

Vinnitsya National Pirogov Memorial Medical University

"Approved"

Vice-chancellor for Academic Affairs

 prof. Y. J. Guminskiy

"31th" of august 2020 year

"Agreed "

Head of social medicine and health care  
organization department

 prof. Ocheredko O.M.

"27th" of august 2020 year

**SYLLABUS**  
**of academic discipline**  
**ES 12 "BIOSTATISTICS"**

Specialty	222 Medicine
Educational level	the second (master`s) level
Educational program	"Medicine", 2020
Academic year	2020-2021
Chair	Social medicine and public health
Lecturer	Prof. Ocheredko O.M.
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Compiled Syllabus	Prof. Ocheredko O.M.

## 1. Status and structure of the discipline

Discipline status	Optional.
Discipline code in EPP/ discipline place in EPP	ES 12, discipline of general training or professional training
Course / semester	4th year (VIII semesters)
The amount of discipline ( the total number of hours / number of credits ECTS)	30 hours / 1.0 ECTS credits
The structure of the discipline	Lectures - not provided by the program Practical classes - 10 hours Independent work -20 hours
Number of content modules	1
Language of study	English
Form of study	Full-time ( <i>or remote full-time by order</i> )

## 2. Description of the discipline

**Brief annotation of the course, relevance** Biostatistics is an important part of the discipline "Social Medicine and Public Health", which focuses on students' knowledge of the formation of statistical aggregates, statistical observations, formulation and testing of statistical hypotheses, research, analysis and evaluation of public health indicators parametric and nonparametric methods, the use of various methods of statistical processing of data from the standpoint of evidence-based medicine, the formation of practical skills and abilities to calculate and analyze indicators of public health and the work of treatment and prevention facilities.

**Prerequisites.** For successful mastering of discipline the student needs the knowledge received in the course of studying of the following disciplines of the general preparation: social medicine in the context of measurements of population and individual health, characteristic shifts due to the peculiarities of registration related to human health; biophysics and higher mathematics course; medical informatics and computer technologies;

**The purpose of the course and its significance for the professional activity** of mastering the theoretical foundations, modern principles of evidence-based medicine and the theoretical foundations of biostatistics ; definition and analysis of basic biostatistical indicators and criteria; mastering the methodological and theoretical foundations of the formation of statistical aggregates for further adequate analysis; the ability to evaluate the results of the analysis according to individual criteria and in relation to the factors that affect them; understanding of modern concepts and methods of data analysis, materials and methods presented in scientific publications on the chosen topic / specialization.

**Postrequisites.** In the process of studying the discipline, the knowledge necessary for the successful mastering of the disciplines of professional training is acquired, namely:

health economics in the context of the peculiarities of the economic dimensions of society processes and features of data organization; epidemiology in the context of measurements of population processes and information collection plans; health care organizations in the context of subject theories (eg health care activities, behavioral incentives, insurance, health planning, remuneration and reimbursement), and the legislative field of restrictions; clinical disciplines in the context of assessing the effect of methods of diagnosis and prevention of diseases and their consequences, optimizing the patient's route, the activities of the department (PHC), etc.

### 3. Learning outcomes.

After successful study of the discipline the applicant will be able to:

1. to plan, organize statistical surveys;
2. to determine the required volume and methods of statistical processing of research data;
3. to calculate and use various statistical indicators, parameters of statistical aggregates;
4. to evaluate probability of the results;
5. to form a statistical population and for their further adequate analysis;
6. to find statistical regularities, formulate and test the statistical hypotheses and;
7. to identify strategies for finding medical information;
8. to determine the methods of graphical representation of the results of statistical analysis.

### 4. Content and logistic of the discipline

<b><i>Module 1. Introduction to biostatistics . Epidemiological studies and their analysis.</i></b>	4th semester 30 hours / 1.0 credit	Practical classes №№ 1-5 Topics for self-study №№ 1- 7
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The discipline includes 5 topics, which are included in 1 thematic module .

#### **Content module 1. Introduction to biostatistics . Epidemiological studies and their analysis.**

Topic 1. Methodical bases of organization and planning of statistical researches. Data types. Methods of collecting statistical material. Compilation of statistical research programs. Methods of generalization of statistical data: the use of absolute values for practical and scientific purposes.

Topic 2. Methods of generalization of statistical data in relative quantities, their essence, types, methods of calculation. Time series and their analysis. Graphical representation of data: modern methods of graphic representation, types of diagrams, rules of their construction. Average values (M), methods of their calculation and evaluation according to mandatory criteria, indicators of variation. The value of derivatives in practical medicine and research.

Topic 3. Parametric (mean error, Student's test) and nonparametric (Mann-Whitney, Hee-square test, Fisher's, etc.) methods of probability estimation. The concept of the null hypothesis. Test the statistical hypothesis. Errors of the first and second kind. Characteristics and analysis of statistical errors. Formation and statistical processing of sample sets of non-parametric content, the order of their use in scientific and practical statistical information.

Topic 4. Correlation (linear and rank correlation coefficients) and regression relationships of different groups of phenomena being studied, their statistical processing and reliability assessment. Strength and direction of communication. Methods of standardization, types. Characteristics of the stages of the direct method of standardization. The practical significance of the method of standardization, evaluation of standardized indicators.

Topic 5. Epidemiological studies in health care, their classification. Design of epidemiological studies: case-control, cohort, randomized clinical trials. Indicators of absolute and relative risk, methods of their calculation and analysis. The concept of chance in epidemiological research. Indicator of the ratio of chances, methods of calculation and analysis.

Lectures are not provided by the program.

## 5. Forms and methods of monitoring learning success

Current control in practical classes	Methods: oral or written survey, testing, electronic survey, solving situational problems, conducting laboratory tests, their interpretation and evaluation of their results (registration of the protocol in the workbook)
Final control of the discipline	According to the regulations on the organization of the educational process in Vinnytsya National Pirogov Memorial Medical University (link <a href="https://www.vnmu.edu.ua/General">https://www.vnmu.edu.ua/General</a> information / Basic documents)
Tools for diagnosing learning success	Theoretical questions, tests, clinically-oriented situational tasks, practical tasks, demonstration of practical skills

## 6. Assessment criteria

Assessment of knowledge is carried out according to the Regulations on the organization of the educational process in Vinnytsya National Pirogov Memorial Medical University (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 From 122 to 200 points in total.

### Discipline assessment scale: national and ECTS

The sum of points for all types of educational activities	ECTS	National mark	
		for exam, course project (work), practice	for offset
180-200	A	exellent	credited
170-179,9	B	good	
160-169,9	C		
141-159,9	D	satisfactorily	
122-140,99	E	satisfactorily	-
120-140,99	E	-	credited
119-61	FX	unsatisfactory with the possibility of reassembly	not credited with the possibility of re-assembly
1-60	F	unsatisfactory with mandatory re-study of the discipline	not credited with mandatory re-study of the discipline

### Criteria for assessing student knowledge

#### Assessment of oral / written response during the current control

The grade "excellent" is given to a student who has deeply and comprehensively mastered the theoretical material, competently and logically teaches it. He is fluent in Latin terminology, clearly answers non-standard questions on the topic of the lesson, is able to link the material of the topic with previously studied sections, which indicates knowledge of the recommended literature and the ability to analyze the material studied, and clearly demonstrates the importance of theoretical knowledge for practice. Medicine

The grade "good" is given to a student who knows and has a good theoretical material, teaches it correctly, does not allow inaccuracies in the answer, is able to reveal the topic from the standpoint of its medical significance and practical application, but the answers do not go beyond the textbook, guidelines.

A grade of "satisfactory" is given to a student who knows the basic concepts and definitions of the studied topic, but admits significant inaccuracies or has difficulty in formulating the answer, does not understand the medical aspects of the topic, can not relate theoretical material to practice.

The grade "satisfactory" is given to a student who knows the basic concepts and definitions of the studied topic, but admits significant inaccuracies or has difficulty in formulating the answer, does not understand the medical aspects of the topic, can not relate theoretical material to practice.

The grade "unsatisfactory" is given to a student who does not know the theoretical foundations of the topic, makes gross mistakes in answering, does not understand the basic concepts and definitions, can not explain the importance of theoretical material for practical medicine.

### **Assessment of practical skills during the current control**

A grade of "excellent" is given to a student who knows the principles and sequence of practical tasks, is able to correctly calculate and evaluate public health indicators and performance indicators of health care facilities, correctly fills in medical records, demonstrates proper performance of necessary practical skills, and true with clear wording of generalizations and conclusions, draws up a protocol.

A grade of "good" is given to a student who makes inaccuracies in the practical task, but is able to identify errors and can demonstrate the performance of practical skills in general, correctly fills out medical records, accurately draws up research results in the protocol of the practical lesson.

A grade of "satisfactory" is given to a student who knows the basics of the practical task, but has difficulty in calculating and evaluating public health indicators and performance indicators of health care facilities, can not demonstrate the correct sequence of practical skills, makes mistakes in filling out medical records, can not fully interpret the results obtained, sloppily draws up a protocol.

A grade of "unsatisfactory" is given to a student who cannot demonstrate practical skills, has significant difficulties in performing practical tasks, can not correctly fill in medical records, violates the procedure for practical work, does not register it in the protocol.

### **Evaluation 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 (volume of 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. (the volume of correct answers is 70-89%). Provides correct answers to most test questions when solving clinical-oriented test tasks.

The grade "satisfactory" is given to the student who makes mistakes in no more than 40% of test tasks (the volume of correct answers is 50-69%). When solving clinically-oriented test tasks, it provides the correct answers to only some questions to the test.

A grade of "unsatisfactory" is given to a student who correctly solves less than 50% of the test tasks in a test. When solving clinical-oriented test tasks, he cannot provide the correct answers to the test questions.

The calculation of individual points is carried out on the basis of the Regulations on the organization of the educational process at of **National Pirogov Memorial Medical University, Vinnytsya** (Vinnytsia, 2020). (link <https://www.vnmu.edu.ua/general-information/main-documents>)

- 12 points, which are added to the assessment of the discipline - are added for prizes at interuniversity competitions in the discipline and interuniversity and international (foreign) scientific conferences with the availability of printed work.
- 11-10 points - are added for prizes at intra-university competitions and scientific conferences with the presence of printed work.
- 10 points - are given to the assessment of the discipline for participation (if took part, but did not receive a prize) in interuniversity competitions in the discipline and interuniversity and international (foreign) scientific conferences with the availability of printed work.
- 8 points - are added to the assessment of the discipline for participation (if took part, but did not receive a prize) in intra-university competitions, scientific conferences of the institution with the presence of printed work.
- up to 6 points - are added to the assessment of the discipline for the manufacture of diagrams, tables, multimedia and videos at the department - taking into account the importance of the work performed.

## **7. Policy training course / course**

The student has the right to receive high-quality educational services, access to contemporary scientific and educational information, qualified advisory assistance during the study of discipline and mastering practical skills. The policy of the department during the providing of educational services is a student-centered, based on normative documents of the Ministry of Education and the Ministry of Health of Ukraine, the Statute of the University and the Procedure for the Providing of Educational Services regulated by the main principles of the organization of the educational process in National Pirogov Memorial Medical University, Vinnytsya and the principles of academic integrity ( link [https://www.vnmu.edu.ua/General information](https://www.vnmu.edu.ua/General%20information)).

**Adherence to the rules of National Pirogov Memorial Medical University, Vinnytsya, safety techniques in practical classes.**

**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 rules of safety 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.** When studying the discipline, the student must be guided by the Code of Academic Integrity and Corporate Ethics of National Pirogov Memorial Medical University, Vinnytsya (link : [https://www.vnmu.edu.ua/General information/](https://www.vnmu.edu.ua/General%20information/) Code of Academic Integrity). In case of violation of the norms of academic integrity during the current and final controls 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 assessment).

**Missed classes.** Missed classes are practiced in the manner prescribed by the Regulations on the organization of the educational process in VNMU named after MI Pirogov (link [https://www.vnmu.edu.ua/ General information / Basic documents](https://www.vnmu.edu.ua/General%20information/Basic%20documents/)) at the time specified in the schedule of exercises (published on the website of the department <https://www.vnmu.edu.ua/кафедра-суспільних-наук>). to the teacher on duty. To complete the missed lesson, the student must 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 providing a synopsis of lecture material, or writing an abstract, or preparing your own presentation on the topic of missed lectures.

**The procedure for admission to the discipline final control** is given in the Regulations of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link [https://www.vnmu.edu.ua/General information](https://www.vnmu.edu.ua/General%20information/)). To the final control allowed students who do not have missed practical classes and lectures and received an average traditional grade of at least "3".

**Additional points.** Individual points in the discipline (from 1 to 12) that student can receive for individual work, the amount of which is published on the website of the department in the educational methodical materials of the discipline, the number of points is determined by the results of IRS according to Regulation of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link [https://www.vnmu.edu.ua/General information](https://www.vnmu.edu.ua/General%20information/)).

**Conflict resolution.** In case of misunderstandings and complaints to the teacher because of the quality of educational services, knowledge assessment and other conflict situations, student should submit his / her claims to the teacher. If the issue is not resolved, the student has the right to apply to the head of the department according to Complaints Consideration Procedure in National Pirogov Memorial Medical University, Vinnytsya (link [https://www.vnmu.edu.ua/General information](https://www.vnmu.edu.ua/General%20information/))

**Politics in terms of remote learning.** Distance learning regulated by the Regulations of the elements of remote learning in National Pirogov Memorial Medical University, Vinnytsya ([https://www.vnmu.edu.ua/ General information](https://www.vnmu.edu.ua/General%20information/)). The main training platforms for studying are Microsoft Team and Google Meets. Practical classes and lectures, exercises and consultations during distance learning is published on the website of the department <https://www.vnmu.edu.ua/кафедра-суспільних-наук>.

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

## 8. Educational resources.

**Educational and methodological support** of the discipline is published on the website of the department (<https://www.vnmu.edu.ua/кафедра-суспільних-наук>). Consultations are held twice a week according to the schedule.

### Main literature

1. Oxford Textbook of Global Public Health, 6 edition. Edited by Roges Detels, Martin Gulliford, Quarraisha Abdool Karim and Chorh Chuan Tan. – Oxford University Press, 2017. – 1728 p.
2. Medical Statistics at a Glance Text and Workbook. Aviva Petria, Caroline Sabin. – Wiley-Blackwell, 2013. – 288 p.

### Supplementary reading

1. Board Review in Preventive Medicine and Public Health. Gregory Schwaid. - ELSEVIER., 2017. – 450 p.
2. Donaldson`s Essential Public Health, Fourth Edition. [Liam J. Donaldson](#), [Paul Rutter](#) – CRC Press, Taylor&Francis Group, 2017 – 374 p.
3. Oxford Handbook of Public Health Practice, Fourth Edition. Charles Guest, Walter Ricciardi, Ichiro Kawachi, Iain Lang. – Oxford University Press, 2012. – 656 p.
4. Primer of Biostatistics, Seventh Edition. Stanton A. Glantz – McGraw-HillEducation, 2012. – 320 p.
5. Health economics: textbook. – Vinnytsia: Nova Knyga, 2010. – 112 p.



6. Oxford Handbook of infectious diseases and microbiology. Oxford University Press, 2017, 914 p.
7. Essentials of clinical infectious diseases 2<sup>nd</sup> edition. William F. Wright. Daemos Medical, 2018 , 488 p.
8. Netter's Infectious diseases. Saunders, 2012, 623 p.
9. Harrison's Infectious diseases. McGraw-Hill Prof Med/Tech, 2010, 1313 p.
10. Jawetz, Melnick & Adelberg's Medical Microbiology 28<sup>th</sup> edition. McGraw-Hill, 2019.
11. Encyclopedia of Infectious Diseases, Michel Tibayrenc. Wiley, 2007, 806 p.
12. Infectious Diseases: A Clinical Short Course, Fourth Edition. [Frederick S. Southwick](#). McGraw-Hill Education, 2020, 735 p.
13. Atlas of human infectious diseases. Heiman F L Wertheim. Wiley-Blackwell, 2012, 311 p.
14. Mims' Pathogenesis of Infectious Disease 6<sup>th</sup> edition. Academic press, 2015, 328 p.
15. Pathology of Infectious Diseases, by Gary W. Procop. Saunders, 2014, 678 p.
16. Emergency management of infectious diseases, Rachel Chin. Cambridge university press, 2008, 577 p.
17. Gordis Epidemiology 6<sup>th</sup> edition. Elsevier, 2019, 434 p.
18. Essentials of Epidemiology in Public Health, Fourth Edition, Jones & Bartlett Learning, 2020, 541 p.
19. Introduction to Epidemiology, Seventh Edition, Ray M. Merrill. Jones & Bartlett Learning, 2016, 360 p.
20. Handbook of epidemiology. Springer-Verlag New York, 2014, 2489 p.
21. Infectious Disease Epidemiology: Theory and Practice. Jones & Bartlett Learning, 2012, 981 p.
22. Practical healthcare epidemiology. Cambridge university press, 2018, 455 p.

#### **Information resources**

1. U.S. National Library of Medicine <http://www.nlm.nih.gov/>
2. European Health for All Database [www.euro.who.int/ru/home](http://www.euro.who.int/ru/home)
3. Cochrane Center for Evidence-Based Medicine [www.cebm.net](http://www.cebm.net)
4. Cochrane Library [www.cochrane.org](http://www.cochrane.org)
5. British Medical Journal [www.bmj.com](http://www.bmj.com)
6. Evidence-Based Medicine [www.evidence-basedmedicine.com](http://www.evidence-basedmedicine.com)
7. Centers for diseases control and prevention - <http://www.cdc>

**The timetable and distribution of groups** with assigned teachers are published on the web page of the department (<https://www.vnmu.edu.ua/кафедра-суспільних-наук>)

Questions to the intermediate and final semester control (credit) of the discipline are published on the web page of the department (<https://www.vnmu.edu.ua/кафедра-суспільних-наук>)

**The syllabus in the discipline " Biostatistics " was discussed and approved at a meeting of the Department of Social Medicine and Public Health of VNMU Protocol №1 27 of August 2020**

Responsible

for the discipline




*signature*

Ocheredko O.M.

*last name and initials*

Head of the department



*signature*

Ocheredko O.M.

*last name and initials*