the successful mastery of the disciplines of bioorganic chemistry, pharmacology, physiology, medical genetics, etc.

The subject area of the programme is the acquisition of knowledge about the most important molecular biological processes, which makes it possible to define the objectives of the course as a field of science and an academic discipline and to analyse the influence of physicochemical, molecular genetic, structural and functional, and other cellular factors on human health. The programme is aimed at providing knowledge of the main methods of chemical analysis of the structure and functions of biopolymers (proteins and nucleic acids); an understanding of the molecular genetic basis of the development of hereditary and multifactorial diseases and of the prospects for applying the achievements of molecular biology in practical medicine; and the development of skills in molecular genetic diagnostics and in determining the mechanisms of transmission and realisation of genetic information.

Prerequisites for the Educational Component. The discipline builds on the subjects previously studied by students at secondary school (“General Biology” and “Organic Chemistry”), as well as on first-year knowledge in the disciplines “Biology with Fundamentals of Genetics” and “Biological Chemistry”.

PURPOSE AND OBJECTIVES

Purpose of the course and its significance for professional practice: to develop in students knowledge and practical skills concerning the molecular structures and functions of the cell, an in-depth understanding of the functioning of the organism’s genetic system, the mechanisms of transmission of genetic information and the prospects for the development of genetic engineering, as a basis for students’ further mastery of the block of disciplines that provides natural-science and professional-practical training, in order to master current problems and achievements of molecular medicine and pharmacy.

Post-requisites for the Educational Component. The discipline is integrated with the course “Applied Genetics”; it also ensures a high level of general biological training and lays the foundation for students’ further mastery of knowledge in core theoretical and clinical professional-practical disciplines (biological chemistry, pathophysiology, clinical immunology, etc.).

The elective course “Current Issues in Molecular Biology” ensures that students acquire the following competencies:

Integral competency: the ability to solve complex problems and to critically understand and resolve practical problems in professional pharmaceutical and/or research and innovation activities, applying the provisions, theories and methods of the fundamental, chemical, technological, biomedical and socio-economic sciences; to integrate knowledge and address complex issues, and to formulate judgements on the basis of insufficient or limited information; to communicate one’s own knowledge, conclusions and their rationale clearly and unambiguously to specialist and non-specialist audiences.

Competencies promoted by the course. In accordance with the requirements of the standard, the discipline ensures that students acquire the following competencies:

Integral: the ability to solve typical and complex specialised tasks and practical problems in professional pharmaceutical activity using the provisions, theories and methods of the fundamental, chemical, technological, biomedical and socio-economic sciences; to integrate knowledge and

address complex issues, and to formulate judgements on the basis of insufficient or limited information; to communicate one's conclusions and knowledge clearly and unambiguously, with sound justification, to specialist and non-specialist audiences.

General competencies (GC):

GC 01. Commitment to preserving the environment.

GC 02. Ability for abstract thinking, analysis and synthesis.

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

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

GC 05. Ability to communicate in the state language both orally and in writing; ability to communicate in a foreign language (preferably English) at a level that ensures effective professional activity.

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

GC 07. Ability to choose a communication strategy; ability to work in a team and with experts from other fields of knowledge/types of economic activity.

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

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

Special (professional, subject-specific) competencies (SC):

SC 01. Ability to collect, interpret and apply the data needed for professional activity, research and the implementation of innovation projects in the field of pharmacy.

SC 02. Ability to integrate knowledge and solve complex problems of pharmacy in broad or multidisciplinary contexts.

SC 06. Ability to communicate one's own knowledge, conclusions and arguments in the field of pharmacy clearly and unambiguously to specialists and non-specialists, including those who are studying.

2. LEARNING OUTCOMES

Upon successful completion of the academic discipline, the student will be able to:

Integrative final programme learning outcomes (PLOs) promoted by the elective course:

PLO 01. To apply specialised knowledge and skills from general and professional disciplines in professional activity.

PLO 02. To critically consider scientific and applied problems in the field of pharmacy.

PLO 03. To assess and ensure the quality and effectiveness of activity in the field of pharmacy.

PLO 06. To communicate professionally in the state language; to use oral communication skills in a foreign language, analyse texts of a professional nature and translate foreign-language information sources.

PLO 12. To promote the preservation of health, including the prevention of disease and the rational prescription and use of medicinal products. To perform professional duties conscientiously and to comply with legislation on the promotion and advertising of medicinal products. To possess the psychological communication skills needed to achieve trust and mutual understanding with colleagues, doctors, patients and consumers.

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

Type of Learning Activity	Hours
Lectures:	14
Practical Classes:	16
Independent Study (IS):	60
Total	90

4. THEMATIC PLAN

№	Module and Topic Titles
Module 1 “Molecular Foundations of Heredity and Variability and Selected Issues of Modern Gene Technologies”	
Content Module 1 “Molecular Foundations of Heredity”	
1	Molecular biology: subject and objectives. Structure of DNA and RNA, their functions and properties. Molecular mechanisms of DNA replication, recombination and repair.
2	Molecular structure of the gene. Structure of the genomes of viruses, prokaryotes and eukaryotes.
3	Regulation of gene expression.
Content Module 2 “Molecular Foundations of Hereditary Diseases”	
4	Regulation of the cell cycle. Fundamentals of oncogenetics.
5	Molecular mechanisms of gene, chromosomal and genomic mutations.
Content Module 3 “Modern Issues of Gene Technologies”	
6	Methods of studying nucleic acids. Recombinant DNA.
7	Gene therapy. Transgenic organisms.
8	Cloning of cells and organisms.

5. FORMS AND METHODS OF ASSESSMENT OF LEARNING OUTCOMES

Ongoing Assessment during Practical Classes	Methods: oral or written assessment and testing, computer-based assessment and testing, solving 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: <u>General Information / Key Documents</u> https://www.vnmdu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf
*Final Assessment of the Academic Discipline – Graded Pass	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: <u>General Information / Key Documents</u> https://www.vnmdu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf
Final Assessment – Examination	It is conducted during the examination session according to the examination schedule and is assessed in accordance with the Regulations on the Organisation of the Educational Process at National Pirogov Memorial Medical University, Vinnytsia: <u>General Information / Key Documents</u> or <u>Regulations on the Organisation of the Educational Process</u> https://www.vnmdu.edu.ua/downloads/other/polog_organiz_ocv_proc(2026).pdf
Assessment Tools for Learning Achievement	Theoretical questions, tests, 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.vnmdu.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmdu.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

Assessment of Practical Skills	According to the traditional grading scale
Pass/Fail Assessment	According to the 200-point scale (the arithmetic mean of the grades obtained during the semester is converted into points). Passed: 122–200 points. Failed: fewer than 122 points.
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.

For specialties within Field of Study I "Healthcare and Social Security", students are required to wear a medical coat during practical classes. Students who fail to comply with this requirement are not admitted to the class.

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 **Department of Pharmacy**). When completing practical assignments, students must keep their workstations clean and orderly and leave them tidy upon completion of the practical work.

While at clinical training sites, students are required to comply with the established therapeutic and protective regime and sanitary and hygiene requirements. Where quarantine restrictions are introduced at a healthcare institution, strict compliance with all applicable requirements is mandatory.

When entering inpatient departments, students must wear a medical coat, cap, and change of footwear. Students must also have a medical mask, gloves, and hand sanitiser with them. Bringing outdoor clothing, outdoor footwear, or bulky personal belongings into inpatient departments is not permitted. Students are strictly prohibited from handling any medical devices, equipment, or instruments without the instructor's permission.

When communicating with patients and their relatives, as well as outside the healthcare institution, students are required to observe ethical and deontological principles and comply with applicable legislation concerning the confidentiality and protection of information. The disclosure or dissemination of patients' medical or personal information by any means, including through social media, verbal communication, or otherwise, is strictly prohibited.

In interactions with healthcare personnel and during discussions as part of the educational process, students are expected to adhere to the principles of tolerance, courtesy, and mutual respect. Inappropriate, disrespectful, or provocative behaviour is not permitted.

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.vnmua.edu.ua/downloads/other/polog_organiz_ocv_proc\(2026\).pdf](https://www.vnmua.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 **Department of Pharmacy (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 → Department of Pharmacy → 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](#) → [Department of Pharmacy](#) → [For Students/Postgraduate Students](#).

LITERATURE

Core Literature for Current Issues in Molecular Biology:

1. Brown, T. A. (2025). *Gene Cloning and DNA Analysis: An Introduction*. 9th ed. Wiley. Publisher
2. Brown, T. A. (2023). *Genomes 5*. 5th ed. CRC Press. Publisher
3. Alberts, B., Heald, R., Johnson, A., Morgan, D., Raff, M., Roberts, K., and Walter, P. (2022). *Molecular Biology of the Cell*. 7th ed. W. W. Norton & Company. Publisher

Supplementary Literature for Current Issues in Molecular Biology:

1. Cohn, R., Scherer, S., and Hamosh, A. (Eds.). (2024). *Thompson & Thompson Genetics and Genomics in Medicine*. 9th ed. Elsevier. Publisher
2. Pierce, B. A. (2024). *Genetics: A Conceptual Approach, Update*. 7th ed. Macmillan Learning. Publisher
3. Weinberg, R. A. (2023). *The Biology of Cancer*. 3rd ed. W. W. Norton & Company. Publisher

ELECTRONIC RESOURCES

University website: [National Pirogov Memorial Medical University, Vinnytsya](#)

Department website: [VNMU Departments](#) — **Department of Pharmacy**

University Library website: [VNMU Library](#)

National Scientific Medical Library of Ukraine: [National Scientific Medical Library of Ukraine](#)

World Health Organization: [World Health Organization \(WHO\)](#)

Ministry of Health of Ukraine: [Ministry of Health of Ukraine](#)

Public Health Center of the Ministry of Health of Ukraine: [Public Health Center of Ukraine](#)

English-language database of medical and biomedical literature: [PubMed](#)

English-language online resource for physicians and other healthcare professionals: [Medscape](#)

Other electronic resources should be added as appropriate to the content of the discipline and the subject area of the relevant academic discipline programme.

The course syllabus for the academic discipline «Current Issues in Molecular Biology» was discussed and approved at the meeting of the Department of Pharmacy (Minutes No. 1 dated 26 August 2026).

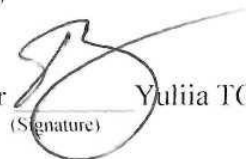
Course Coordinator:
Doctor of Biological Sciences, Professor



(Signature)

Viktoriia RODINKOVA

Acting Head of the Department of Pharmacy:
Candidate of Pharmaceutical Sciences, Associate Professor



(Signature)

Yuliia TOMASHEVSKA