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, 2023

WORK PROGRAM FOR THE ELECTIVE DISCIPLINE «CLINICAL ASPECTS OF IMMUNOPROPHYLAXIS»

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

2023

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. 8 of June 29, 2023).

Developed by:

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Work program approved at the meeting of the Department of Internal Medicine No. 2
Minutes №1 dated August 28, 2023.

– Head of the Department _____ Vasyl SHTANKO

Agreed with the guarantor of the EPP _____ Valeriia MARICHEREDA

Approved by the Subject-Cycle Methodological Commission for Therapeutic Disciplines of ONMedU
Minutes № 1 dated August 31, 2023.

Chairman of the Subject-Cycle Methodological Commission for Therapeutic Disciplines,
Doctor of Medicine, Professor _____ Olena VOLOSHYNA

Revised and approved at the meeting of the Department of Internal Medicine No. 2
Minutes № ___ dated "___" _____ 20__ p.

Head of the Department _____

Revised and approved at the meeting of the Department of Internal Medicine No. 2
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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: Credits: 3 Hours: 90 Content sections: 2	Branch of knowledge: 22 "Health care" Specialty: 222 "Medicine" Level of higher education: second (master's)	*Full time form study* *Elective discipline* *Study year: 5* *Semesters IX - X* *Lectures (0 h.)* *Seminars (0 h.)* *Practical's (30 h.)* *Laboratory (0 h.)* *Independent Work (60 h.)* *Form of final control – credit*

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

The purpose an elective discipline (ED) is to form in future doctors' understanding of the immune system structure, mechanisms of immune response formation; immune-dependent pathology, functioning of the immune system in different age groups; the concept of individual and population immunity; the need for immunoprophylactic measures; the classification of vaccines; updated recommended Immunization Schedule in Ukraine and various countries.

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

- modern scientific ideas regarding the formation of a specific immune response to antigens;
- mechanisms of formation of the primary and secondary immune response to infectious and non-infectious pathogens;
- assessment the patient's immune status according to basic immunolaboratory methods and principles of interpretation of immunograms;
- concept of individual, group, collective, population immunity;
- innovative methods for creating and introducing vaccines, classification of vaccines;
- approaches to vaccinations regulated by the Ministry of Health of Ukraine in the conditions of medical and preventive institutions;
- the necessity of forming individual and population immunity in providing a medical care system.

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 allergic response to vaccines.

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

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

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.

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

PLO 4. Identify the leading clinical symptoms and syndromes of emergency conditions in immunology; 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. The structure of the immune system and the principles of the functioning of the immune system.

CM 2. Principles of immunoprophylaxis.

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

Topic 1. Structure of the immune system and principles of functioning.

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.). Antigens and their characteristics. Specific immunity, its features, stages of formation and cooperation of immunocompetent cells that participate in the formation of the immune response. Populations (T- and B-lymphocytes) and subpopulations (T-helper types 1 and 2, 17, T-regulatory, T-CTL) of lymphocytes, stages of their maturation and differentiation, their function. The main complex of histocompatibility: structure, properties, function.

Topic 2. Patterns and features of immune response formation.

Mechanisms of formation of innate and adaptive immune response. Specific immunity, its features, stages of formation and cooperation of immunocompetent cells that participate in the formation of the immune response. Regulation of immunity. Age characteristics of bone marrow, thymus and peripheral lymphoid organs. Age-related features of the functioning of immunocompetent cells. Age-related features of cytokine production. Age-specific features of the development of inflammatory reactions. Thymus and aging. Immunoregulatory processes in old age. Immune theories of aging. Immunopathology in the elderly.

Topic 3. Immunological research methods. Basic rules for assessing immune status.

A comprehensive approach to assessing a person's immune status. Features of immunological anamnesis. Clinical methods of assessing the state of the immune system. Instrumental methods of assessing the state of the immune system. Definition of the main symptoms and syndromes of immune disorders. Laboratory methods for assessing the state of the immune system: humoral innate protective factors; assessment of cellular immunity; comprehensive assessment of local immunity. Immunogram, interpretation of results. Possibilities and limitations of immunological methods in the clinic. Peculiarities of making an immunological diagnosis.

Topic 4. Immunodeficiency diseases.

Inborn errors of immunity (IEI; primary immunodeficiencies [PIDs]: definition, classification, mechanisms of development. Clinical signs, immunodiagnostics, doctor's tactics, approaches to

treatment: combined, T- and B-dependent immunodeficiencies caused by a violation of the phagocytic link of immunity and a deficiency of complement proteins.

Acquired immunodeficiency diseases: definition, causes, mechanisms of development, classification, diagnosis. The role of acquired immunodeficiency diseases in the pathogenesis of various diseases. Early detection of secondary immunological deficiency in the body. Basic approaches to treatment and prevention, taking into account clinical manifestations and features of the course.

Topic 5. Classification of vaccines. Recommended Immunization Schedule in Ukraine and worldwide. The main directions of creating vaccines. Classification of vaccines. Causes of post-vaccination reactions and post-vaccination complications. Diagnosis of post-vaccination reactions and post-vaccination complications. Concept of post-vaccination reaction. Classification of post-vaccination reactions. The concept of post-vaccination complications. Classification of post-vaccination complications. Diagnosis of post-vaccination reactions and post-vaccination complications. Providing emergency care for post-vaccination reactions. Recommended Immunization Schedule in Ukraine. Timing of preventive vaccinations and justification. Basic orders of the Ministry of Health of Ukraine regarding preventive vaccinations.

4. Structure of the discipline

Topic	Hours					
	Total	**Lectures**	**Seminars**	**Practical**	**Laboratory**	**IW**
CM 1. The structure of the immune system and the principles of the functioning of the immune system						
Topic 1. Structure of the immune system and principles of functioning	21	-	-	6	-	15
Topic 2. Patterns and features of immune response formation	21	-	-	6	-	15
Topic 3. Immunological research methods. Basic rules for assessing immune status	6	-	-	6	-	-
Topic 4. Immunological research methods. Basic rules for assessing immune status	14	-	-	4	-	10
CM 2. Principles of immunoprophylaxis						
Topic 5. Classification of vaccines. Recommended Immunization Schedule in Ukraine and worldwide	26	-	-	6	-	20
Final lesson. Credit.	2	-	-	2	-	-
Total	**90**			**30**		**60**

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. Structure of the immune system and principles of functioning	2
2	Topic 1. Practical lesson 1/1. Structure of the immune system and principles of functioning	2
3	Topic 1. Practical lesson 1/1. Structure of the immune system and principles of functioning	2
4	Topic 2. Practical lesson 2/1. Patterns and features of immune response formation	2
5	Topic 2. Practical lesson 2/1. Patterns and features of immune response formation	2
6	Topic 2. Practical lesson 2/1. Patterns and features of immune response formation	2
7	Topic 3. Practical class 3/1. Immunological research methods. Basic rules for assessing immune status	2
8	Topic 3. Practical class 3/1. Immunological research methods. Basic rules for assessing immune status	2
9	Topic 3. Practical class 3/1. Immunological research methods. Basic rules for assessing immune status	2
10	Topic 4. Practical class 4/1. Immunological research methods. Basic rules for assessing immune status	2
11	Topic 4. Practical class 4/1. Immunological research methods. Basic rules for assessing immune status	2
12	Topic 5. Practical class 5/1. Classification of vaccines. Recommended Immunization Schedule in Ukraine and worldwide	2
13	Topic 5. Practical class 5/1. Classification of vaccines. Recommended Immunization Schedule in Ukraine and worldwide	2
14	Topic 5. Practical class 5/1. Classification of vaccines. Recommended Immunization Schedule in Ukraine and worldwide	2
15	Final lesson. Credit.	2
	Total	**30**

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.	**Topic 1. Structure of the immune system and principles of functioning.** 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.).	15

	Antigens and their characteristics. Specific immunity, its features, stages of formation and cooperation of immunocompetent cells that participate in the formation of the immune response. Populations (T- and B-lymphocytes) and subpopulations (T-helper types 1 and 2, 17, T-regulatory, T-CTL) of lymphocytes, stages of their maturation and differentiation, their function. The main complex of histocompatibility: structure, properties, function.	
2.	**Topic 2. Patterns and features of immune response formation.** Mechanisms of formation of innate and adaptive immune response. Specific immunity, its features, stages of formation and cooperation of immunocompetent cells that participate in the formation of the immune response. Regulation of immunity. Age characteristics of bone marrow, thymus and peripheral lymphoid organs. Age-related features of the functioning of immunocompetent cells. Age-related features of cytokine production. Age-specific features of the development of inflammatory reactions. Thymus and aging. Immunoregulatory processes in old age. Immune theories of aging. Immunopathology in the elderly.	15
3	**Topic 4. Immunodeficiency diseases.** Inborn errors of immunity (IEI; primary immunodeficiencies [PIDs]: definition, classification, mechanisms of development. Clinical signs, immunodiagnostics, doctor's tactics, approaches to treatment: combined, T- and B-dependent immunodeficiencies caused by a violation of the phagocytic link of immunity and a deficiency of complement proteins. Acquired immunodeficiency diseases: definition, causes, mechanisms of development, classification, diagnosis. The role of acquired immunodeficiency diseases in the pathogenesis of various diseases. Early detection of secondary immunological deficiency in the body. Basic approaches to treatment and prevention, taking into account clinical manifestations and features of the course.	10
4	**Topic 5. Classification of vaccines. Recommended Immunization Schedule in Ukraine and worldwide**. The main directions of creating vaccines. Classification of vaccines. Causes of post-vaccination reactions and post- vaccination complications. Diagnosis of post-vaccination reactions and post- vaccination complications. Concept of post-vaccination reaction. Classification of post-vaccination reactions. The concept of post-vaccination complications. Classification of post-vaccination complications. Diagnosis of post-vaccination reactions and post-vaccination complications. Providing emergency care for post-vaccination reactions. Recommended Immunization Schedule in Ukraine. Timing of preventive vaccinations and justification. Basic orders of the Ministry of Health of Ukraine regarding preventive vaccinations.	20
	Total	**60**

7. Training methods

Practical lessons: 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 lesson:

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 lesson:

«5»	The applicant 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 applicant 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 applicant 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 applicant 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 practical lessons 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 lessons, which are posted on the department's website
Methodological recommendations for independent work of higher education students.
Multimedia presentations of practical lessons.

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.

12. Recommended literature.

Main:

1. Centers for Disease Control. General recommendation on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 43 (no. RR-1):1, 1994 . [PubMed]
2. **Plotkin SA, Mortimer EA, Jr: Vaccines. 2nd Edition. W.B. Saunders Co, Philadelphia, 1994**
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. Basic immunology : functions and disorders of the immune system / Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai ; Illustrations by David L. Baker, Alexandra Baker. -- Fifthedition. 318 p. ; cm. Includes bibliographical references and index.
3. 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.
4. 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.who.int/health-topics/vaccines-and-immunization#ta
3. https://www.cdc.gov/vaccines/schedules/index.html
4. https://vaccine-schedule.ecdc.europa.eu/
5. https://www.unicef.org/immunization
6. https://vaccine.org.ua/2023/09/18/moz-onovylo-rekomendacziyi-z-vakczynacziyi/
7. https://allergy.immunologyconferences.com/events-list/asthma
8. https://healthcenter.od.ua/imunoprofilaktyka/medykam/

Information support:

Electronic library of ONMedU: links to the attached methodological guides of practical lessons and independed work.