

MINISTRY OF HEALTH OF UKRAINE  
BUKOVINIAN STATE MEDICAL UNIVERSITY

"APPROVE"

Vice-rector for scientific and pedagogical work  
Associate Professor I.V. Gerush  
" 24 " 08 2021

**STUDENT GUIDE  
(SYLLABUS)  
of studying the discipline**

**Histology, Cytology and Embryology**

**Field of knowledge** 22 Healthcare  
(code and name of the field of knowledge)

**Specialty** 222 Medicine  
(code and name of the specialty)

**Educational degree** Master  
(master, bachelor, junior bachelor)

**Educational year** 2

**Form of study** full-time  
(full-time, part-time, distance)

**Department** Histology, Cytology and Embryology  
(name of the department)

Approved at the methodical session of the department Histology, Cytology and Embryology  
"25" 08 2021 (Protocol №1).

Head of the Department (signature) (O.V. Tsyhykalo)

Approved by the subject methodical commission on morphological medical and biological  
disciplines  
"25" 08 2021 (Protocol № 1).

Chairman of the subject methodical  
commission (signature) (V.V.Krivetsky)

Chernivtsi – 2021

## 1. GENERAL INFORMATION ABOUT SCIENTIFIC AND PEDAGOGICAL WORKERS WHO TEACH THE SUBJECT

<b>Department</b>	Histology, Cytology and Embryology
<b>Surname, name of scientific and pedagogical staff, scientific degree, academic status</b>	As.prof. Khodorovska A.A. – associate Professor of the Department, Ph.D. in Medicine, <a href="mailto:khodorovska.alla@bsmu.edu.ua">khodorovska.alla@bsmu.edu.ua</a> As.prof. Chernikova G.M. – associate Professor of the Department, Ph.D. in Medicine, <a href="mailto:chernikova.galina@bsmu.edu.ua">chernikova.galina@bsmu.edu.ua</a> ; As.prof. Malyk Yu.Yu. – associate Professor of the Department, Ph.D. in Medicine, <a href="mailto:malyk.yuliia@bsmu.edu.ua">malyk.yuliia@bsmu.edu.ua</a> ; As.prof. Semenyuk T.O. – associate Professor of the Department, Ph.D. in Medicine, <a href="mailto:semeniuk.tetiana@bsmu.edu.ua">semeniuk.tetiana@bsmu.edu.ua</a> ; As. prof. Chala K.M. – associate Professor of the Department, Ph.D. in Biology, <a href="mailto:chala.kateryna@bsmu.edu.ua">chala.kateryna@bsmu.edu.ua</a> ; As. Petryshen O.I. – associate Professor of the Department, Ph.D. in Medicine, <a href="mailto:petryshen@bsmu.edu.ua">petryshen@bsmu.edu.ua</a> ; As. Stolyar D.B. – Ph.D. in Medicine, <a href="mailto:stolyar@bsmu.edu.ua">stolyar@bsmu.edu.ua</a> ; As. Popova I.S. – assistant of the Department, <a href="mailto:popova_i@bsmu.edu.ua">popova_i@bsmu.edu.ua</a>
<b>Web page of the department on the official website of the university</b>	<a href="https://www.bsmu.edu.ua/histology/">https://www.bsmu.edu.ua/histology/</a>
<b>Department website</b>	<a href="http://histology.bsmu.edu.ua/">http://histology.bsmu.edu.ua/</a>
<b>E-mail</b>	<a href="mailto:histology@bsmu.edu.ua">histology@bsmu.edu.ua</a>
<b>Address</b>	м. Чернівці, вул. Кобилянської, 52
<b>Contact phone</b>	+38 (0372) 52-53-42

## 2. GENERAL INFORMATION ABOUT THE DISCIPLINE

<b>Status of the discipline</b>	normative / selective
<b>Number of credits</b>	11,5
<b>Total amount of hours</b>	345
<b>Lectures</b>	50
<b>Practical lessons</b>	110
<b>Individual work</b>	185
<b>Type of final control</b>	final module control / credit

## 3. DESCRIPTION OF THE DISCIPLINE (ABSTRACT)

The term "histology" (from the Greek histos tissue + logos word, science) was proposed by the German scientist Karl Mayer in 1819, calling the science of multicellular animal and human tissues. However, the scope and significance of the subject of histology has now gone beyond the literal translation of its name. Histology studies not only tissues, but also the cells that make up them, the structure of organs and systems of the body. According to this, the following sections of the subject are distinguished: cytology (the science of the cell); general histology, or histology itself (studies tissues); special histology (studies the structure of organs and their systems). Closely related to histology is also the science of embryo development – Embryology, since the structures of the body are studied in the process of their origin and development. Embryology, like cytology, is now separated from histology and is an independent science, but in the training course of a medical higher educational institution they are combined into one subject along with histology. Thus, the full name of the course is Histology, Cytology and Embryology.

The subject of study of the discipline is the microscopic and ultramicroscopic structure of cells, tissues and organs of the human body

Interdisciplinary connections: based on students' study of medical biology, anatomy, medical physics and integrates with these disciplines; lays the foundations for students' study of Physiology, Biochemistry, pathological anatomy and pathological physiology, propaedeutics of clinical disciplines, which provides for the integration of teaching with these disciplines and the formation of skills to apply knowledge of Histology, Cytology and Embryology in the process of further training and in professional activities.

## 4. POLICY OF THE SUBJECT

### 4.1. List of normative documents:

- Regulations on the organization of the educational process (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/polozhennya-pro-organizacziyu-osvitnogo-procesu-u-vdnzu-bukovinskij-derzhavnij-medichnij-universitet.pdf>);
- Instructions for assessing the educational activities of BSMU students in the implementation of the European credit transfer system of the educational process (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/bdmu-instrukciya-shhodo-oczinyuvannya-%D1%94kts-2014-3.pdf>);
- Regulations on the procedure for reworking missed and uncredited classes (<https://www.bsmu.edu.ua/wp-content/uploads/2019/12/reworks.pdf>);
- Regulations on the appeal of the results of the final control of knowledge of higher education (<https://www.bsmu.edu.ua/wp-content/uploads/2020/07/polozhennya-pro-apelyacziyu-rezultativ-pidsumkovogo-kontrolyu-znan.pdf>);
- Codex of Academic Integrity ([https://www.bsmu.edu.ua/wp-content/uploads/2019/12/kodeks\\_academic\\_faith.pdf](https://www.bsmu.edu.ua/wp-content/uploads/2019/12/kodeks_academic_faith.pdf));
- Moral and ethical codex of students ([https://www.bsmu.edu.ua/wp-content/uploads/2019/12/ethics\\_code.docx](https://www.bsmu.edu.ua/wp-content/uploads/2019/12/ethics_code.docx));
- Regulations on the prevention and detection of academic plagiarism (<https://www.bsmu.edu.ua/wp-content/uploads/2019/12/antiplagiat-1.pdf>);
- Regulations on the procedure and conditions for students to choose elective courses ([https://www.bsmu.edu.ua/wp-content/uploads/2020/04/nakaz\\_polozhennyz\\_vybirkovi\\_dyscypliny\\_2020.pdf](https://www.bsmu.edu.ua/wp-content/uploads/2020/04/nakaz_polozhennyz_vybirkovi_dyscypliny_2020.pdf));
- Rules of internal labor regulations of the Higher State Educational Institution of Ukraine "Bucovynian State Medical University" (<https://www.bsmu.edu.ua/wp-content/uploads/2020/03/17.1-bdmu-kolektivnij-dogovir-dodatok.doc>).

### 4.2. Policy on adherence to the principles of academic integrity of higher education students:

- independent performance of educational tasks of current and final controls without the use of external sources of information;
- cheating during control of knowledge is prohibited;
- independent performance of individual tasks and correct registration of references to sources of information in case of borrowing of ideas, statements, information.

### 4.3. Policy on adherence to the principles and norms of ethics and deontology by higher education students:

- actions in professional and educational situations from the standpoint of academic integrity and professional ethics and deontology;
- compliance with the rules of internal regulations of the university, to be tolerant, friendly and balanced in communication with students and teachers, medical staff of health care institutions;
- awareness of the importance of examples of human behavior in accordance with the norms of academic integrity and medical ethics.

### 4.4. Attendance policy for higher education students:

- attendance at all training sessions (lectures, practical (seminar) classes, final modular control) is mandatory for the purpose of current and final assessment of knowledge (except for respectable reasons).

### 4.5. Deadline policy and completion of missed or uncredited classes by higher education students:

- reworks of missed classes are held according to the schedule of missed or uncredited classes and consultations.

## 5. PRECISIONS AND POST-REQUIREMENTS OF THE EDUCATIONAL DISCIPLINE (INTERDISCIPLINARY RELATIONS)

List of disciplines, on which the study of academic discipline is based	List of academic disciplines, for which the basis is laid as a result of studying the discipline
medical biology and genetics	pathological anatomy

human anatomy and physiology	Microbiology with the basics of immunology
biological physics	pathological physiology
	pharmacology

## 6. Aim and task of educational discipline

6.1. Aim and task of educational discipline 1.1. The aim of teaching of educational discipline "Histology, cytology and embryology", is study of microscopic and ultramicroscopy structure of structures of human organism, their development and changes in the various terms of vital functions.

6.2. The basic tasks of study of discipline "Histology, cytology and embryology", are:

- Study of molecular and structural bases of functioning and proceeding in cages and their derivatives is Study of bases of adaptation, reactivity and maintenance of homeostasis
- Determination of adaptation and regenerator possibilities of organs taking into account their tissue composition, features of adjusting and age-old changes is Interpretation of conformities to law of embryo development of man, adjusting of processes of morphogeny
- Determination of critical periods of эмбриогенезу, defects and anomalies of development of man

## 7. RESULTS OF STUDYING THE DISCIPLINE.

As a result of studying the discipline student must:

7.1. **Know:** content, tasks, sections of the discipline and their significance for biology and medicine; basic principles and stages of production of histological preparations; basic provisions of cell theory; microscopic and submicroscopic structure of structural components of eukaryotic cells; methods of cell reproduction; processes and stages of embryogenesis of chordates, vertebrates and mammals, their detailed characteristics and significance; patterns of human embryonic development, critical periods of embryogenesis, human malformations; features of embryonic tissue development (histogenesis); classification and morphofunctional features of all tissues of the human body; features of physiological and reparative tissue regeneration; features of embryonic development of organs (organogenesis); microscopic structure of various human organs in the aspect of the relationship of tissues that make up them; structural organization of organs and their tissue composition in the conditions of physiological and reparative regeneration.

7.2. Be able to: to differentiate the cells and their structural components in histological specimens and electron photomicrographs;

- interpret patterns of embryonic development and structural organization of tissues;
- analyze the quantitative composition of shaped elements in a healthy person's blood smear;
- analyze the features of the structure of organs in relation to the functions performed;
- evaluate the state of cells in various functional States of organs;
- solve situational problems from the main sections of the discipline;
- to use microscopic devices;
- identify and describe histological and embryological micro-preparations;
- work with literature and write an essay on the subject based on literature data.

8.3. Demonstrate:

- ability to use microscopic devices;
- the ability to identify and describe the histological and embryological microscope slide;
- ability to identify and describe electronic microphotographs.

## 8. INFORMATIONAL SCOPE OF THE DISCIPLINE

### *Description of each module of the discipline:*

8.1. Specific objectives of the module (content modules). 345 hours (11.5 ECTS credits) are allocated for the study of the academic discipline) – 1 Module "Cytology and medical embryology. General histology", which consists of two content modules and 2 module "Special histology and embryology", which consists of three content modules.

8.2. Thematic structure of the module (content modules).

## **Module 1. "Cytology and medical embryology. General histology"**

### *Content module 1. Cytology and medical embryology*

Topic 1. Preparation of tissues for the microscopic examination. Methods of the microscopic investigations.

Topic 2. Cellular theory. Cell, its structure and function. Plasmalemma.

Topic 3. Cytoplasm: general organelles, specialized organelles. Inclusions.

Topic 4. Nucleus of the cell. Cell division. Aging and death of the cells.

Topic 5. Difference of meiosis from mitosis. Gametogenesis. Sex cells.

Topic 6. Fertilization. Cleavage.

Topic 7. Implantation. Gastrulation.

Topic 8. Differentiation of the germ layers. Extraembryonic organs.

### *Content module II. General histology*

Topic 1. The study of tissues. Epithelial tissues: covering and glandular epithelium.

Topic 2. Blood: erythrocytes, thrombocytes.

Topic 3. Blood: leukocytes. Lymph.

Topic 4. Haemopoiesis.

Topic 5. Loose connective tissue.

Topic 6. Dense connective tissue. Connective tissues with special properties.

Topic 7. Skeletal connective tissues: cartilage.

Topic 8. Skeletal connective tissues: bone.

Topic 9. Skeletal, cardiac and smooth muscle tissues.

Topic 10. Nervous tissue: neurons, neuroglia. Nerve fibers. Nerve endings.

## **Module 2. "Special histology and embryology"**

### *Content module 3. Histology and embryology of regulatory and sensory systems*

Topic 1. Arteries and veins. Microcirculatory bed.

Topic 2. Heart.

Topic 3. Bone marrow. Thymus.

Topic 4. Lymph node.

Topic 5. Spleen.

Topic 6. Spinal cord. Spinal ganglion. Peripheral nerve.

Topic 7. Large hemispheres of the brain.

Topic 8. Cerebellum.

Topic 9. Autonomic nervous system.

Topic 10. Sense organs. Organ of the smell. Taste organ.

Topic 11. Sense organs. Eye.

Topic 12. Sense organs. Audiovestibular organ.

Topic 13. Hypothalamus. Pituitary gland. Pineal body. Dissociative endocrine system.

Topic 14. Thyroid and parathyroid glands.

Topic 15. Adrenal glands.

Topic 16.

### *Content module 4. Special histology and embryology of the skin, its derivatives and digestive organs*

Topic 1. Skin and its derivatives

Topic 2. Digestive system: organs of the oral cavity.

Topic 3. Esophagus. Stomach.

Topic 4. Small intestine.

Topic 5. Large intestine.

Topic 6. Salivary glands. Pancreas.

Topic 7. Liver. Biliary tract.

### *Content module 5. Special histology and embryology of the respiratory, urinary and reproductive systems*

Topic 1. Respiratory system.

Topic 2. Kidney and urinary tract.

Topic 3. Male reproductive system.

- Topic 4. Ovaries. Uterine tubes.  
 Topic 5. Uterus. Menstrual cycle.  
 Topic 6. Mammary glands.  
 Topic 7. Mammary glands.

**9. STRUCTURE OF EDUCATIONAL DISCIPLINE**

Names of content modules and topics	Amount of hours				
	Total	including			
		Classroom		Independent students' work	Individual work
Lections	Practicals				
1	2	3	4	5	6
<b>Module 1 "Cytology and medical embryology. General histology"</b>					
<b>Content module 1. Cytology and medical embryology</b>					
Topic 1. Preparation of tissues for the microscopic examination. Methods of the microscopic investigations.	8		2	6	
Topic 2. Cellular theory. Cell, its structure and function. Plasmalemma.	10		2	8	
Topic 3. Cytoplasm: general organelles, specialized organelles. Inclusions.	2		2		
Topic 4. Nucleus of the cell. Cell division. Aging and death of the cells.	4		2	2	
Topic 5. Difference of meiosis from mitosis. Gametogenesis. Sex cells.	4		2	2	
Topic 6. Fertilization. Cleavage.	3	1	2		
Topic 7. Implantation. Gastrulation.	7	1	2	4	
Topic 8. Differentiation of the germ layers. Extraembryonic organs.	12	2	2	8	
<b>Total on the content module 1</b>	52	4	18	30	
<b>Content module 2. General histology</b>					
Topic 1. The study of tissues. Epithelial tissues: covering and glandular epithelium.	17	2	2	13	
Topic 2. Blood: erythrocytes, thrombocytes.	3	1	2		
Topic 3. Blood: leukocytes. Lymph.	11	1	2	8	
Topic 4. Haemopoiesis.	4	2	2		
Topic 5. Loose connective tissue.	7	1	2	4	
Topic 6. Dense connective tissue. Connective tissues with special properties.	3	1	2		
Topic 7. Skeletal connective tissues: cartilage.	5	1	2	2	
Topic 8. Skeletal connective tissues: bone.	9	1	2	6	
Topic 9. Skeletal, cardiac and smooth muscle tissues.	8	2	2	4	
Topic 10. Nervous tissue: neurons, neuroglia. Nerve fibers. Nerve	12	2	2	8	

endings.					
<b>Total on the content module 2</b>	81	14	22	45	
<b>Individual work (if present)</b>					
<b>Final module control</b>	10		4	6	
<b>TOTAL HOURS</b>	143	18	44	81	
<b>Module 2 "Special histology and embryology"</b>					
<b>Content module 3. Histology and embryology of regulatory and sensory systems</b>					
Topic 1. Arteries and veins. Microcirculatory bed.	5	1	2	2	
Topic 2. Heart.	5	1	2	2	
Topic 3. Bone marrow. Thymus.	9	1	2	6	
Topic 4. Lymph node.	4.5	0.5	2	2	
Topic 5. Spleen.	4.5	0.5	2	2	
Topic 6. Spinal cord. Spinal ganglion. Peripheral nerve.	12	2	2	8	
Topic 7. Large hemispheres of the brain.	3	1	2		
Topic 8. Cerebellum.	3	1	2		
Topic 9. Autonomic nervous system.	2		2		
Topic 10. Sense organs. Organ of the smell. Taste organ.	10	2	2	6	
Topic 11. Sense organs. Audiovestibular organ.	14	2	2	10	
Topic 12. Hypothalamus. Pituitary gland. Pineal body. Dissociative endocrine system.	14	2	2	10	
Topic 13. Thyroid and parathyroid glands.	3	1	2		
Topic 14. Adrenal glands.	3	1	2		
<b>Total on the content module 3</b>	96	16	32	48	
<b>Content module 4. Special histology and embryology of the skin, its derivatives and digestive organs</b>					
Topic 1. Skin and its derivatives.	2		2		
Topic 2. Digestive system: organs of the oral cavity.	10	2	2	6	
Topic 3. Esophagus. Stomach.	9	1	2	6	
Topic 4. Small intestine.	4.5	0.5	2	2	
Topic 5. Large intestine.	2.5	0.5	2		
Topic 6. Salivary glands. Pancreas.	11	1	2	8	
Topic 7. Liver. Biliary tract.	3	1	2		
<b>Total on the content module 4</b>	44	6	16	22	
<b>Content module 5. Special histology and embryology of the respiratory, urinary and reproductive systems</b>					
Topic 1. Respiratory system.	12	2	2	8	
Topic 2. Kidney and urinary tract.	6	2	2	2	
Topic 3. Male reproductive system.	10	2	2	6	
Topic 4. Ovaries. Uterine tubes.	10	2	2	6	
Topic 5. Uterus. Menstrual cycle.	9	1	2	6	
Topic 6. Mammary glands.	3	1	2		
<b>Total on the content module 5</b>	52	10	14	28	
<b>Individual work (if present)</b>					

<i>Final module control</i>	10		4	6	
<b>TOTAL HOURS</b>	202	32	66	104	
<b>TOTAL HOURS OF HISTOLOGY</b>	<b>345</b>	<b>50</b>	<b>110</b>	<b>185</b>	

### 10. THEMATIC PLAN OF LECTURES

No	Name of topic	Amount of hours
1.	Fundamentals of the general embryology. Basic embryology.	2
2.	Fundamentals of the general embryology. Peculiarities of the human embryogenesis.	2
3.	The study of tissues. Epithelial tissues.	2
4.	Blood and lymph.	2
5.	Haemopoiesis.	2
6.	Connective tissues.	2
7.	Skeletal tissues.	2
8.	Muscle tissues.	2
9.	Nervous tissue.	2
10.	Cardiovascular system.	2
11.	Organs of haemopoiesis and immune defense.	2
12.	Nervous system. Spinal cord.	2
13.	Nervous system. Large hemisphere of the brain. Cerebellum.	2
14.	Sense organs. Eye.	2
15.	Sense organs. Audiovestibular organ.	2
16.	Central organs of endocrine system.	2
17.	Periferal organs of endocrine system.	2
18.	Digestive system: development and structury organs of the oral cavity.	2
19.	Digestive system: structure of digestive tube.	2
20.	Digestive system: pancreas, liver.	2
21.	Respiratory system.	2
22.	Urinary system.	2
23.	Male reproductive system.	2
24.	Female reproductive system. Ovaries. Uterine tubes.	2
25.	Female reproductive system. Uterus. Menstrual cycle. Mammary glands.	2
	<b>Total</b>	<b>50</b>

### 11. THEMATIC PLAN OF PRACTICAL (SEMINAR) CLASSES

No	Name of topic	Amount of hours
1.	Preparation of tissues for the microscopic examination. Methods of the microscopic investigations.	2
2.	Cellular theory. Cell, its structure and function. Plasmalemma.	2
3.	Cytoplasm: general organelles, specialized organelles. Inclusions.	2
4.	Nucleus of the cell. Cell division. Aging and death of the cells.	2
5.	Difference of meiosis from mitosis. Gametogenesis. Sex cells.	2
6.	Fertilization. Cleavage.	2
7.	Implantation. Gastrulation.	2
8.	Differentiation of the germ layers. Extraembryonic organs.	2
9.	<i>Control of the content module 1.</i>	2
10.	The study of tissues. Epithelial tissues: covering and glandular epithelium.	2
11.	Blood: erythrocytes, thrombocytes.	2
12.	Blood: leukocytes. Lymph.	2
13.	Haemopoiesis.	2
14.	Loose connective tissue.	2
15.	Dense connective tissue. Connective tissues with special properties.	2
16.	Skeletal connective tissues: cartilage.	2
17.	Skeletal connective tissues: bone.	2



18.	Skeletal, cardiac and smooth muscle tissues.	2
19.	Nervous tissue: neurons, neuroglia. Nerve fibers. Nerve endings.	2
20.	<i>Control of the content module 2.</i>	2
21.	<b><i>Final control of the module 1.</i></b>	4
22.	Arteries and veins. Microcirculatory bed.	2
23.	Heart.	2
24.	Bone marrow. Thymus.	2
25.	Lymph node.	2
26.	Spleen.	2
27.	Spinal cord. Spinal ganglion. Peripheral nerve.	2
28.	Large hemispheres of the brain.	2
29.	Cerebellum.	2
30.	Autonomic nervous system.	2
31.	Sense organs. Organ of the smell. Taste organ.	2
32.	Sense organs. Eye.	2
33.	Sense organs. Audiovestibular organ.	2
34.	Hypothalamus. Pituitary gland. Pineal body. Dissociative endocrine system.	2
35.	Thyroid and parathyroid glands.	2
36.	Adrenal glands.	2
37.	<i>Control of the content module 3.</i>	2
38.	Skin and its derivatives.	2
39.	Digestive system: organs of the oral cavity.	2
40.	Esophagus. Stomach.	2
41.	Small intestine.	2
42.	Large intestine.	2
43.	Salivary glands. Pancreas.	2
44.	Liver. Biliary tract.	2
45.	<i>Control of the content module 4.</i>	2
46.	Respiratory system.	2
47.	Kidney and urinary tract.	2
48.	Male reproductive system.	2
49.	Ovaries. Uterine tubes.	2
50.	Uterus. Menstrual cycle.	2
51.	Mammary glands.	2
52.	<i>Control of the content module 5.</i>	2
53.	<b><i>Final control of the module 2.</i></b>	4
	<b>Total</b>	<b>110</b>

## 12. THEMATIC PLAN OF INDEPENDENT WORK

№	Name of topic	Amount of hours
1	Histology in Ukraine.	2
2	Methods of research in histology. The technology of making of histological preparations	4
3	Structural basis for transport through plasmalemma.	2
4	Mechanisms of reception.	2
5	Structural basis of cytoprotection	2
6	Mitosis and meiosis.	4
7	Cell response to external stimuli	2
8	Endometrial receptivity and implantation mechanisms.	4
9	Mechanisms of placenta development	4
10	The patterns of organogenesis.	4
11	General principles of tissue organization.	3
12	Epithelium as a leading component of histo-hematic barriers.	4
13	Glandular epithelium. The secretory cycle.	4
14	Epithelial stem cells.	2
15	Thrombosis. Stages and mechanisms.	2
16	Leukocytes. Mechanisms of adhesion, migration and Keeling of microorganisms.	6

17	Interaction of blood cells and connective tissue in inflammation.	2
18	Repair of loose fibrous connective tissue regulation of the volume and composition of the connective tissue matrix.	2
19	Articular cartilage	2
20	Bone as an organ.	2
21	Restructuring of the bones. Bone tissue regeneration	4
22	Muscle as an organ. Muscle regeneration.	4
23	Nerve ending. Neuromuscular spindles.	6
24	Histophysiology of locomotor apparatus	2
25	<i>Preparation for final control 1</i>	6
26	Development of the cardiovascular system.	2
27	Morphological bases of neurohumoral regulation of blood vessel activity.	2
28	Development of endocrine glands	6
29	Diffuse endocrine system.	2
30	TRANS - and para-pituitary regulation	2
31	The embryogenesis of the organs of hematopoiesis.	6
32	Cellular bases of non-specific immunity	2
33	Cellular bases of cellular and humoral immune responses	2
34	Development of the nervous system.	6
35	The regeneration of nerves.	2
36	The development of the eye.	6
37	The development of the ear.	6
38	Nerve endings of the skin, their role in the work of the statokinetic system.	4
39	Development of the oral cavity and digestive system.	6
40	Structural foundations of digestion.	4
41	Neurohumoral regulation of digestion.	2
42	Intestinal-associated lymphoid tissue	2
43	Development of digestive glands	6
44	Regulation of secretory activity and regeneration of digestive glands	2
45	Development of the respiratory system.	6
46	Neurohumoral regulation of the mucociliary apparatus and bronchial tone.	2
47	Structural bases of urine concentration.	2
48	The development of the organs of the male reproductive system	6
49	Structural and molecular criteria for the diagnosis of male infertility	2
50	Development of female reproductive system organs	6
51	Regulation of the ovarian-menstrual cycle	4
52	Cervix uteri.	2
53	<i>Preparation for final control 2</i>	6
	<b>Total</b>	<b>185</b>

### 13. LIST OF INDIVIDUAL TASKS (*if provided*)

- presentations at the scientific student circle.
- participation in scientific conferences.
- publication of reports in the form of abstracts and articles in the periodical scientific press (journals, collections of scientific papers).
- production of visualizations according to educational programs (tables, posters, histological crossword).

### 14. LIST OF THEORETICAL TASKS TO THE FINAL MODULE CONTROL

#### MODULE I. Cytology and medical embryology. General histology

##### *Content module 1. Cytology and medical embryology*

- Histology. Definition, content and tasks of the modern histology. Parts of discipline, its significance for biology and medicine.
- Basic steps of the historical development of histology as a science. Histological schools in

Ukraine.

- Basic principles and steps of the preparation of histological specimens for the light and electron microscopy. Special methods of the histological investigations for the vital, supravital and postvital investigations.
- Cell theory. History of the problem. Basic states. Cell as elementary living system of the multicellular organism. Definition. Noncellular structures of the organism.
- General structure of the eukaryotic cells. Cell membrane, its structure and chemical content.
- Functions of plasmolemma: delimitation and transport, membrane digestion. Receptor functions of the cell membrane. Intercellular junctions, its types and morpho-functional characteristic.
- Energetic apparatus of the cell structure and functions.
- Synthetic apparatus of the cell, its structural content and functional significance.
- Apparatus of the intracellular digestion, general characteristic, structure and functions.
- Cytoskeleton, its content components and its functional significance.
- Inclusions of cytoplasm, its classification, structure, properties and functional significance.
- Nucleus, its significance in the vital activity of the cell. Nuclear-cytoplasmic ratio as the single of the functional state of the cell. Morpho-functional characteristic of the basic components of the nucleus: karyolemma, karyoplasm, chromatin and nucleolus.
- Cell cycle. Types of cells reproduction, its morphological characteristic, significance for biology and medicine. Morpho-functional characteristic of the cell cycle. Interphase.
- Reorganization of the structural components of the cell at time of different phases of mitosis.
- Particularities and biological significance of meiosis. Notion about endoreproduction and polyploidy. Growth, differentiation, aging and death of the cell. Reaction of cells on harmful influence. Adaptation. Apoptosis.
- Embryology, its matter, tasks, scientific directions and significance for biology and medicine.
- Characteristic of the content components of the process of embryo development: induction, determination, division, migration, growth, differentiation. Ontogenesis and phylogenesis, definition. Processes and stages of the embryogenesis.
- Basic stages of oogenesis and its morpho-functional characteristic. Comparison of stages of oogenesis and spermatogenesis. Comparative characteristic of spermatogenesis and oogenesis. Morphological and functional characteristic of sex cells.
- Fertilization.
- Cleavage, its characteristic and significance. Types of blastulae.
- Manners and stages of gastrulation. Characteristic of different types of gastrulation. Structure of gastrula.
- Differentiation of germ layers, formation of the axial complex of germ organs.
- Characteristic of histo- and organogenesis. Features and relation of processes of development of basic organ systems.
- Formation, structure and functions of the embryonic membranes and provisory organs.
- Particularities of the human embryo development.
- Notion about the critical periods of the human embryo development. Connection of the human embryo with maternal organism. System "mother- fetus". Placenta and umbilical cord.

### ***Content module 2. General histology.***

- Tissue as one of the levels of organization of living organisms. Definition. Classification.
- Morpho-functional characteristic of the cellular derivatives (syncytium, symplast, extracellular matrix).
- Morpho-functional particularities of the epithelial tissues. Phylogenetic and morpho-functional classification of the covering epithelium. Morpho-functional characteristic of different types of simple and stratified epithelia.
- Glandular epithelium. Classification, sources of the development and structure of glands. Morphology of phases of secretory cycle. Types of secretion.
- General characteristic of tissues of internal environment. Classification, origin. Morphology and functions of blood. Basic components of blood plasma, its function. Morpho-functional characteristic of erythrocytes. Poikilocytosis. Anisocytosis. Classification and morpho-functional characteristic of leukocytes. Microscopic, ultramicroscopic and cytochemical characteristic of granular leukocytes. Microscopic, ultramicroscopic and cytochemical characteristic of nongranular leukocytes. The role and significance of leukocytes in the immune reactions of organism. Structure and functional significance of platelets.
- Postembryonic haemopoiesis. Haemopoietic organs. Types of haemopoietic tissue. Postembryonic haemopoiesis. Modern scheme of the haemopoiesis. Morpho-functional characteristic of stem haemopoietic cell. Postembryonic erythropoiesis. Postembryonic granular leukocytopoiesis. Postembryonic platelets cytopoiesis. Postembryonic lymphocytopoiesis. Postembryonic monocytopenoiesis.
- Particularities of the embryonic haemopoiesis.

- Morpho-functional characteristic and classification of connective tissue. General structure and localization of loose connective tissue. Structure and functions of cells of loose connective tissue. Participation of cells in the protective reactions of organism. Content, physical-chemical properties and functional significance of the extracellular matrix. Dense connective tissue, its types, structure and functions. Features of the structure and localization of connective tissues with special properties.
- Classification and particularities of the structure of skeletal tissues. Structural organization and classification of the cartilage. Structure, features of localization and functions of chondroblasts and chondrocytes. Histochemical properties of extracellular matrix of cartilage. Morpho-functional characteristic of hyaline, elastic and fibrous cartilages. Structure and functional significance of the perichondrium. Development, growth, regeneration and aging changes of cartilage.
- General structure, chemical content and functional significance of bone tissue. Microscopical structure and functional significance of osteoblasts, osteocytes and osteoclasts. Chemical content and properties of the extracellular matrix of bone tissue. Classification of bone tissue. Morpho-functional characteristic of woven and lamellar bone tissues. Structure of tubular bones. Periosteum, its role in structure, nutrition, growth and regeneration of bone. Structure of diaphysis of tubular bone. Osteon, as morpho-functional unit of the bone. Regeneration and aging changes of bones. Direct and indirect osteogenesis.
- General morpho-functional characteristic of muscle tissues and its classification. Structure, origin, localization, features of contraction and regeneration of smooth muscle tissue. Structure and localization of striated skeletal muscle tissue. Structure of muscle fiber. Microscopic and ultramicroscopic structure of myofibril. Sarcomere. Types of muscle fibers and its functional particularities. Mechanism of the muscle contraction. Structure of muscle as an organ. Features of regeneration. Particularities of histological structure, development, localization and regeneration of cardiac muscle tissue.
- Morpho-functional characteristic and sources of the development of nervous tissue. Morphological and functional classification of nerve cells. General structure of the neuron. Structural-functional particularities of the perikaryon and processes. Classification, structure and significance of different types of neuroglia.
- General characteristic and classification of nerve fibers. Thin structure of myelinated and unmyelinated nerve fibers.
- General morpho-functional characteristic and classification of nerve endings. Classification, structure and functions of receptors. Notion about the synapse. Classification, structure, mechanism of the transmission of stimulation in the interneural synapse. Classification and structure of effectors.
- Structure of simple and compound reflex arcs.

## **MODULE II. Special histology and embryology**

### ***Content module 3. Histology and embryology of regulatory and sensory systems***

- Classification and functional significance of arteries of different types. Morpho-functional characteristic of arteries of muscular and muscular-elastic types. Structure of arteries of elastic types. Particularities of the tunica media of aorta. General distinctions in the structure of veins in comparison with the wall of arteries. Particularities of the structure of veins of muscular and unmuscular types. Morpho-functional characteristic and significance of the vessels of the microcirculatory bed. Structure of the wall of blood capillary. Classification of haemocapillaries dependent on structure of endothelium and basement membrane. Particularities of the microscopic structure of the wall of arteriole, venule and its functions. Classification and functions of the arteriolo-venular anastomoses. Morpho-functional characteristic and sources of development of lymphatic vessels.
- Sources of the development and particularities of histogenesis of heart. General structure of the wall of heart. Structure of endocardium and its structural similarity with blood vessels. Morpho-functional characteristic of the contractile cardiac muscle cells of myocardium. Characteristic of the conducting system of the heart. Features of the structure of conducting cardiac muscle cells. Structure of epicardium and pericardium. Aging changes of the heart. Modern view about regeneration and transplantation of the heart.
- General structure, functional significance and classification of the haemopoietic organs and organs of immune protection. Notion about stem and hemistem cells of haemopoietic tissue. Modern scheme of haemopoiesis. Morphological characteristic and localization of myeloid and lymphoid system of haemopoiesis. Notion about immunity, immune system and its tissue components. Characteristic of immune cells and its interaction in the reactions of humoral and cell mediated immunities. Structural components of bone marrow and its functional significance. Aging changes and regeneration of bone marrow. General characteristic of thymus as the central organ of haemopoiesis and immune protection. Structure of the cortex and medulla of the lobule of thymus. Characteristic of age and accidental involution of thymus. Notion about thymus-lymphatic status, its morphological manifestations and importance for organism.

- Development, general structure and functional significance of lymph node. Structure of the cortex and characteristic of the cellular content of follicles. Morpho-functional characteristic and significance of the medulla. Cellular content and functions of the paracortex of lymph node. Structure and functional significance of lymphatic sinuses. Role of reticular cells in the protective reactions of organism. Morphology and functions of haemolymphatic nodes.
- General structure of spleen and its functional significance for organism. Features of the embryonic and postembryonic haemopoiesis in spleen. Microscopic structure of white pulp of spleen. Morpho-functional characteristic of red pulp of spleen. Particularities of blood supply of spleen, structure and functions of venous sinuses. Elements of macrophage system in haemopoietic organs and its role in protective reactions of organism. Participation of lymph organs in proliferation, maturation of T- and B-lymphocytes, its differentiation.
- Morpho-functional characteristic, classification and sources of the development of nervous system. General marks of structural organization of nervous centers. Brain membranes. Blood-brain barrier.
- Morpho-functional characteristic and embryogenesis of the spinal cord. Structure of the grey matter: neuron content, nuclei. Structure of the white matter: basic ascending and descending conducting ways. Types and localization of the neuroglia of spinal cord.
- Reflex arc, its types and morphological components.
- Histological structure and development of the cerebral cortex of brain. Characteristic of the neuron content of cerebral cortex layers. Particularities of the structure of granular and agranular types of cerebral cortex and its functional significance. Myeloarchitectonics of cerebral cortex. Notion about cerebral module. Structural organization of basic nuclei of the brain stem.
- Principles of organization of ascending conducting ways.
- General structure and functions of cerebellum. Neuron content of the cerebellar cortex layers. Interneuron communication. Characteristic of the afferent and efferent fibers of cerebellum. Structure and functional significance of glial cells of cerebellum.
- Development, general structure and functional significance of the spinal ganglion. Morphological and functional particularities of sensory neurons and neuroglial element of spinal ganglion.
- General morpho-functional characteristic and classification of the autonomic (vegetative) nervous system. Particularities of the histological structure of vegetative ganglion. Structure of extra- and intramural ganglia. Classification of neurons by O. S. Dogeli. Content parts of sympathetic and parasympathetic parts of autonomic nervous system and its action on functions of organs. Vegetative reflex arc, its morphological components. Notion about analyzers and its morphological components.
- Classification of sense organs by origin and structure of receptor cells. Morpho-functional characteristic of taste organ. Structure of taste bud. Histophysiology of the taste analyzer. Morpho-functional characteristic of the smell organ. Structure of the smell bud. Histophysiology of the smell analyzer.
- General structure and morpho-functional characteristic of the organ of vision. Sources of the development and basic steps of the embryogenesis of organ of vision. Content parts of dioptric, accommodative and receptor apparatus of the eye globe. Structure and functions of the outer fibrous tunica of the eye globe. Structural organization and significance of components of vascular tunica (proper vascular tunica, iris, ciliary body). Microscopic structure of lens and vitreous body. Structure and functions of visual part of retina. Neuron content. Histophysiological characteristic of photoreceptor cells. Characteristic of macula lutea and blind macula of retina. Structure and functions of structures of auxiliary apparatus of the eye.
- General structure and sources of development of organ of hearing and equilibrium. Structure of the external and middle ear. Thin structure and significance of the tympanic membrane and auditory ossicles. Structural organization of the osseous and membranous labyrinths of the inner ear. Structure of the walls of cochlea duct. Localization, structure and functions of supporting and sensory cells of organ of Corti. Structure of the vestibular part of the membranous labyrinth. Morphological and functional particularities of the maculae of sacculus, utriculus and crista ampullaris of semicircular ducts. Histophysiology of organ of hearing and equilibrium. Structural organization and sources of development of cardio-vascular system. General structure of the wall of blood vessels and its features in connection with haemodynamic conditions of functioning.
- General morpho-functional characteristic of endocrine system. Classification of endocrine glands. Hormones, mechanism of its action and significance for organism. Notion about target cells and receptors for hormones. Morpho-functional characteristic of large-cellular and small-cellular nuclei of hypothalamus. Particularities of structure and functions of neurosecretory cells. Notion about hypothalamus-adenohypophysis systems and its participation in neuro-humoral regulation of organism. Characteristic of transadenohypophysial and parahypophysial influences of hypothalamus on endocrine organs. Development, general structure and functions of hypophysis. Morpho-functional characteristic and classification of cells of anterior lobe of hypophysis. Trope hormones and their significance in the regulation of endocrine glands. State

- of endocrine cells of adenohypophysis at violations of hormone status of organism. Structure and significance of intermediate and tuberal lobes of hypophysis. Particularities of structure of posterior lobe of hypophysis. Role of neurohypophysis in excretion into the blood hormones of anterior hypothalamus. Embryogenesis, structure and functional significance of pineal gland.
- Development, general structure and functional significance of thyroid gland. Morpho-functional characteristic of the follicle. Morphological particularities and functions of follicular cells and C-cells. Microstructure of the follicle dependent on functional activity of follicular cells. Interfollicular epithelium and its functional significance. Characteristic of phases of secretory cycle of follicle of thyroid gland. Embryonic development, structure and functional significance of parathyroid glands.
  - Histogenesis of the cortex and medulla of adrenal gland. Particularities of structure of endocrine cells of zona glomerulosa, fasciculata and reticular of adrenal cortex. Morpho-functional characteristic of chromaffin cells of adrenal medulla. Participation of adrenal glands in protective reactions of organism. Communication of adrenal glands with hypothalamus, hypophysis and sympathetic part of nervous system. Localization, sources of development and classification because of origin of single hormone producing cells of nonendocrine organs. Role of hormones of endocrine cells APUD-system in regulation of organ functions. Features of paracrine (placed) and distant regulation of organs and system of organs.

***Content module 4. Special histology and embryology of the skin, its derivatives and digestive organs***

- Sources of development, general structure, tissue content and functions of skin. Microscopic structure of cells of different layers of epidermis. Characteristic of keratinization process and physiological regeneration of epidermis of skin. Particularities of structure of “thick” and “thin” skin. Morphological characteristic and significance of dermis. Sources of development, structure and functional significance of hypodermis. Features of structure of skin in the different regions of skin. Thin structure and physiological significance of sweat and sebaceous glands of skin. General structure, growth and changing of hair. Particularities of the structural organization of nail.
- General morpho-functional characteristic and sources of development of digestive system. Division of digestive tube on regions dependent on structure and functions. General structure of the wall of digestive tube, particularities of structural organization of its tissue content in the different regions of digestive tube. Particularities of the tunica mucosa of the organs of oral cavity (lips, cheeks, gums, hard and soft palates). Tissue content and features of structure of the tongue on different its surfaces. Morpho-functional characteristic, classification and localization of tongue papillae. Structure and functions of taste bud.
- Sources of development, general structure and tissue content of tooth. Histological structure, chemical content of enamel, dentin and cement. Structure and functions of pulp and periodontum. Characteristic and features of the teeth changing. Deciduous and permanent teeth.
- Histological structure of the wall of pharynx. Structural components and functional significance of the lympho-epithelial ring of Pirogov. Morphology, function and regeneration of palatine tonsil.
- Sources of development, general structure of the wall of esophagus and its functional significance. Particularities of structure of tunics in the different parts of esophagus. Microscopic structure, localization and functions of esophageal glands. Age changes and regeneration of the esophagus.
- Development, general structure of the stomach and its functional significance. Particularities of the structure of tunics and relief of stomach in different its regions. Types, localization and general structure of gastric glands. Cellular content and functional significance of proper gastric glands. Morpho-functional features of pyloric and cardiac glands of stomach.
- Regeneration and age features of the stomach.
- Embryonic development, regions and tissue content of tunics of small intestine. Particularities of relief of the tunica mucosa of small intestine. Cellular content and functional significance of the system “crypt-villus”. Morpho-functional characteristic of epithelial cells of villi and crypts of tunica mucosa of small intestine. Histophysiology of absorption and role of microvilli of columnar epithelial cells in the parietal digestion. Particularities of structure of tunica submucosa of small intestine. Thin structure of the duodenal glands and its function. Localization and functional significance of aggregated lymphatic follicles (Peyer’s patches) in the wall of small intestine. Structure of muscularis externa and tunica serosa of small intestine in different its regions.
- Sources of embryonic development of large intestine. General morpho-functional characteristic and structure of the wall of large intestine. Particularities of the relief of tunica mucosa of large intestine. Histophysiology of the absorption in the large intestine. Structure and functions of appendix.
- Development, classification and general structure of large salivary glands. Particularities of the structure of the terminal secretory parts of parotid, submandibular and sublingual salivary

- glands. Basic microscopic and ultramicroscopic signs of mucous and serous cells. Morpho-functional characteristic of excretory ducts of large salivary glands.
- Sources of development and general structure of the pancreas. Morphology and functional significance of the exocrine part of pancreas. Microscopic structure of the acinus. Intercommunication between terminal secretory parts and intercalated excretory duct. Particularities of structure and functions of the excretory ducts. Structural organization of the endocrine part of the pancreas. Cellular content and morpho-functional characteristic of endocrine cells of pancreatic islets.
- Sources of the development and general morpho-functional characteristic of liver. Thin structure of the classical hepatic lobule. Structural organization of hepatic cords, morpho-functional characteristic of hepatocytes. Circulatory system of the liver and particularities of its blood supply. Particularities of the structure of intralobular haemocapillaries. Significance of the space of Disse. Notion about portal lobule and liver acinus. Morphological characteristic of the bile-excreting ways. Microscopic structure of the bile canaliculi and bile ducts. Sources of development, structure and functional significance of the gallbladder.

*\Content module 5. Special histology and embryology of the respiratory, urinary and reproductive systems*

- General morpho-functional characteristic of respiratory system and its significance. Sources of development, content parts and functional significance of air conducting ways. Structural particularities and functions of the epithelium of air conducting ways. Features of the structure of tunica mucosa of nasal cavity. Structure and functions of larynx, significance of vocal ligaments.
- General structure of the wall of trachea, role of fibrous-cartilage tunica. Structural organization of the bronchial tree and general structure of the wall of bronchi. Particularities of structure of bronchi dependent on caliber.
- Morpho-functional characteristic of acinus as morpho-functional unit of respiratory part of lungs. Cellular content of alveoli, morphological characteristic of alveolar cells. Microscopic and ultramicroscopic structure of blood-air barrier.
- Morpho-functional characteristic and functional significance of the urinary system. Sources and basic steps of the embryonic development of kidney. Structural organization and microscopic structure of the cortex and medulla of kidney. Particularities of the blood supply of kidney. Types, localization and parts of nephron. Structure and functional significance of cortical nephrons. Histophysiology of the nephron and collecting tubules connecting with the mechanism of the urine formation. Histophysiological particularities of the juxtaglomerular nephrons. Structural components and functional significance of the endocrine apparatus of kidney. General characteristic and functional significance of the urine excretory ways. Structure and physiological particularities of the transitional epithelium. Particularities of the structure of the wall of ureter. Histological structure and functions of the urinary bladder.
- Particularities of the structure of the urethra in male and female. Development and general morpho-functional characteristic of male reproductive system. General structure and functions of testis. Characteristic of spermatogenesis, its regulation. Particularities of the structure of spermatogenic cells on the different stages of development. Structure and functions of convolutes seminiferous tubules of testis. Structure and significance of blood-testis barrier. Morpho-functional characteristic of endocrine cells of testis. Structure of the wall of tubules in epididymis. Morphology and functional significance of deferent and ejaculatory ducts. General structure and functions of prostate gland. Structure of the terminal secretory parts and excretory ducts of prostate. Structure and functions of seminal vesicles and bulbourethral glands. Hormone connection between hypophysis and male reproductive system.
- Development and general morpho-functional characteristic of female reproductive system. Development and general structure of the ovary. Structure of the primordial, primary, secondary and mature follicles. Dynamic of its development. Stages of the formation of corpus luteum. Atresia of follicles. Basic differences of the arteric body from corpus albicans and corpus luteum. Biological sense and hormonal regulation of ovulation. Age particularities of the ovary structure.
- General structure of the wall of the uterine tubes. Particularities of the relief of tunica mucosa and cellular content of the epithelium.
- General structure of the wall and functions of uterus. Characteristic of basal and functional layers of endometrium of uterus and particularities of its vessels. Particularities of histophysiology of myometrium and perimetrium. Restructure of the uterus at time of pregnancy and after delivery. Ovarian-menstrual cycle, characteristic of cyclic changes in the ovary, uterus and vagina in the different phases of the cycle. Action of hypophyseal hormones and action of hypothalamic centers of regulation of ovarian-menstrual cycle.
- Development and general structure of the mammary gland. Thin structure of the terminal secretory parts and excretory ducts before lactation. Particularities of the structure of

parenchyma of mammary gland at time of lactation and in no lactation. Hormone connection of hypophysis with mammary gland. Modern methods of contraception.

#### **15. LIST OF PRACTICAL SKILLS AND TASKS TO THE FINAL MODULE CONTROL**

- diagnostics and description of a histological preparation using a light-optical microscope;
- knowledge of structures on electronic microphotography ;

#### **16. METHODS AND FORMS OF IMPLEMENTATION OF THE CONTROL**

During the course of studying the discipline, all activities of the student are subject to control, both current (at each lesson) and final (during control events).

Module control is a diagnosis of the student's assimilation of the module material (credit score). The academic year includes two of the final module control.

The initial control of students ' knowledge is carried out during practical classes and includes checking the knowledge of theoretical and practical material that was studied in previous courses, it is carried out by means of a frontal oral survey, writing control papers, which uses questions for control papers.

The current control of students ' knowledge is carried out during practical classes and includes checking the knowledge of theoretical material and mastering practical skills, which are provided by the methodological developments of classes on the relevant topics. Students ' knowledge is checked by means of an oral frontal survey, solving test tasks of various degrees of severity, solving typical and atypical situational tasks, as well as checking the correctness of performing diagnostics of histological specimens and electronic microphotographs.

Intermediate control of students ' knowledge is carried out during the final control works during the last session of the content module.

Final control of students ' knowledge is carried out at the last practical lesson after completing the module in the form of final module control. Students are asked about their knowledge of the theoretical material (according to the list of questions). Along with this, students perform practical work that is attached to the ticket and solve situational problems, which is also taken into account when evaluating their knowledge.

The final module control (FMC) is performed after completing the study of all the topics of the module in the last control session of the module.

Before final module control students who attended all included in the curriculum for the discipline of classroom training and received a positive assessment ("5", "4", "3"), and the study module scored points not less than the minimum.

A student who has missed classes for good or no good reason is allowed to work out the academic debt up to a certain period.

The *maximum balls* of points that a student can get when passing the final module control is 80.

The final module control is considered credited if the student has *scored at least 50 balls*.

The final module control in Histology, Cytology and Embryology consists of two parts. The first part is performing test tasks in a computer class. If the result is unsatisfactory, the student is not allowed to enter the second part of the module. The second part-diagnostics and description of two histological preparations, one electronic microphotography and two theoretical questions (according to the list of questions). The student's response is evaluated in accordance with the developed and approved evaluation criteria for Histology, Cytology, and Embryology.

The maximum number of balls for the module final control is 80.

The module is considered credited if the student has scored at least 50 balls.

The final module control includes:

1. Solving 50 test tasks (1 correct answer – 0.5 balls, the maximum correct answer -25 balls).
2. One electronic microphotograph (maximum balls – 5).
3. Control of the level of theoretical training of students. Each student is offered 2 theoretical answer, which are rated at 20 balls for each (40 balls in total).
4. Checking the level of assimilation of practical skills is carried out by diagnosing two histological specimens using a light-optical microscope (only 10 balls).

#### **17. EVALUATION OF THE LEVEL OF STUDENT TRAINING IN THE DISCIPLINE**



Procedure, methods and criteria for assessing the current educational activities, methods and criteria for assessing during the final module control, assessment of the discipline as a whole).

**Distribution of points assigned to students** (with notes: - on the maximum and minimum number of points for studying the module, - on the conversion of points into traditional grades "5", "4", "3", "2" when mastering the topic of the module; - on the minimum number of points for admission to the final modular control (FMC); - the minimum number of points for the modular control).

Number of module number of study hours / number of credits ECTS	Number of content modules, their numbers	Number of practical classes	Conversion into point of the traditional scale					Scores for individual task	Minimum score *
			Traditional scale						
			"5"	"4"	"3"	"2"			
Модуль 1 143/4,8	2 (№№ 1-2)	20	5,7	4,5	3,5	0	6	<b>70</b>	
Модуль 202/6,7	3 (№№ 6-8)	31	3,7	3	2,5	0	5,3	<b>77,5</b>	

The maximum balls that a student can get when studying the module is calculated by multiplying the balls corresponding to the "5" rating by the balls of topics in the module with the addition of balls for individual work:  $120=(5,7 \times 20) +6$ ;  $120=(31 \times 3,7)+6$ .

The minimum balls for full-time students that a student can get when studying the module is calculated by concluding the balls corresponding to the "satisfactory" rating in each lesson:  $70=3.5 \times 20$ ;  $77,5=5.3 \times 31$ .

## 18. RECOMMENDED LITERATURE

### 19.1 Basic

- Ross, Michael. Histology: A Text and Atlas: атлас / M. H. Ross, G. I. Kaye, W. Pawlina. - 4th ed. - Philadelphia; Baltimore ; New York : Lippincott Williams & Wilkins, 2003. - 875 p.
- Inderbir Singh. Textbook of Human Histology: with Colour Atlas and Practical Guide / Inderbir Singh. - 6th ed. - New Delhi; St. Louis: Jaypee Brothers Medical Publishers (P) LTD, 2011. - 386 p.
- Histology and cell biology. Johnson, K.E. Pennsylvania. 1991.
- Textbook of Human Histology [Text] : with Colour Atlas and Practical Guide / Inderbir Singh. - 6th ed. - New Delhi ; St. Louis : Jaypee Brothers Medical Publishers (P) LTD, 2011.
- Color Textbook of Histology [Text] : [textbook] / Leslie P. Gartner, James L. Hiatt. - 3rd International ed. - Philadelphia : Saunders Elsevier, 2007. - 573 p.

### 19.2. Auxillary

- Medical Embryology. Langman J. Baltimore. Wilkins Co. 1969.
- Atlas of Normal Histology /Mariano S.H. di Fiore. – 6<sup>th</sup> ed./ rev. and edited by Victor P.Eroschenko. Philadelphia, London. 1988. – 267 p.
- Atlas of Histology. Leeson, R.C., Leeson, T.S. and Paparo A.A. Saunders Co. 1985.
- Johanes, A.Y., and Rhodin M.D.: An Atlas of Ultrastructure. Philadelphia, London, Saunders Co., 1963.
- Tissues and organs: a text atlas of scanning electron microscopy. – Kessel RG, Kardon RH. – Freeman Co. – 1979.
- Young, Barbara. Wheater's Functional Histology: a Text and Colour Atlas / B. Young, J. W. Heath. - 4th ed., international. - Edinburgh; London : Churchill Livingstone, 2000. - 413 p.

7. Geneser, Finn. Color Atlas of Histology / F. Geneser. - New Delhi: Jaypee Brothers Medical Publishers (P) LTD, 2005. - 231 p.
8. Douglas F. Paulsen. Basic Histology. – Prentice - Hall International Inc. – 1990.

#### 19.3 Information resources

1. <http://moodle.bsmu.edu.ua>
2. [http://nsau.edu.ru/downloads/library/ugebnik/gistologi/pages/frameset\\_book.htm](http://nsau.edu.ru/downloads/library/ugebnik/gistologi/pages/frameset_book.htm)
3. <http://www.anatomyatlases.org/MicroscopicAnatomy>
4. [histo\\_gram\\_cv](#)

#### **20. COMPILERS OF THE STUDENT HANDBOOK (SYLLABUS)**

1. Chernikova G.M. – associate Professor of histology, Cytology and embryology, Ph.D. in Medicine
2. Khodorovska A.A. – associate Professor of histology, Cytology and embryology,, Ph.D. in Medicine