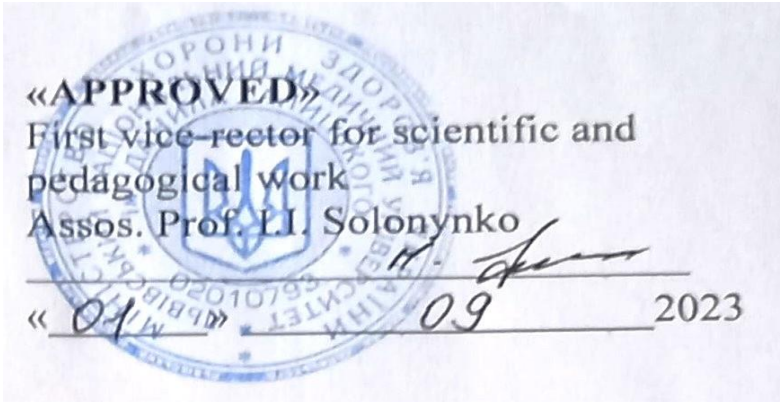
DANYLO HALYTSKY LVIV NATIONAL MEDICAL UNIVERSITY

Department of Microbiology



EDUCATION CURRICULUM OFDISCIPLINE
VB 1.37 “Current problems of virology”
(elective course)preparation of specialists
of the second (master's) level of higher education
field of knowledge 22 "Healthcare"
specialty 222 «Medicine»

Discussed and approved
at the methodical meeting of the
department microbiology
Protocol No 15
Dated21 June 2022
Head of the department:
prof. Olena KORNIYCHUK MD

«APPROVED» at the sitting of the cyclic
methodical commission
on the preventive medicine
Protocol No 5
Dated27 June 2022
Head of the commission
Professor Vira FEDORENKO, MD

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INTRODUCTION

The program of study of the discipline "Modern problems of virology"according to the Standard of higher education of the second (master's) levelfield of knowledge 22 "Health"specialty _222 "Medicine"educational program of master of medicine

The program of studying the discipline of the elective course "Modern problems of virology" is made inaccordance with the Standard of higher education of Ukraine of the second (master's) level of higher education in the field of knowledge 22 "Health" specialty222 "Medicine", discussed at the XIII AllUkrainian scientific-practical conferencewith international participation "Topical issues of quality of medical education" (May 12-132016, Ternopil) and an approximate curriculum for the training of specialists of the second (master's) level of higher education in the field of knowledge 22 "Health" in higher educational institutions of the Ministry of Health of Ukraine in specialty 222 "Medicine" qualification educational "Master of Medicine", professional qualification "Doctor", approved on 07/26/2016. at. Minister of Health V. Shafransky; taking into account the Instructions for assessing the educational activities of students in the implementation of the European credit transfer system for the organization of the educational process, approved by the Ministry of Health of Ukraine on 15.04.2014.

Description of the discipline

Modern problems of virology studies the origin, evolution and properties of human pathogenic viruses, patterns of interaction of viruses with macroorganisms, immune system and mechanisms against infectious immunity, diagnostic methods, principles of treatment and specific prevention of infectious diseases.

The study of this discipline is necessary to understand the role of viruses in the pathogenesis of infectious and a number of somatic diseases, the importance of basic methods in diagnosis.

In order to integrate into the world educational and scientific space, the content of the program took into account the main directions of development of modern diagnostics, treatment and prevention of diseases caused by viruses and introduced training material from leading international textbooks on microbiology and virology.

According to the curriculum, the study of the discipline is carried out in IV-V semesters.

Types of educational activities of students, according to the curriculum are: a) practical classes; b) independent work of students. Thematic plans of practical classes and independent work provide the study of all sections of virology.

The duration of one practical lesson according to the curriculum and taking into account the standards of weekly classroom workload of students is at least 3 academic hours. According to the method of organization, they are clinical, aimed at controlling the assimilation of theoretical material and the formation of practical skills and abilities to solve practical problems.

Current control. Assimilation of the topic is controlled in practical classes in accordance with specific goals.Practical classes include solving situational problems, learning the methods of collection, primary processing and transportation of clinical material. communication with patients and colleagues in the process of performing their professional actions. Means of control are oral questioning, solving test tasks and situational problems, mastering practical skills of working with biomaterial.

Student's independent work is one of the organizational forms of learning, which is regulated by the curriculum and performed by the student independently outside the classroom. The type of independent work is preparation for practical training and study of the legal framework.

The final control of students' knowledge is carried out upon completion of the study of the discipline by the final test. Assessment of student performance in the discipline is a rating, set for multi-point scale and is defined by the ECTS system and the scale adopted in Ukraine.

Description of the educational plan on the elective course “MODERN PROBLEMS OF VIROLOGY” for students

Structure of the discipline	Quantity of hours				Year of study	Types of control
	Total	Auditorium		SEW		
		lecture	Practices			

	3credits ECTS 90 hrs.	**12**	**18**	**60**		
General virology		**4**	**4**	**24**	**Second year III semesters**	**Credit**
Special virology		**8**	**14**	**36**	**III semesters**	**Credit**

The subject of study of the discipline is the properties of pathogenic representatives of the world of viruses, their interaction with the human body, the mechanisms of development of infectious diseases, methods of their diagnosis, specific prevention and treatment.

Interdisciplinary links: Modern problems of virology as a discipline is based on the knowledge gained in the study of general biology, biochemistry, biophysics, histology, cytology and embryology, physiology. Virology, in turn, is the basis for the study of epidemiology, infectious diseases, clinical immunology and allergology, pharmacology, general hygiene, internal medicine, surgery and pediatrics and other clinical disciplines, which involves the integration of teaching with these disciplines and the application of virology knowledge in the process further training and professional activities. Lays the foundations of the doctrine of the physiological role of microbes in the human body and the prevention of changes in the normal microflora in the process of drug interventions.

The purpose and objectives of the discipline

The purpose - the study of general and special virology - and the ultimate goals - is set on the basis of OPP training of a doctor in accordance with the block of its content module - (natural science training) and is the basis for building the content of the discipline. The description of goals is formulated through skills in the form of target tasks (actions). On the basis of the ultimate goals for each module or content module, specific goals are formulated in the form of certain skills (actions), target tasks that ensure the achievement of the ultimate goal of studying the discipline.

1.2.The main tasks of studying the discipline "Modern problems of virology" are:

• interpret the biological properties of viruses, the patterns of their interaction with the macroorganism and the environment;

• determine the methods of virological diagnosis, etiotropic therapy and specific prevention of infectious diseases;

• explain the role and functions of the immune system of the human body;

• to interpret the main mechanisms of formation of the immune response of the human body;

• identify the main types of pathological reactions of the immune system and the relationship with the occurrence of the most common human diseases.

1.3. Competence and learning outcomes, the formation of which is facilitated by discipline (the relationship with the normative content of the training of higher education graduates, formulated in terms of results of study in the Standard of Higher Education).

In accordance with the requirements of the Standard of Higher Education, discipline ensures students' acquisition of competences:

- general: the ability to apply knowledge in practical situations. Ability to make decisions in non-standard situations.Ability to choose a communication strategy; ability to work in a team; interpersonal skills.Skills in the use of information and communication technologies.Ability to abstract thinking, analysis and synthesis, the ability to learn and to be modernly trained.Determination and persistence in relation to the tasks and established responsibilities.Ability to act socially responsible and with public consciousness.Ability to lead a healthy lifestyle.The desire to save the environment. Universal competencies that are important for successful further professional and social activities, as well as personal development.
- special (professional, subject): Ability to evaluate the results of laboratory research. Ability to perform sanitary and preventive measures.Ability to plan preventive and anti-epidemic measures against infectious diseases.Ability to process state, social, economic and medical information.Ability to assess the impact of socio-economic and biological determinants on the health of the individual, family, population. Ability to apply scientifically grounded psychological methods of effective work with colleagues, medical staff, patients and their relatives, readiness to interact with other people. Awareness of the individual in the field of culture of other peoples.

Detail of competencies according to the descriptors of the NRC form the "Matrix of competencies".

№	**Competence**	**Knowledge**	**Ability**	**Communication**	**Autonomy and**

					responsibility
1	**2**	**3**	**4**	**5**	**6**
GENERALCOMPETENCES					
1	Ability to apply knowledge in practical sit-tations	Have specialist conceptual knowledge gained during the learning process.	Be able to solve complex problems and problems of professional activity.	A clear and unequivocal report of their own conclusions, knowledge and explanations that justify them, to specialists and non-specialists.	Responsible for making decisions in difficult conditions
2	Ability to learn and master modern knowledge.	Know the current trends in the industry and analyze them.	Be able to carry out an analysis of professional information, make informed decisions, acquire modern knowledge.	Establish appropriate connections for achievement of the goals.	Be responsible for the timely acquisition of modern knowledge.
3	Knowledge and understanding of the subject area and understanding of professional activity.	Have a profound knowledge of the structure of professional activity.	Be able to carry out professional activities that require updating and integration of knowledge.	Ability to effectively form a communication strategy in professional activity	To be responsible for professional development, the ability to further professional training with a high level of autonomy.
4	Skills in the use of information and communication technologies.	Have deep knowledge in the field of informational and communication technologies that are relevant to professional activities.	To be able to use informational and co-munication technologies in the professional field that needs to be updated. and the integration of knowledge.	Use information and communication technologies in professional activities	To be responsible for the development of professional knowledge and skills.
5	Definedness and ease-about the set tasks and responsibilities.	Know the ways and means of fulfilling post-office tasks.	Being able to define the purpose and the task of being persistent and conscientious in carrying out the duties.	Establishing interpersonal connections for the effective fulfillment of duties and duties.	Responsible for high-quality performance of tasks
6	Ability to communicate in foreign language	Have basic knowledge of the foreign language.	Be able to communicate in foreign languages.	Use a foreign language in the professional activities	To be responsible for the development of professional knowledge using a foreign language.
7	Ability to communicate in the state language both verbally and in writing.	Have knowledge of the state language.	To be able to use knowledge of the state language, both verbally and in writing.	Use in professional and business communication and in preparation of documents a state language.	To be responsible for the full possession of the state monopoly, for the development of professional knowledge.
Special (professional, subject) competence					

1.	Ability to evaluate the results of laboratory and instrumental research	Have specialized knowledge about humans, their organs and systems, know the standard methods of laboratory and instrumental research (according to list 4: Serological reactions in infectious diseases; Rapid tests for viral diseases; Amplification methods in infectious diseases; Serological reactions in autoimmune diseases; Chemical and bacteriological studies of biological fluids and secretions).	Be able to analyze the results of laboratory and instrumental studies and on their basis to assess information about the patient's diagnosis (according to list 4)	It is reasonable to assign and evaluate the results of laboratory and instrumental research (according to list 4).	Be responsible for deciding on the evaluation of laboratory and instrumental research results
2.	Ability to develop preventive and anti-epidemic measures for infectious diseases	To know the principles of organizing and conducting a system of preventive and anti-epidemic measures for infectious diseases and preventing their spread in typical conditions and during exacerbations. To know the Law of Ukraine "on amendments to certain legislative acts of Ukraine aimed to prevent the emergence and spread of coronary heart disease (COVID-19)".	Be able to identify risk groups in terms of the development of infectious diseases.	Inform employees of clinical institutions about the timely implementation of treatment and prevention measures.	Be responsible for quality and timely diagnostic results (including early diagnosis), compliance with the rules of evidence-based medicine.

		Know methods of detection and early diagnosis of infectious diseases , organization of primary anti-epidemic measures in the center of infectious diseases.			
3.	Ability to process state, social, economic and medical information	Know standard methods, including modern computer information technology, processing of state, social and medical information	Ability to determine the source of the required information depending on its type; ability to carry out statistical processing of material and analysis of the received information	To form conclusions on the basis of the analysis and statistical processing of the received information	To be responsible for qualitative and timely performance of statistical processing and the analysis of the received information
4.	Ability to assess the impact of socio-economic and biological determinants on the health of the individual, family, population	Know the socio-economic and biological determinants that affect the health of the population; types and methods of prevention to prevent the negative impact of socio-economic factors on the health of the population and its individual groups	Be able to calculate on the basis of epidemiological and medical-statistical research indicators of public health Be able to assess the relationship and impact of social - economic and biological factors on the health of the individual, family, health population Be able to plan preventive measures to prevent the negative impact of socio-economic factors on the health of the population and its individual groups	To obtain the necessary information from certain sources on the state of health of the population and its individual groups and to formulate conclusions on the impact of socio-economic and biological factors on the health of the population	To be responsible for the validity of preventive measures to prevent the negative impact of socio-economic factors on the health of the population and its individual groups
5.	Ability to apply intellectual abilities and knowledge when working with the patient	To know the ideological function of bioethics in the formation of civil society and historical aspects of the concept of "human rights"	Be able to identify potential threats to the nature of living organisms	Get the necessary medical, social, special information	Make effective decisions, including in extreme conditions and be responsible for them

6.	Ability to provide medical, ethical and legal assessment of specific cases from the standpoint of confidentiality and medical secrecy in solving situational problems in patients with HIV.	Know the Law of Ukraine "On Counteracting the Spread of Diseases Caused by Human Immunodeficiency Virus (HIV), Legal and Social Protection of People Living with HIV."	Take into account the diversity of human and civil rights	Apply the norms and principles of biomedical ethics and deontology	Be responsible for maintaining medical secrecy.

Learning outcomes:

Integrative final program learning outcomes, the formation of which is facilitated by the discipline:

• Ability to analyze the biological properties of viruses, the patterns of their interaction with the macroorganism and the environment.

• Ability to interpret the basic mechanisms of formation of the immune response of the human body.

• Ability to identify the main types of pathological reactions of the immune system and the relationship with the most common human diseases.

• Ability to determine methods of virological diagnosis, etiotropic therapy and specific prevention of infectious diseases.

• Ability to process state, social, economic and medical information.

Learning outcomes for the discipline - a set of knowledge, skills, abilities, other forms of competence acquired by a person in the learning process in accordance with the standard of higher education, which can be identified, quantified and measured.

As a result of studying the discipline the student must

Know:

- biological properties of viruses from the standpoint of their interaction with the macroorganism, human population and the environment.

Be able:

- have the basic methods of diagnosis, interpret the principles of etiotropic therapy and specific prevention of viral processes.

Curriculum of the discipline

General and special virology as a discipline is based on the knowledge gained in the study of general biology, a complex of chemical disciplines, biophysics, disciplines of morphological and physiological cycle.The study of virology is necessary to understand the role of viruses in the pathogenesis of diseases, the importance of serological methods in diagnosis, the knowledge gained is used in the study of problems of treatment and prevention of diseases.

Work program of the elective course "Modern problems of virology"

It consists of two divisions:

1. General virology.
2. Special virology.

Types of student activities according to the curriculum are

a) lectures, b) practical classes, b) independent work (VTS), in the organization of which teachers' consultations play a significant role.

The structure of the discipline

The distribution of study time by forms of study and types of classes according to the working curriculum is provided.

№	Topic	Quantity of hours			
		lecture	Practices	SEW	Individual SEW

	General virology				
1	Features of morphology and ultrastructure of viruses. The main types of interaction between virus and cell. Classification of viruses	1	1		
2	Methods of cultivation and detection of viruses in chicken embryos, cell cultures, laboratory animals. (Indication and identification of viruses)	1	1		
3	The main serological reactions used in virological studies (mechanism, classification) to diagnose viral diseases Modern methods of virological diagnosis, treatment and prevention of viral infections.(RIF. ELISA. RIAPLR. Hybridization methods, restriction analysis. The method of DNA probes.		2		
4	Modern views on the origin of viruses			2	
5	Features of the structure of viral proteins and viral nucleic acids			2	
6	Enzyme-linked immunosorbent assays in the diagnosis of viral infections			2	
7	Polymerase chain reaction in the diagnosis of viral infections			2	
8	Immunoblotting			2	
9	Restriction analysis of viral nucleic acids			2	
10	Virus interference			2	
11	Features of antiviral immunity			2	
12	Immunopathological reactions - delayed-type reactions to the resistance of viruses to the body's protective reactions			2	
13	Virus-viral associations			2	
14	Genetics of viruses. Molecular basis of virus virulence			2	
15	Prions, viroids			2	
	Special virology				
16	Picornavirus family (polio viruses, Coxsackie, ECHO). Features of structure and reproduction. Virological diagnosis. Specific prevention. Coronaviruses. Features of biology and their role in the Covid19 pandemic in 2019-2022..	2	2		

17	Influenza viruses (orthomyxovirus family). Genetic variability. Features of reproduction. Virological diagnosis. Specific prevention of paramyxoviruses. Classification. Features of reproduction. Virological diagnosis. Specific prevention.	2	2		
18	Pathogens of arbovirus infections. Family of filoviruses (Marbur and Ebola viruses). Family of flaviviruses (tick-borne encephalitis virus). Features of reproduction. Virological diagnosis. Specific prevention.	2	2		
19	HIV and AIDS. Features of reproduction. Virological diagnosis. Specific prevention.	1	2		
20	Hepatitis. Classification. Features of reproduction. Virological diagnosis. Specific prevention.	1	2		
21	Herpesviruses and adenoviruses. Features of reproduction. Virological diagnosis. Specific prevention.	2	2		
22	Group of arboviruses. Crimean-Congolese hemorrhagic fever virus.			4	
23	Tick-borne encephalitis virus			4	
25	Family of coronaviruses			4	
26	Pathogens of rotavirus infections			4	
27	Poxvirus family. Smallpox virus			4	
28	Contagious fever virus			2	
29	Pathogens of slow viral infections (measles virus, PSPE, rubella virus)			4	
30	Prions. Virions. Virusoids. Role in infectious pathology.		2		
31.	Oncogenic RNA genomic viruses. Oncogenic DNA genomic viruses			10	
	Total	**12 h**	**18 h**	**60 h**	

THEMATIC PLAN OF LECTURES

№ з/п	**Topic**	**Quantity of hours**
1.	Features of morphology and ultrastructure of viruses. The main types of interaction between virus and cell. Classification of viruses.Methods of cultivation and detection of viruses in chicken embryos, cell cultures, laboratory animals. (Indication and identification of viruses)	2
2.	Picornavirus family (polio viruses, Coxsackie, ECHO). Features of structure and reproduction. Virological diagnosis. Specific prevention. Coronaviruses. Features of biology and their role in the Covid19 pandemic in 2019-2022..	2
3.	Ortho- and paramyxoviruses. Genetic variability. Features of reproduction. Virological diagnosis. Specific prevention	2
4.	Pathogens of arbovirus infections. Family of filoviruses (Marbur and Ebola viruses). Family of flaviviruses (tick-borne encephalitis virus). Features of reproduction. Virological diagnosis. Specific prevention.	2
5.	HIV and AIDS. Features of reproduction. Virological diagnosis. Specific	2

	prevention.	
6.	Herpesviruses and adenoviruses. Features of reproduction. Virological diagnosis. Specific prevention.	2
	Total	**12 h**

Individual educational and research task is one of the forms of organizationuniversity education, which aims to deepen, generalize and consolidate the knowledge gained by students in the learning process, as well as the application of this knowledge in practice. Individual tasks are performed by students independently under the guidance of teachers. The purpose of the individual educational and research task is independent study of a part of the program material, systematization, deepening, generalization and practical application of the student's knowledge from the educational course, development of skills of independent work. The designed individual task has a title page, the content of the individual task, theoretical and practical component, conclusion, list of references. Disclosure of an individual task should have a practical focus, a connection with a specific object of activity in the field of medicine or dentistry. Registration of work is carried out according to requirements of regulatory (methodical) documents.

The section should reveal the forms of organization of individual tasks in the discipline and their topics. An individual educational and research task is performed if it is planned in the working curriculum for the academic year.

"Teaching methods": relevance of the subject, connection with related disciplines, practical skills, current control of students' preparation for classes using test tasks of the license exam "Step-1", the use of interactive methods: "Brainstorming", "Method of competitive groups" "," Case method "and other educational technologies used to transfer and assimilate knowledge, skills and abilities.

The section **"Methods of control"** should contain a description of the content and technology of assessing student knowledge, namely - a list of all types of work that the student must perform during the current, final control, independent work, individual tasks and evaluation criteria.

Distribution of the points that students get

In the section should be indicated:

• **Types of the control** (current and final)

• **Form of the final control according to the curriculum** (test, credit)

• **Evaluation criteria**

Control measures include current and final semester control and certification of the graduates.

Current control is carried out during training sessions and aims at checking mastering educational material by students. Form of conducting current control during training sessions is determined by working curriculum on the subject.

Evaluation of current educational activity. In evaluating the mastering of each topic for current educational activity the student gets marks by 4-point (traditional) scale taking into account approved evaluation criteria for appropriate discipline. Herewith all types of work, provided by the curriculum, are taken into account. The student must get the mark for each theme. Assessment forms of current educational activity should be standardized and include control of theoretical and practical training. Put by the traditional assessment scale marks are converted into points.

For subjects which form of the final control is the test:

The maximum number of points that a student can get for current educational activity at studying a subject is 200 points.

The minimum number of points that a student should get for current educational activity for admission the subject is 120 points.

Calculating the number of points is based on received by the student marks by the traditional scale while studying a subject during the semester, by calculating the average arithmetic (AA), rounded to two decimal places. The resulting mark is converted into points for multipoint scale as follows:

$x = AA \times 200/5$

Table 1

Conversion of the average mark for current activity in multipoint scale for the disciplines that ends with the test (differentiated test)

4-бальна шкала	200-бальна шкала
5	120
4.95	119
4.91	118
4.87	117
4.83	116
4.79	115
4.75	114
4.7	113
4.66	112
4.62	111
4.58	110
4.54	109
4.5	108

4-бальна шкала	200-бальна шкала
4.45	107
4.41	106
4.37	105
4.33	104
4.29	103
4.25	102
4.2	101
4.16	100
4.12	99
4.08	98
4.04	97
3.99	96
3.95	95

4-бальна шкала	200-бальна шкала
3.91	94
3.87	93
3.83	92
3.79	91
3.74	90
3.7	89
3.66	88
3.62	87
3.58	86
3.54	85
3.49	84
3.45	83
3.41	82

4-бальна шкала	200-бальна шкала
3.37	81
3.33	80
3.29	79
3.25	78
3.2	77
3.16	76
3.12	75
3.08	74
3.04	73
3	72
Менше 3	Недостатньо

Independent work of students is evaluated during the current control of theme in the appropriate class. Mastering of themes which are submitted only to the independent work is controlled at the final control.

Final control is carried out to assess the results of study on a particular educational qualification level and on some of its completed stages by the national scale and scale ECTS. Final control includes semester control and students certification.

Semester control is carried out in the forms of semester exam or test (differentiated test) from a specific discipline in the volume of educational material, determined by the working program on the discipline and in terms determined by the working curriculum, individual curriculum of the student.

Semester (differentiated) test is a form of final control, which is to evaluate mastering the academic material on certain discipline by the student solely on the basis of performance of all kinds of educational works provided by the working curriculum. Semester (differentiated) test is evaluated by the results of current control.

Semester exam is a form of final control of mastering by the student theoretical and practical material on a single discipline per semester, carried out as a control measure. Student is considered to be admitted to the semester exam on the discipline, if he has visited all provided by the curriculum on the discipline lecture classes, fulfilled all kinds of works, provided by the working curriculum on this discipline and in its study during the semester got not less than the minimum number of points (72 points).

Semester exam is conducted in writing during the examination session, as scheduled. The form of the exam must be standardized and include control of theoretical and practical training.

The maximum number of points that a student can get in the exam is 80.

The minimum number of points in the exam is at least 50.

Determination of the number of points that a student got from the discipline

Mark of the discipline, culminating in the exam is defined as the sum of points for current educational activity (at least 72) and points for the exam (at least 50).

Mark of the disciplines, which form of the final control is differentiated test is based on the results for current educational activity and is calculated in points, according to the table 1.

Mark of the disciplines, which form of the final control is test (differentiated test), is based on the results of current educational activity and is expressed by two-point scale "Passed" or "Not passed". To enroll a student must get for current educational activity at least 60% of the maximum amount of points in the discipline (120 points).

Points of the discipline irrespectively are converted regardless both in scale ECTS, and in a 4-point scale. Points of the ECTS scale into 4-point scale are not converted and vice versa.

Points of the students, who study in one specialty, including the number of points gained in the discipline, are ranked on a scale ECTS as follows:

Table 2

Points ECTS	Statistical index
A	**The best 10 % of students**
B	**Next 25 % of students**
C	**Next 30 % of students**
D	**Next 25 % of students**
E	**The last 10 % of students**

Points of the discipline for students who successfully completed the program are converted into traditional 4-point scale by absolute criteria that are presented in the table below:

Table 3

Points of the discipline	Mark by 4-point scale
From 170 till 200 points	5
From 140 till 169 points	4
From 139 points till minimum quantity of points, that a student should get	3
Lower than minimal quantity of points, that a student should get	2

Points ECTS are not converted in traditional scale as the scale ECTS and four-point scale are independent.

Objectivity of students' educational activities evaluation is tested by statistical methods (correlation coefficient between the points ECTS and national scale mark).