

National Pirogov Memorial Medical University, Vinnytsya

"APPROVE"


Higher Educational Institution
Vice-Rector for Scientific and Academic Work
and International Links


Inna ANDRUSHKO

" 30 " August 2024

"AGREED"

Head of Department
Associate professor of HEI


Viktoria PILIPONOVA

" 29 " August 2024

SYLLABUS
of academic discipline
«Pathological physiology»

| | |
|-----------------------|---|
| Specialty | 226 Pharmacy, Industrial Pharmacy |
| Educational level | the second (master`s) level |
| Educational programme | EPP «Pharmacy, industrial pharmacy», 2023 |
| Academic year | 2024-2025 |
| Department of | Pathophysiology |
| Lecturer | Associate Professor of HEI Viktoriia PILIPONOVA, associate professor of HEI Arina IVANITSA |
| Contact information | <i>pathophysiology@vnmnu.edu.ua,</i> <i>56 Pyrogov Street (morphological building),</i> <i>(0432)570379</i> |
| Syllabus compiler | Associate Professor of HEI Arina IVANITSA |

1. Status and structure of the discipline

| | |
|--|--|
| Discipline status | Compulsory |
| Discipline code in EPP/ discipline place in EPP | EC 17, the cycle component of general practice |
| Course / semester | 3rd year (V-VI semesters) |
| The amount of discipline (the total number of hours / number of credits ECTS) | 120 hours /4 credits ECTS |
| Number of content modules | 2 modules |
| The structure of the discipline | Lectures - 30 hours Practical classes - 50 hours Independent work - 40 hours |
| Language of study | Ukrainian, English |
| Form of study | Full-time (with the introduction of quarantine measures - distance full-time) |

2. Description of the discipline

Short annotation of the course, relevance

Pathological physiology is a science that determines the vital activity of a sick organism, the general laws of the onset, development and completion of a disease. The main objective of the pathophysiology course is to teach students to understand the importance of pathophysiology and its place in the system of medical knowledge; an idea of the modern direction of development of pathophysiological science; understand the perspectives of the experimental method in the study of pathological processes; to apply theoretical knowledge of cellular pathophysiology in the study of the etiology and pathogenesis of diseases, functional systems; draw conclusions about the causes and mechanisms of functional, structural disorders of organs and systems; to combine the achievements of clinical research and modern experimental approaches to solve topical issues of the etiology and pathogenesis of diseases.

Prerequisites - pathophysiology has several types of connections with other sciences, in particular, with sciences that study the properties of environmental factors that can cause disease (physics, chemistry, biology, microbiology, sociology). These sciences provide the information needed to study the etiology. For example, as far as physics is concerned, in practical classes on pathophysiology on the topic "Pathogenic action of environmental factors", the mechanisms of the pathogenic action of ionizing radiation are studied, the influence of which on the body is of great importance.

Pathological physiology is associated with the sciences that study the properties of the organism and its vital functions (cytology, embryology, histology, normal physiology, biochemistry, immunology, genetics). These sciences form the basis for the study of the pathogenesis of the disease. Pathophysiology is associated with general theoretical sciences that study diseases (pathological anatomy, pharmacology). Pathophysiology has links to clinical sciences. Pathological physiology determines the main etiological and pathogenetic principles of prevention, diagnosis and treatment of diseases.

The purpose of the course and its significance for professional activity is the formation of deep theoretical knowledge and practical skills to understand the basic concepts of general

nosology, the role of destructive and compensatory phenomena in disease development, analysis of pathological processes and their patterns, assessment of harmful effects and disease prevention.

Postrequisites - pathological physiology, being the scientific basis of medicine, its philosophy, establishes the etiology and pathogenesis of the disease and on this basis determines the main directions of their prevention and treatment. The study of pathophysiology is one of the key points in the further study of clinical disciplines.

3. Results of discipline training

- Application of knowledge of general and professional disciplines in professional activities.
- Using the results of independent search, analysis and synthesis of information from various sources to solve typical problems of professional activity.
- Argumentation of information for decision-making, responsibility for them in standard and non-standard professional situations based on the principles of deontology and ethics in professional activities.
- Implementation of professional communication in modern Ukrainian literary language, use the skills of oral communication in a foreign language, analyzing texts of professional orientation and translate foreign language information sources.
- Implementation of professional activities using information technology, "Information Databases", navigation systems, internet resources, software, other information and communication technologies.
- Use of methods for assessing performance indicators; identify reserves to increase labor efficiency.
- Analysis of the information received as a result of scientific researches, to generalize, systematize and use it in professional activity

4. Content and logistics of the discipline

| | | |
|--|--|---|
| Module 1 General pathology | 5th semester 60 hours / 2.0 credits | Lectures № 1-6 Practical classes №1-11 Topics for self- study № 1-8 |
| Module 2 Pathophysiology of organs and systems | 6 semester 60 hours / 2.0 credits | Lectures № 7-15 Practical classes №12-25 Topics for self- study № 1-7 |

The discipline includes 25 topics, which are divided into 2 thematic modules.

Module 1. General pathology

Content module 1. "General nosology".

Topic 1 Subject and tasks of pathophysiology. General doctrine of disease, etiology and pathogenesis.

Topic 2. Pathogenic action of physical factors (mechanical factor, ionizing radiation, reduced and increased barometric pressure, thermal factor, chemical factors).

Topic 3. Violation of immunological reactivity. Allergy. Immunodeficiency.

Content module 2. "Typical pathological processes"

Topic 4. Local circulatory disorders.

Topic 5. Inflammation.

Topic 6. Fever. Alimentary starvation.

Topic 7. Pathology of tissue growth. Tumors.

Content module 3. Typical metabolic disorders.

Topic 8. Disorders of carbohydrate metabolism. Disorders of fat and protein metabolism.

Topic 9. Disorders of water-electrolyte metabolism. Disorders of vitamin metabolism.

Topic 10. Violation of acid-base balance.

Topic 11. Control of practical skills №1: "General pathology".

Module 2. Pathophysiology of organs and systems.

Content module 4. Pathophysiology of the blood system

Topic 12. Pathophysiology of the blood system. Qualitative and quantitative changes in erythrocytes. Posthemorrhagic, hemolytic anemias and anemias caused by erythropoiesis disorders.

Topic 13. Leukocytosis, leukopenia. Leukemia. Analysis of hemograms.

Topic 14. Violation of physicochemical properties of blood and hemostasis system. Analysis of hemograms.

Content module 5. Pathophysiology of the cardiovascular and respiratory systems

Topic 15. Circulatory failure, classification. Heart failure. Pathophysiology of blood vessels.

Topic 16. Pathophysiology of external respiration. Respiratory failure. Hypoxia.

Content module 6. Pathophysiology of digestion, liver, kidneys

Topic 17. Pathophysiology of the digestive system. PC offset.

Topic 18. Pathophysiology of the liver.

Topic 19. Pathophysiology of the kidneys. Analysis of urograms

Content module 7. Pathophysiology of endocrine, nervous systems and extreme conditions

Topic 20. Pathophysiology of the endocrine system.

Topic 21. Pathophysiology of the nervous system and extreme conditions.

Topic 22. Control of practical skills №2: "Pathophysiology of systems and organs".

Topic 23. Control of practical skills №3: Test control for the year.

The topics of the lecture course reveal the problematic issues of the relevant sections of pathophysiology.

Practical classes include:

1. Research by students of the state of physiological functions and changes in the relevant parameters under conditions pathology on the basis of experiments recorded in videos, movies presented in computers programs and other educational technologies;

2. Solving situational problems (analysis and interpretation of homeostasis parameters, indicators activities of organs and systems, mechanisms of their regulation, etc.), which has a clinical and diagnostic and prognostic direction.

Assimilation of the topic is controlled in practical classes in accordance with specific objectives.

It is recommended to use the following tools to diagnose the level of preparation of students:

- survey of students,
- use of tests,
- solving situational problems

The student's independent work provides preparation for practical classes and intermediate tests, study of topics for independent extracurricular work, writing essays, preparation of presentations, tables. The control of mastering the topics of independent extracurricular work is carried out at the intermediate control classes and the final control of the discipline.

Individual work includes the study of scientific literature, preparation of reviews on the topics provided for presentation at the meetings of the student scientific circle, the implementation of scientific and practical researches, participation in specialized competitions, scientific and practical conferences.

Thematic plans of lectures, calendar plans of practical classes, thematic plan of independent extracurricular work, volume and directions of individual work are published on the website of the department.

The route for obtaining materials: Department pathophysiology / for students / Full-time education / Pharmacy / 3course / Educational materials / or through the link <https://www.vnmu.edu.ua/en/department/pathophysiology>. Access to the materials is carried out through the student's corporate account s000XXX@vnmu.edu.ua

5. Forms and methods of monitoring academic performance

| | |
|---|---|
| Current control in practical studies | Methods: performed in a practical lesson according to the specific objectives of each topic. The level of preparation of students: is determined on the basis of test results, written or oral answers to control questions, solving situational problems, interpreting the results of experimental and clinical and laboratory research, control of practical skills and filling out a workbook. The student's knowledge of the topic and a certain section is assessed by the traditional assessment (5-point system) according to the "Regulations on the organization of the educational process in National Pirogov Memorial Medical University." |
| Control of mastering the thematic section of the discipline at intermediate control lessons | Methods: performed at the end of the final lesson "Practical skills" by checking the possibility of students using for clinical and diagnostic analysis of theoretical knowledge and practical skills on all topics of the content module, as well as the results of independent work of students. Performed in the last lesson of the content module by solving clinically oriented situational problems and testing. The score for the current control of individual modules is set as the arithmetic mean for answering situational tasks and test tasks |
| Intermediate control | Methods: the assessment of the discipline is carried out in the form of a test after the V semester. Intermediate control is credited if the |

| | |
|-----------------------------------|---|
| | student has mastered a certain section of the discipline in full, as evidenced by the current assessment of each practical lesson and lecture course (according to the regulations on the organization of the educational process in National Pirogov Memorial Medical University (link https://www.vnmu.edu.ua /General information / Basic documents)) |
| Final control the discipline | Methods: mastering the discipline is carried out in the form of an exam after the VI semester during the semester session on the basis of an oral answer to the questions in the exam ticket (list of questions is given in Addition 1), solving situational problems and pre-examination testing (according to the regulations on the organization of the educational process in National Pirogov Memorial Medical University (link https://www.vnmu.edu.ua /General information / Basic documents)) |
| Learning success diagnostic tools | Theoretical questions, tests, clinically-oriented situational tasks, practical tasks, demonstration of practical skills |

6. Assessment criteria

Knowledge assessment is carried out in accordance with the Regulations of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link <https://www.vnmu.edu.ua>/General information/Basic documents)

| | |
|---------------------------------|--|
| Continuous assessment | On a four point system of traditional assessments: 5 «excellent», 4 «good», 3 «satisfactory», 2 «unsatisfactory» |
| Midpoint separation assessment | On a four-point system of traditional assessments |
| Control of practical skills | According to the four-point system of traditional assessments |
| Pass-fail exam | On a 200-point scale (the arithmetic average grade for the semester is converted into points) Credited: 120 to 200 points Not credited: less than 120 points (See Grading Scale) |
| Final control of the discipline | <i>Sum of points for pre-examination testing (12-20 points) and oral questioning (38-60 points) (for disciplines included in Step 1,2)</i> Exam grade: 71-80 points - "excellent" 61-70 points - "good" 50-60 points - "satisfactory" Less than 50 points - "unsatisfactory" / did not pass |
| Discipline assessments: | Current academic assessment - from 72 to 120 points (conversion of the average traditional assessment of practical class on a 120-point scale): 60% of the grade for the discipline Final control - from 50 to 80 points: 40% of the grade for the discipline |

| | |
|--|---------------------------------------|
| | Individual work - from 1 to 12 points |
| | Total - from 122 to 200 points |

Discipline Score Scale: National and ECTS

| The sum of grades for all types of educational activities | Score ECTS | Score on a national scale | |
|---|------------|---|--|
| | | For exam, course project (work), practice | for credit test |
| 180-200 | A | excellent | credited |
| 170-179,9 | B | good | |
| 160-169,9 | C | | |
| 141-159,9 | D | satisfactory | |
| 122-140,99 | E | satisfactory | |
| 0-121,99 | FX | unsatisfactory with the possibility of reassembly | is not credited with the possibility of reassembling |
| | F | unsatisfactory with a mandatory reexamination of discipline | is not credited with mandatory reexamination of discipline |

Criteria for assessing the acquisition of theoretical knowledge and practical skills during the current, intermediate and final control

Assessment of the oral / written answer during the current control

The grade **"excellent"** is given to a student who has deeply, 90-100% mastered the program material, competently and logically teaches it, who has managed to relate general theoretical positions to specific pathological processes, while changing the wording of the task does not cause difficulties with the answer. The student skillfully applies the theoretical provisions in solving problems, substantiating the results of experiments. Along with a deep knowledge of the textbook material and lectures, the student shows acquaintance with additional literature. When solving the tests, the student not only names the correct answer, but also correctly justifies it.

Grade **"good"** is given to a student who firmly, 70-90% knows the program material, competently and significantly teaches it. When solving problems and substantiating the results of experiments correctly uses theoretical positions, has practical skills, knows the mechanisms of development of major syndromes, is able to establish causal relationships.

The grade **"satisfactory"** is given to a student who knows only the basic material (40-70%), allows inaccuracies in the wording and has not mastered the details. He has difficulties in applying theoretical provisions in the interpretation of experimental research data and clinical and pathophysiological problems, who has not sufficiently mastered practical skills. When solving test problems, he calls the washing answer without the possibility of a thorough explanation.

Assessment of **"unsatisfactory"** is given to a student who does not know the basic issues of the program material, makes significant mistakes, poorly oriented in the data of experiments and clinical and pathophysiological problems, who has not mastered the basic practical skills

Assessment of practical skills during the current control

The grade **"excellent"** is given to the student who, knows the course and sequence of experimental and clinical-laboratory researches at performance of independent practical work,

demonstrates correct performance of necessary practical skills, and correctly with accurate formulations of generalizations and conclusions, draws up the report.

The grade **"good"** is given to a student who admits inaccuracies in the performance of experimental and clinical and laboratory research, but is able to identify errors and can demonstrate the implementation of practical skills in general, accurately draws up research results in the protocol of practical training.

Assessment **"satisfactory"** is given to a student who knows the basics of the practical task, but has difficulty performing experimental and clinical and laboratory studies, can not demonstrate the correct sequence of practical skills, can not fully interpret the results of research, sloppy protocol.

The grade **"unsatisfactory"** is given to the student who cannot demonstrate performance of practical skill, experiences considerable difficulties at performance of experimental and clinical and laboratory researches, breaks the order of performance of practical work, does not register a course of work in the protocol.

Assessment of test tasks during the current control

The grade **"excellent"** is given to the student who at carrying out test control is allowed no more than 10% of incorrect answers (correct answers 90-100%). Provides correct answers to all test questions when solving clinically-oriented test tasks.

A grade of **"good"** is given to a student who makes no more than 20% of mistakes during the test. (correct answers 80-89%). Provides the correct answers to most test questions when solving clinically-oriented test tasks.

The grade **"satisfactory"** is given to the student who makes mistakes in no more than 30% of test tasks (correct answers is 70.5-79%). When solving clinically-oriented test tasks, it provides the correct answers to only a few questions to the test.

A grade of **"unsatisfactory"** is given to a student who correctly solves less than 70% of the test tasks in a test. He cannot provide the correct answers to the test questions when solving clinically oriented test tasks.

Assessment of intermediate control

The final semester test is carried out upon completion of the study of module I at the last practical lesson.

Semester control in the form of credit is set to 30, if students who have attended all the classes provided by the curriculum and during the study of the module scored the number of points not less than the minimum (122 points) are credited. Students who did not complete the program of the first module, namely: did not complete the missed classes, received less than 122 points, will not be credited.

Assessment of independent student work

The student's independent work is assessed during the final classes of mastering the modules of the discipline by oral questioning or solving test tasks on topics that are not included in the classroom plan. Evaluation of prepared messages, presentations on the selected topic is carried out by traditional evaluation.

The grade **"excellent"** is given to a student who has deeply and comprehensively revealed the problem, logically stated the main issues, gave examples from modern medical information sources. He is able to connect the material of this topic with the previously studied sections,

which demonstrates the ability to analyze the studied material, as well as clearly demonstrates the importance of the acquired theoretical knowledge for practical medicine.

Grade **"good"** is given to a student who knows and has a good theoretical material, competently revealed the main issues of the topic and its medical significance, but did not go beyond the textbook, guidelines.

A grade of **"satisfactory"** is given to a student who has revealed the basic concepts and definitions of the recommended topic, but has not fully disclosed it, does not understand the medical aspects of the topic, can not relate theoretical material to practice.

Assessment of individual student work

It is carried out on the basis of individual tasks, scientific and practical work, reports on the results of research at the student scientific circle, conferences, participation in the competition of student research papers, Olympiads in the discipline, making diagrams, tables, multimedia and videos.

Regulations on the organization of the educational process at National Pirogov Memorial Medical University. The number of points depends on the volume and significance of the work, but is not more than 12 points in total:

- prizes in the second round of the All-Ukrainian Olympiad in the discipline, interuniversity and international conferences - 12 points
- prizes in the first round of the All-Ukrainian Olympiad in the discipline and intra-university conferences - 11-10 points
- participation without a prize in the second round of the All-Ukrainian Olympiad in the discipline, interuniversity and international conferences - 10 points
- participation without a prize in the first round of the All-Ukrainian Olympiad in the discipline and intra-university conferences - 6-8 points
- creation of additional visual materials for the department - 6 points.

Assessment of the oral answer during the final control (exam)

A grade of **"excellent"** is given to a student who has fully answered all theoretical questions, which is not less than 81%, competently and logically teaches material that has managed to relate general theoretical provisions to specific pathological processes, while changing the wording of the problem does not cause difficulties. The student skillfully applies theoretical principles in solving problems. Along with a deep knowledge of the textbook material and lectures, the student shows acquaintance with additional literature.

The grade **"good"** is given to a student who correctly answers 61-80% of the ticket questions, knows the program material, teaches it competently and significantly. When solving problems correctly uses theoretical provisions.

The grade **"satisfactory"** is given to a student who knows only the basic material, which is at least 51-60%, allows inaccuracies in the wording and has not mastered the details. Experiencing difficulties in applying theoretical provisions in substantiating clinical and pathophysiological problems.

The grade **"unsatisfactory"** is given to the student who does not know the basic questions of a program material, makes essential mistakes, is badly guided in the decision of clinical and pathophysiological problems.

7. Discipline / course policy

The student has the right to receive quality educational services, access to modern scientific and educational information, qualified counseling during the study of the discipline and the acquisition of practical skills. The policy of the department during the provision of educational services is student-centered, based on regulations of the Ministry of Education and the Ministry of Health of Ukraine, the university charter and the procedure for providing educational services, regulated by the main provisions of the educational process at National Pirogov Memorial Medical University integrity.

Compliance with the rules of the VNMU routine, safety techniques in practical classes and rules of behavior during the "Air alarm" signal or other warning signals.

Instruction on biological safety techniques, safety of handling chemical reagents and burners is conducted at the first practical session by the teacher. Conducting the briefing is registered in the Journal of briefing on safety techniques. A student who has not been instructed is not allowed to perform practical work.

During the arrival of the signal "Air alarm" and other warning signals, the teacher who conducted the class must interrupt the class and proceed in an organized manner with the students to the shelter of civil defense and stay until the signal is canceled. The teacher should inform the students about further actions after canceling the signal: continue the lesson and recommend to independently complete the material with a subsequent survey in the next lesson.

Observance of National Pirogov Memorial Medical University regulations, safety measures at practical classes. Safety instruction is given at the first practical lesson by the teacher. The briefing is recorded in the Safety Instruction Log. A student who has not been instructed is not allowed to perform practical work.

Requirements for preparation for practical classes. The student should be prepared for a practical lesson, test tasks for the current topic should be solved in a workbook, diagrams and tables are filled.

You should come to class on time, without delay. A student who is more than 10 minutes late for class is not allowed to the last and must work it in the prescribed manner.

In practical classes, the student must be dressed in a work uniform (medical gown, hat). Students who do not have a work uniform are not allowed to study.

The student must follow the safety rules in practical classes and during the stay in the department.

When discussing theoretical issues, students should demonstrate tolerance, courtesy and respect for their colleagues and the teacher; when performing practical tasks, the workplace should be kept in order and cleaned after the practical work.

Usage of mobile phones and other electronic devices. The use of mobile phones and other electronic devices in the classroom is allowed only during electronic testing or surveys.

Academic integrity. During the study of the discipline the student must be guided by the Code of Academic Integrity of National Pirogov Memorial Medical University (<https://www.vnmua.edu.ua/general-information/basic-documents/code-of-academic-integrity>). In case of violation of the norms of academic integrity during the current and final controls, the student receives a grade of "2" and must work it out to his teacher in the prescribed manner within two weeks after receiving an unsatisfactory grade.

Missed classes are practiced in the manner prescribed by the Regulations on the organization of the educational process in National Pirogov Memorial Medical University (link

<https://www.vnmu.edu.ua/> General information / Basic documents) at the time specified in the schedule of exercises (published on the website of the department <https://www.vnmu.edu.ua/> department of pathophysiology) to the next teacher. To complete the missed lesson, the student must provide a completed workbook protocol on the relevant topic, take a test and answer questions in writing or orally to the topic of the lesson. The practice of missed lectures is carried out after the presentation of the lecture material and by an oral interview.

The procedure for admission to the discipline final control on the discipline set out in the Submission on the organization of the educational process in National Pirogov Memorial Medical University (link <https://www.vnmu.edu.ua/> General information / Basic documents). Students who have not missed missed practical classes and lectures and received an average traditional grade of at least "3" are admitted to the final control.

Additional points. Individual points in the discipline the student can get for individual work, the amount of which is published on the website of the department in educational materials of the discipline, the number of points is determined by the results of IRS according to the Regulations on the organization of educational process in National Pirogov Memorial Medical University (link <https://www.vnmu.edu.ua/> General information / Basic documents).

Conflict resolution. In the event of misunderstandings and complaints to the teacher due to the quality of educational services, assessment of knowledge and other conflict situations, the student must report their claims to the teacher. If the conflict issue is not resolved, the student has the right to submit an appeal to the head of the department according to the Regulations on consideration of appeals of applicants for higher education in National Pirogov Memorial Medical University (<https://www.vnmu.edu.ua/> General information / Main documents).

Politics in terms of remote learning. The order of distance learning is regulated by the Regulations on the introduction of elements of distance learning in National Pirogov Memorial Medical University (<https://www.vnmu.edu.ua/> General information / Basic documents). The main training platforms for training are Microsoft Team, Google Meets. The procedure for conducting practical classes and lectures, exercises and consultations during distance learning is published on the website of the department (<https://www.vnmu.edu.ua/> Department of Pathophysiology / Student or <https://www.vnmu.edu.ua/> Department of Pathophysiology / News).

Feedback from the teacher is via messengers (Viber, Telegram, WhatsApp) or e-mail (at the teacher's choice) during business hours.

8. Training resources

Educational and methodological support of the discipline is published on the website of the department (<https://www.vnmu.edu.ua/> Department of Pathophysiology / Student). Consultations are held twice a week according to the consultation schedule.

1) Basic literature:

1. General nosology. Manuals for the students. – Vinnitsia, 2021.
2. Handbook of general and Clinical Pathophysiology/ Edited by prof. A.V.Kubyshev, CSMU, 2017.
3. Pathophysiology : textbook / N.V. Krishtal, V.A. Mikhnev, N.N. Zayko et al. ; edited by N.V. Krishtal, V.A. Mikhnev. — 3rd edition. — Kyiv : AUS Medicine Publishing, 2019. — 656 p.

2) Additional literature:

1. Alberts B. Molecular biology of the cell /B.Alberts.-6th ed.-Garland Science, 2015.- 1464p.

2. Damjanov, Ivan. Pathophysiology: textbook/ I.Damjanov.-1st ed.-Philadelphia:Elsevier, 2009.-464p.
3. Kumar V.Robbins and Cotran Pathologic Basis of Disease. Vol. I.V.Kumar, A.K.Abbas,J.C.Aster. – India: Elsevier, 2014.-1391 p.
4. Kumar V.Robbins and Cotran Pathologic Basis of Disease. Vol. I.V.Kumar, A.K.Abbas,J.C.Aster. – India: Elsevier, 2015.-1391 p.
5. Mohan Harsh. Textbook of pathology/ - 6 th ed.-New Delhi: Jaypee Brothers Medical Publishers Ltd, 2010-933p.
6. Pathophysiology: The Biologic Basis of Disease in Adults and Children /ed.by K.L.McCance, S.E.Huether.- 7th ed. Mosby,2014.-1840 p.
7. Porth C.M. Pathophysiology: Concepts of Altered Health States. – LippincottWilliams &Wilkins; Seventh Edition USA. - 2004. – 1616 p.
8. Simeonova N. K. Pathophysiology=Патофізіологія: textbook for students of higher medical educational institutions of the III-IV accreditation levels / N.K. Simeonova; ed. by V. A.Mikhnev. – 2nd ed. – Kyiv: AUS Medicine Publishing, 2015. – 544 p.

3) Electronic resources:

1. The site of the University of National Pirogov Memorial Medical University:
<http://www.vnmu.vn.ua/>

2. The site of the Department of Pathophysiology of National Pirogov Memorial Medical University:

<http://pathophysiology.vnmu.edu.ua/>

1. Library site (library.vnmu.edu.ua)

www.ExamConsult.co.uk

www.medicalstudent.com

www.pathguy.com

www.bloodline.net

www.tdmu.edu.ua

<http://libr.krmu.kharkov.ua>

<http://www.librare.gov.ua>

<http://nbuv.gov.ua>

<http://comp-doctor.ru>

<https://nmapo.edu.ua>

<http://www.medbioworld.com>

<http://roar.eprints.org/>

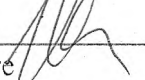
<http://www.sciencekomm.at/>


<http://testcentr.org.ua/>

9. The schedule and distribution of groups by teachers is published on the web page of the department (<http://www.vnmu.edu.ua/> Department of Pathophysiology / Student).

10. Questions to the intermediate and final controls of the discipline are published on the web page of the department (<https://www.vnmu.edu.ua/> Department of Pathophysiology / Student).

The syllabus of the discipline «Pathophysiology» was discussed and approved at the meeting of The department Pathophysiology (record №1, from «29» August 2024)

Responsible for the academic discipline  Ass-prof., of HEI Arina IIVANITSA
signature

Head of the department  Associate professor of HEI Viktoria PILIPONOVA