

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE  
ODESA NATIONAL MEDICAL UNIVERSITY**

**Department of INTERNAL MEDICINE No.2**

**APPROVED**  
*Vice-rector for scientific and pedagogical work*  
Eduard BURIACHKIVSKYI  
September 01, 2024



**WORK PROGRAM FOR THE ELECTIVE DISCIPLINE  
«ASSESSMENT OF THE HUMAN IMMUNE SYSTEM»**

**Speciality 222 «Medicine»**  
**Branch of knowledge 22«Health Care»**  
**Educational qualification «Master of Medicine»**  
**Professional qualification «Doctor»**

The work program is based on the educational and professional program "Medicine" for the training of specialists of the second (master's) level of higher education in the specialty 222 "Medicine" of the field of knowledge 22 "Health Care", approved by the Academic Council of ONMedU (Minutes No. 10 of June 27, 2024).

Developed by:

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Work program approved at the meeting of the Department of Internal Medicine No. 2 Minutes №1 dated August 27, 2024.

A.i. Head of the Department *[Signature]* Olena KHYZHNYAK

Agreed with the guarantor of the EPP *[Signature]* Valeriia MARICHEREDA

Approved by the Subject-Cycle Methodological Commission for Therapeutic Disciplines of ONMedU Minutes No. 1 dated August 30, 2024.

Chairman of the Subject-Cycle Methodological Commission for Therapeutic Disciplines, Doctor of Medicine, Professor *[Signature]* Olena VOLOSHYNA

Revised and approved at the meeting of the Department of Internal Medicine #2  
with postgraduate training

Minutes No. 1 dated "02" September 2024 p.

Head of the Department *[Signature]* OLENA VOLOSHYNA

Revised and approved at the meeting of the \_\_\_\_\_  
Minutes No. \_\_\_\_ dated "\_\_\_\_" \_\_\_\_\_ 20\_\_ p.

Head of the Department \_\_\_\_\_

## 1. Description of the course

Name of indicators	Field of knowledge, specialty, specialization, level of higher education	Characteristic academic discipline
General number:	Branch of knowledge 22«Health Care»  Speciality 222 «Medicine»  Level of higher education Second «Master of Medicine»	<i>Full time form study</i>
Credits: 3		<i>Elective discipline</i>
Hours: 90		<i>Study year: 6</i>
Content sections: 2		<i>Semesters XI - XII</i>
		<i>Lectures (0 h.)</i>
		<i>Seminars (0 h.)</i>
		<i>Practical's (30 h.)</i>
		<i>Laboratory (0 h.)</i>
		<i>Independent Work (60 h.)</i>
		<i>Form of final control – credit</i>

## 2. The aim and objectives of the discipline, competencies, program learning outcomes.

The purpose an elective discipline (ED) is to form in future doctors an idea about the regularities of immune system functioning, to get acquainted with the methods of clinical and laboratory diagnosis of immunodeficiency and allergic diseases.

### The main objectives of the ED are to acquire knowledge about:

- clinical signs of immunodeficiency diseases.
- modern methods of immune status research.
- assessment of the patient's immune status according to basic immunolaboratory methods and principles of interpretation of leukograms and immunograms.
- modern principles of allergic diseases diagnosis.

### Program competencies.

*Integral competence.* The ability to solve typical and complex problems in the field of clinical immunology and allergology. Ability to continue learning with a high degree of autonomy.

*General competencies (GC).*

GC1. Ability to abstract thinking, analysis and synthesis.

GC 3. Ability to apply knowledge in practical situations.

GC 5. Ability to adapt and act in a new situation.

GC 6. Ability to make reasonable decisions.

GC 7. Ability to work in a team.

GC 8. Ability to interpersonal interaction.

GC 10. Ability to implement information and communication technologies

GC 11. Ability to search, process and analyze information from various sources.

*Special (professional, subject) competencies (SC):*

SC1. Ability to collect medical information about the patient and analyze clinical data.

SC 2. Ability to determine the necessary list of laboratory and instrumental studies and evaluate their results.

SC 7. Ability to diagnose emergency conditions in allergology.

SC 8. Ability to determine tactics and provide emergency medical care.

SC 9. Ability to carry out medical and evacuation measures.

SC 11. Ability to solve medical problems in new or unfamiliar environments with incomplete or limited information, taking into account aspects of social and ethical responsibility, including early intervention.

Program learning outcomes (PLO):

Higher education applicant **should know:**

PLO 2. Fundamentals of basic, clinical biochemical sciences at a level sufficient to solve professional problems in the field of health care, in particular clinical immunology and allergology.

Higher education applicant **should be able to:**

PLO 4. Identify the leading clinical symptoms and syndromes of emergency conditions in immunology and allergology; use preliminary anamnesis data, patient examination data, and establish a preliminary diagnosis of the disease according to standard methods.

PLO 7. To prescribe and analyze mandatory and additional methods of examination (laboratory, functional, instrumental) for differential diagnosis in immunology.

PLO 8. Identify the main clinical syndrome or symptom that determines the severity of the patient's condition (in a health care setting, outside the health care setting), in conditions of lack of information and limited time.

PLO 9. Determine the nature and principles of patient treatment in a health care facility, outside the facility and at the stages of medical evacuation based on a preliminary diagnosis, adhering to relevant ethical and legal standards.

PLO 14. Determine the tactics and provide emergency medical care in case of emergencies in a limited time in accordance with current clinical protocols and standards of care.

PLO 16. To formulate rational medical routes for patients; to organize interaction with colleagues in their own and other institutions.

### **3. Content of the discipline.**

The ED program consists of 2 content modules (CM):

CM 1. Patterns of functioning and methods of studying the state of the immune system.

CM 2. Diagnosis of allergic diseases.

The following topics will be considered and discussed in the form of seminars:

#### **Topic 1. Functioning patterns of the immune system.**

Definition and types of immunity. Central and peripheral organs of the immune system. Factors of innate immunity: cellular (monocyte-macrophage system, killer and granulocyte cells), humoral (complement system, cytokines, etc.). Specific immunity, its features, stages of formation and cooperation of immunocompetent cells that participate in the formation of the immune response. Mechanism of antigen presentation. Populations (T- and B-lymphocytes) and subpopulations (T-helper types 1, 2 and 17, T-regulatory, T-CTL) of lymphocytes, stages of their maturation and differentiation, their function. The main complex of histocompatibility: structure, properties, function. Patterns of cellular and humoral immune response formation. General patterns and mechanisms of the immune response.

### **Topic 2. Clinical methods of assessing the human immune status.**

Features of immunological anamnesis. Clinical methods of evaluating the immune system. Instrumental methods of assessing the immune system. Comprehensive assessment of local immunity.

Warning and probable signs of primary and secondary immunodeficiency conditions in humans.

Immunological tests of the first and second level. Indications for the study of the immune status of a person. Principles of basic laboratory methods of research of the immune system and its disorders: electrophoresis; immunoelectrophoresis; immunofixation; enzyme immunoassay; immunoblotting; agglutination; radioimmunoassay; immunoprecipitation; immunofluorescence analysis; flow cytometry; immunochromatographic analysis; polymerase chain reaction. A comprehensive approach to assessing a person's immune status. Immunogram, interpretation of results. Possibilities and limitations of immunological methods in the clinic.

### **Topic 3. Human cellular immunity state assessment.**

Immunophenotyping. Cellular expression of the most significant CD molecules.

Modern methods of studying the state of cellular immunity and their interpretation: visual streptavidin-biotin method; lymphocytolysis reaction; determination of cytotoxic activity of lymphocytes; phagocytic activity of neutrophils; NST test; determination of the metabolic activity of neutrophils by the chemiluminescence method; the reaction of inhibiting the migration of leukocytes; lymphocyte blast transformation reaction; method of immunomagnetic separation of cells; the method of immune spots (ELISPOT).

Clinical interpretation of changes in the absolute and percentage content of cells of the immune system in various pathological conditions of the human body.

### **Topic 4. Human humoral immunity state assessment.**

Mechanisms of humoral immune response formation. Factors of the humoral immune response. Mechanism of formation of primary and secondary humoral immune response.

The structure of immunoglobulins. Concepts of affinity and avidity. The role of immunoglobulins in the immune response. Functional significance of the main classes of immunoglobulins.

Deviations of immunoglobulins in children. The value of the complement system in the process of the immune response.

Cytokines. Participation of cytokines in immune response mechanisms. Chemokines. Scheme of providing cytokines for the antibacterial immune response. Proteins of the immune system.

#### **Topic 5. Methods of allergy diagnosis.**

Classification of hypersensitivity reactions according to Gel and Coombs. The main mechanisms of the occurrence and development of immunopathological conditions, their role in the development of various diseases. Mechanisms of development of anaphylactic reactions. Mechanisms of development of humoral cytotoxic reactions. Mechanisms of reaction development of immune complex formation. Mechanisms of development of pathological immune reactions mediated by T-sensitized lymphocytes. Mechanisms of autosensitization caused by antibodies.

Problematic aspects of the diagnosis of allergic diseases. IgE-positive and IgE-negative forms of allergic diseases. Pseudoallergy. Causes of pseudoallergic reactions. Characteristics of the most significant allergens. Candidate genes for atopy and bronchial asthma.

Diagnosis of allergic diseases: allergy history; review; functional research methods; allergy diagnosis methods. Concept of molecular allergology.

#### **4. Structure of the discipline**

Topic	Hours					
	Total	Lectures	Seminars	Practical	Laboratory	IW
<b>CM 1. The structure of the immune system and the principles of the functioning of the immune system.</b>						
Topic 1. Functioning patterns of the immune system.	21	-	-	6	-	15
Topic 2. Clinical methods of assessing the human immune status.	16	-	-	6	-	10
Topic 3. Human cellular immunity state assessment	16	-	-	6	-	10
Topic 4. Human humoral immunity state assessment.	16	-	-	6	-	10
<b>CM 2. Allergic diseases.</b>						
Topic 5. Methods of allergy diagnosis.	19	-	-	4	-	15
Final lesson. Credit.	2	-	-	2	-	-
<b>Total</b>	<b>90</b>			<b>30</b>		<b>60</b>

#### **5. Topics of lectures / seminars / practical / laboratory classes**

##### **5.1. Topics of lectures**

Lectures are not provided.

### 5.2. Topics of the seminars

Seminars are not provided

### 5.3. Topic of Practical classes:

№	Topic	Hours
1	Topic 1. Practical lesson 1/1. Functioning patterns of the immune system.	2
2	Topic 1. Practical lesson 1/1. Functioning patterns of the immune system.	2
3	Topic 1. Practical lesson 1/1. Functioning patterns of the immune system.	2
4	Topic 2. Practical lesson 2/1. Clinical methods of assessing the human immune status.	2
5	Topic 2. Practical lesson 2/1. Clinical methods of assessing the human immune status.	2
6	Topic 2. Practical lesson 2/1 Clinical methods of assessing the human immune status.	2
7	Topic 3. Practical class 3/1. Human cellular immunity state assessment	2
8	Topic 3. Practical class 3/1. Human cellular immunity state assessment	2
9	Topic 3. Practical class 3/1. Human cellular immunity state assessment	2
10	Topic 4. Practical class 4/1. Human humoral immunity state assessment.	2
11	Topic 4. Practical class 4/1. Human humoral immunity state assessment.	2
12	Topic 4. Practical class 4/1. Human humoral immunity state assessment.	2
13	Topic 5. Practical class 5/1. Methods of allergy diagnosis.	2
14	Topic 5. Practical class 5/1. Methods of allergy diagnosis.	2
15	Final lesson. Credit.	2
<b>Total</b>		<b>30</b>

### 5.4. Topics of laboratory classes:

Laboratory classes are not provided.

## 6. Independent work of a higher education applicant

№	Topic title / types of tasks	Hours
1.	<b>Topic 1. Functioning patterns of the immune system.</b> Definition and types of immunity. Central and peripheral organs of the immune system. Factors of innate immunity: cellular (monocyte-macrophage system, killer and granulocyte cells), humoral (complement system, cytokines, etc.). Specific immunity, its features, stages of formation and cooperation of immunocompetent cells that participate in the formation of the immune response. Mechanism of antigen presentation. Populations (T- and B-lymphocytes) and subpopulations (T-helper types 1, 2 and 17, T-regulatory, T-CTL) of lymphocytes, stages of their maturation and differentiation, their function. The main complex of histocompatibility: structure, properties, function. Patterns of cellular and humoral immune response formation. General patterns and mechanisms of the immune response.	15
2.	<b>Topic 2. Clinical methods of assessing the human immune status.</b> Features of immunological anamnesis. Clinical methods of evaluating the immune system. Instrumental methods of assessing the immune system.	10

	<p>Comprehensive assessment of local immunity. Warning and probable signs of primary and secondary immunodeficiency conditions in humans.</p> <p>Immunological tests of the first and second level. Indications for the study of the immune status of a person. Principles of basic laboratory methods of research of the immune system and its disorders: electrophoresis; immunoelectrophoresis; immunofixation; enzyme immunoassay; immunoblotting; agglutination; radioimmunoassay; immunoprecipitation; immunofluorescence analysis; flow cytometry; immunochromatographic analysis; polymerase chain reaction. A comprehensive approach to assessing a person's immune status. Immunogram, interpretation of results. Possibilities and limitations of immunological methods in the clinic.</p>	
3	<p><b>Topic 3. Human cellular immunity state assessment.</b></p> <p>Immunophenotyping. Cellular expression of the most significant CD molecules. Modern methods of studying the state of cellular immunity and their interpretation: visual streptavidin-biotin method; lymphocytolysis reaction; determination of cytotoxic activity of lymphocytes; phagocytic activity of neutrophils; NST test; determination of the metabolic activity of neutrophils by the chemiluminescence method; the reaction of inhibiting the migration of leukocytes; lymphocyte blast transformation reaction; method of immunomagnetic separation of cells; the method of immune spots (ELISPOT). Clinical interpretation of changes in the absolute and percentage content of cells of the immune system in various pathological conditions of the human body.</p>	10
4	<p><b>Topic 4. Human humoral immunity state assessment.</b></p> <p>Mechanisms of humoral immune response formation. Factors of the humoral immune response. Mechanism of formation of primary and secondary humoral immune response.</p> <p>The structure of immunoglobulins. Concepts of affinity and avidity. The role of immunoglobulins in the immune response. Functional significance of the main classes of immunoglobulins. Deviations of immunoglobulins in children. The value of the complement system in the process of the immune response.</p> <p>Cytokines. Participation of cytokines in immune response mechanisms. Chemokines. Scheme of providing cytokines for the antibacterial immune response. Proteins of the immune system.</p>	10
5	<p><b>Topic 5. Methods of allergy diagnosis.</b></p> <p>Classification of hypersensitivity reactions according to Gel and Coombs. The main mechanisms of the occurrence and development of immunopathological conditions, their role in the development of various diseases. Mechanisms of development of anaphylactic reactions. Mechanisms of development of humoral cytotoxic reactions. Mechanisms of reaction development of immune complex formation. Mechanisms of development of pathological immune reactions mediated by T-sensitized lymphocytes. Mechanisms of autosensitization caused by antibodies.</p> <p>Problematic aspects of the diagnosis of allergic diseases. IgE-positive and IgE-negative forms of allergic diseases. Pseudoallergy. Causes of pseudoallergic reactions. Characteristics of the most significant allergens. Candidate genes for atopy and bronchial asthma.</p> <p>Diagnosis of allergic diseases: allergy history; review; functional research methods; allergy diagnosis methods. Concept of molecular allergology.</p>	
	<b>Total</b>	<b>60</b>



## 7. Training methods

**Practical classes:** explanation, conversation, discussion, discussion of problematic situations, solving clinical situational problems, training exercises on differential diagnosis of immunopathological and allergic conditions.

**Independent work:** work with recommended basic and additional literature, with electronic information resources, independent mastery of communication skills with the patient and his relatives (guardians), work with the bank of laboratory and instrumental research results.

## 8. Forms of control and assessment methods (including criteria for assessing learning outcomes)

**Current control:** oral questioning, assessment of communication skills, solving situational clinical problems, assessment of activity in the classroom.

**Final control:** credit for assessing the completeness of the discipline programme with an additional oral examination.

### Assessment of current learning activities in a practical class:

1. Assessment of theoretical knowledge on the topic of the lesson:

methods: survey, evaluation of activity in the classroom

maximum grade - 5, minimum grade - 3, unsatisfactory grade - 2.

2. Assessment of work with the patient on the subject of the lesson:

- methods: assessment of: a) communication skills of communicating with the patient and his parents, b) the correctness of prescribing and evaluating laboratory and instrumental studies, c) compliance with the differential diagnosis algorithm, d) substantiation of the clinical diagnosis, e) drawing up a treatment plan

- maximum score – 5, minimum score – 3, unsatisfactory score – 2;

### Current assessment criteria for the practical class:

«5»	The student has a fluent command of the material, takes an active part in discussing and solving a situational clinical problem, confidently demonstrates practical skills during the examination of a sick child and the interpretation of clinical, laboratory and instrumental research data, expresses his opinion on the topic of the lesson, demonstrates clinical thinking.
«4»	The student has a good command of the material, participates in the discussion and solution of a situational clinical problem, demonstrates practical skills during the examination of a sick child and the interpretation of clinical, laboratory and instrumental research data with some errors, expresses his opinion on the topic of the lesson, demonstrates clinical thinking.
«3»	The student does not have sufficient knowledge of the material, is unsure of participating in the discussion and solution of a situational clinical problem, demonstrates practical skills during the examination of a sick child and the interpretation of clinical, laboratory and instrumental research data with significant errors.
«2»	The student does not master the material, does not take part in the discussion and solution of the situational clinical problem, does not demonstrate practical skills during the examination of a sick child and the interpretation of clinical, laboratory and instrumental research data.

Credit is assigned to an applicant who has completed all the tasks of the work programme of the discipline, actively participated in seminars and has a current average grade of at least 3.0 and has no academic debt.

The test is taken at the last class of the discipline. The grade for the test is the arithmetic mean of all components on a traditional four-point scale and has a value that is rounded by the statistical method with two decimal places.

## 9. Distribution of points received by applicants for higher education

The obtained grade point average for the discipline for students who have successfully completed the work program of the discipline is converted from the traditional four-point scale to points on a 200-point scale, as shown in the table:

### Conversion of traditional assessment to multi-point scale

National scale	Point for discipline
«5»	185 – 200
«4»	151 – 184
«3»	120 – 150
«2»	< 120

A multi-point scale (200-point scale) characterizes the actual performance of each student in mastering the educational component. The conversion of the traditional grade (grade point average for a discipline) into a 200-point scale is performed by the University's Information Technology Department.

According to the points obtained on a 200-point scale, the achievements of applicants are evaluated according to the ECTS rating scale. Further ranking on the ECTS rating scale allows to evaluate the achievements of applicants in the educational component who study in one course of one specialty, according to the points they received.

The ECTS scale is a relative and comparative rating system that establishes the applicant's belonging to the group of the best or worst among the reference group of fellow students (faculty, specialty). Grade A on the ECTS scale cannot be equal to grade A, and grade B cannot be equal to grade B, etc. When converting from a multi-point scale, the limits of grades "A", "B", "C", "D", "E" on the ECTS scale do not coincide with the limits of grades "5", "4", "3" on the traditional scale. Applicants who have received grades "FX" and "F" ("2") are not included in the list of ranked applicants. The grade "FX" is assigned to applicants who have scored the minimum number of points for current academic activities, but who have not been credited with the final control. The grade "F" is assigned to applicants who have attended all classes in the discipline, but have not gained an average score (3.00) for current academic activities and are not allowed to take the final control.

Applicants enrolled in the same course (one specialty), based on the number of points gained in the discipline, are ranked on the ECTS scale as follows:

### Conversion of traditional grade in the discipline and the sum of points to the ECTS scale

ECTS scale	Statistical indicator
"A"	The best 10% of students
"B"	The next 25% of students
"C"	The next 30% of students
«D»	The next 25% of students
"E"	The last 10% of students

## 10. Methodological support

Work programme of an elective discipline.

Syllabus of the elective discipline

Methodical instructions for practical classes, which are posted on the department's website

Methodological recommendations for independent work of higher education students.

Multimedia presentations of practical classes.

## 11. Questions for preparing for the final control

1. Basic biological tasks and functions of the body's immune system.
2. Classification of organs of the immune system. Apoptosis (concept and role in the functioning of the body).
3. Differences between specific and non-specific immune response.
4. The main factors of non-specific immune response.
5. The main factors of the specific (adaptive) immune response.
6. Antigen presentation: role in the formation of the immune response. Antigen presenting cells.
7. Phagocytosis: role in implementation of non-specific and specific immune response. Phagocytizing cells.
8. Humoral factors of non-specific immune protection of the body.
9. Killer cells: main types, their functions and features.
10. Granulocytes: functions and role in the immune response. Diagnostic significance in various pathological conditions.
11. Agranulocytes: functions and role in the immune response. Diagnostic significance in various pathological conditions.
12. Complement system. Biological consequences of complement system activation. Ways of activation.
13. B-lymphocytes: markers and functions. Diagnostic significance in various pathological conditions.
14. T-lymphocytes: types and main markers. Diagnostic significance in various pathological conditions.
15. T-helpers of types I and II: differences in mechanisms of action.
16. Immunoglobulins: structure, function, classes. Diagnostic significance of IgM and IgG in various pathological conditions
17. Immunoglobulins: structure, function, classes. Diagnostic significance of IgE and IgA in various pathological conditions
18. Cellular and humoral immune response of adaptive immunity: features and differences.
19. Cytokines: main classes and their functions.
20. The main human histocompatibility complex. Classes of antigens and their role in the formation of the immune response.
21. The main human histocompatibility complex. Concept. Location Mechanisms of imitation.
22. Factors of antibacterial immune protection of the body. Cellular and humoral immune response.
23. Antiviral immune response.
24. Mechanisms of body protection against multicellular parasites.
25. Classification of immunodeficiency states. Diagnostic criteria.
26. Classification of immunodeficiency states. Primary immunodeficiency states with disorders in the humoral (B-cell) and T-cell chain: main syndromes, features of the clinical course, diagnosis, principles of therapy.
27. Classification of immunodeficiency states. Primary immunodeficiency states with phagocyte function deficiency, complement system insufficiency and combined primary immunodeficiency states: main syndromes, features of the clinical course, diagnosis, principles of therapy.
28. Secondary immunodeficiency states: causes, classification, features of the clinical course, diagnosis, principles of therapy.
29. The mechanism of cell-induced cytotoxicity (the mechanism of action of killer cells).
30. The role and mechanisms of participation in antitumor protection of the body of T-killers, T-helpers of type I, natural killers, LAK cells, specific antibodies.
31. Factors immunoresistance of tumors and tumor cells. Antigens of tumor cells. Oncomarkers.

32. Principles of tumor immunotherapy: main groups of drugs. Immunoprophylaxis of tumors.
33. Concept of immune hypersensitivity. Classification according to Gel and Coombs.
34. Concept of immune hypersensitivity. Modern classification of hypersensitivity reactions.
35. Mechanisms of development of anaphylactic reactions. Diseases caused by anaphylactic reactions.
36. Mechanisms of development of cytotoxic reactions. Diseases caused by cytotoxic reactions.
37. Mechanisms of development of immune complex reactions. Diseases caused by immune complex reactions.
38. Mechanisms of development of cell-mediated reactions. Diseases caused by cell-mediated reactions.
39. Mechanisms of the development of reactions of the stimulating type. Diseases caused by reactions of the stimulating type.
40. Causes of the formation of allergic pathology. Stages of pathogenesis of allergic reactions.
41. Classification of allergens.
42. Pseudoallergy: concepts and causes.
43. Allergological history (components). Clinical manifestations of allergic diseases. Provocation tests with allergens.
44. Laboratory methods of diagnosing allergic diseases.
45. Skin allergy tests: types; conducting method; interpretation of results.
46. Drugs for antiallergic therapy: drug groups and main representatives.
47. Antihistamines. The difference between antihistamine drugs of the first generation and the second.
48. Drugs for course therapy of atopic diseases and emergency care.

### **List of practical skills**

1. Assessment of the state of the immune status of the body based on leukogram and immunogram data.
2. Clinical criteria characterizing the presence of primary and secondary immunodeficiency states.
3. Algorithm of treatment measures for anaphylactic shock.
4. Assign emergency care to a patient with acute allergic urticaria and Quincke's edema.

## **12. Recommended literature.**

### **Basic**

#### **Main:**

1. Educational and methodological manual "Clinical immunology": from the discipline "Clinical immunology and allergology" for students of the 5th year of the medical faculty, specialty "Dentistry", / Dotsenko S.Ya., Rekalov D.G., Shekhovtseva T.G. . [etc.]. – Zaporizhzhia, 2019. - 163 p.
2. Immunology in modern dentistry: method. a manual for stomatological students. fact-tu, intern dentists and stomatologists. profile. - Kharkiv, 2018. - 116 p.
3. Educational and methodological manual "Clinical immunology": from the discipline "Clinical immunology and allergology" for students of the 5th year of the medical faculty / Dotsenko S.Ya., Rekalov D.G., Shekhovtseva T.G. [etc.]. – Zaporizhzhia, 2019. - 163 p.
4. Bazhora Y.I., Honcharuk S.F. Clinical immunology and allergology. Textbook: ed. 4th, add. // Odessa: Press - courier, 2018. - 264 p.

#### **Additional:**

1. EAACI European Academy of Allergy and Clinical Immunology White Paper on Research, Innovation and Quality Care. Published by the European Academy of Allergy and Clinical Immunology 2018.
2. Global Atlas of ALLERGY. Published by the European Academy of Allergy and Clinical Immunology 2014.

3. GLOBAL ATLAS OF SKIN ALLERGY. Published by the European Academy of Allergy and Clinical Immunology 2019.
4. Basic immunology : functions and disorders of the immune system / Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai ; Illustrations by David L. Baker, Alexandra Baker. -- Fifth edition. 318 p. ; cm. Includes bibliographical references and index.
5. ISBN 978-0-323-39082-8 I. Lichtman, Andrew H., author. II. Pillai, Shiv, author. III. Title. [DNLM: 1. Immunity. 2. Hypersensitivity. 3. Immune System--physiology. 4. Immunologic Deficiency Syndromes. QW 504] QR181 616.07'9--dc23.
6. 5th Edition of Clinical Immunology: Principles and Practice / Robert R. Rich. Elsevier – 2019. C. – 1323.

### **13. Electronic information recourses:**

1. <https://elifesciences.org/subjects/immunology-inflammation>
2. <https://www.eaaci.org/>
3. <https://www.facebook.com/EAACI>
4. <http://aalu.org.ua/>
5. <https://allergy.immunologyconferences.com/events-list/asthma>
6. <https://www.immunopaedia.org.za/>
7. <https://www.worldallergy.org/meetings>

### ***Information support:***

Electronic library of ONMedU: links to the attached methodological guides of practical classes and indended work.