

MINISTRY OF HEALTH OF UKRAINE
ODESA NATIONAL MEDICAL UNIVERSITY
Department of Pharmaceutical Chemistry and Drug Technology

Syllabus of the educational discipline

«The relationship between the structure and properties of medicinal substances»

Scope of the educational discipline	Total hours per discipline: 90 hours, 3,0 credits. Semesters: VI. 3 rd year.
Days, time, place of the education discipline	According to the schedule of classes. Department of Pharmaceutical Chemistry and Drug Technology. Odesa, st. Marshal Malinovskyi, 37. Pharmaceutical faculty
Teacher (-s)	Professor Volodymyr Gelmboldt Assistants: Ivan Shyshkin
Contact Information	Help by phones: Nikitin Olexii, head teacher of the department 067-485-11-06 Klyvniak Iryna, senior laboratory assistant 048-777-98-28 E-mail: pharmchemistry@onmedu.edu.ua Face-to-face consultations: from 2:00 p.m. to 5:00 p.m. every Thursday, from 9:00 a.m. to 2:00 p.m. every Saturday. Online consultations: from 4:00 p.m. to 6:00 p.m. every Thursday, from 9:00 a.m. to 2:00 p.m. every Saturday. The link to the online consultation is given to each group during the classes separately.

COMMUNICATION

Communication with applicants will be conducted in the classroom (face-to-face).

During distance learning, communication is carried out through the Microsoft Teams platform, as well as through e-mail correspondence, Viber messengers (through groups created in Viber for each group, separately through the head of the group), Telegram.

ABSTRACT OF THE EDUCATIONAL DISCIPLINE

The subject study is the general theoretical provisions of pharmaceutical chemistry with a description of the general relationship between structure and properties.

Prerequisites: is based on students' study of inorganic, organic, analytical chemistry, biophysics, medical biology and integrates with these disciplines.

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Postrequisites: lays the foundations for students to study pharmaceutical chemistry, biological chemistry, general and molecular pharmacology, and toxicology.

Goal – in-depth assimilation of fundamental knowledge in the field of chemistry, which is the basis of studying a cycle of chemical disciplines that will be widely used in practical work. The course on relationships between the structure and properties of medicinal substances is also a component of some aspects of the courses in physical and colloid chemistry, chemical technology, pharmaceutical chemistry and biochemistry and includes a description of classes of organic compounds, including biologically active organic compounds.

Tasks of the discipline: acquiring skills in using chemical and reference literature, studying the theoretical foundations of organic chemistry, studying classic methods of synthesis and properties of various organic compounds, establishing the relationship between the structure, reactivity and properties of organic compounds to the extent necessary for further study and understanding of basic chemical processes taking place at the molecular level in order to know the qualitative reactions to the main functional groups, mastering individual physicochemical methods for identifying organic compounds.

Expected results

As a result of studying the educational discipline, the applicant must

Know:

- basic principles of classification, nomenclature and structural isomerism of organic compounds;
- types of chemical bonds, conjugated systems, electronic effects, acidity and basicity of organic compounds as the main basis of their reactivity;
- principles of classification of organic reactions by direction, bond breaking method and mechanism of their course;
- structure, nomenclature, isomerism, methods of extraction and chemical properties of hydrocarbons, halogen-, oxygen-, sulfur- and nitrogen-containing derivatives of hydrocarbons, heterofunctional compounds, heterocyclic compounds, biopolymers and bioregulators.

Be able:

- use chemical and reference literature, work with tabular and graphic material; independently carry out theoretical elemental analysis of organic compounds; determine the physical constants of organic compounds (melting point, boiling point, specific rotation).

Master the skills: to determine the reactivity of the organic structure, to select analytical reactions depending on the functional group, to determine chromophoric groups, to determine auxochromic groups, to determine pharmacophore groups.

DESCRIPTION OF THE EDUCATIONAL DISCIPLINE

Forms and methods of education.

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The discipline will be taught in the form of practical classes (30 hours) and organization of students' independent work (60 hours).

Consultations are individual.

When conducting practical classes, teaching methods are used: educational and methodological materials, situational tasks, individual tasks, laboratory equipment, test and calculation tasks to test acquired knowledge and skills, a list of necessary literary sources is provided for independent work.

Content of the education discipline

Topic 1. The effect of chemical modification on the properties of the medicinal substance.

Topic 2. Semi-synthetic penicillins (Amoxicillin, Ampicillin sodium). Relationship "structure-properties". Pharmaceutical analysis of drugs and modified fragments in the structure of drugs.

Topic 3. Semi-synthetic cephalosporins (Cefaclor, Cefotaxime, Ceftriaxone sodium). Relationship "structure-properties". Pharmaceutical analysis of drugs and modified fragments in the structure of drugs.

Topic 4. Phenothiazine derivatives (Chlorpromazine hydrochloride, Promethazine hydrochloride, Thioridazine). Relationship "structure-properties". Pharmaceutical analysis of drugs and modified fragments in the structure of drugs.

Topic 5. ACE inhibitors. Classification. Relationship "structure-properties". Pharmaceutical analysis of drugs (Captopril, Enalapril) and modified fragments in the structure of drugs.

Topic 6. Fluoroquinolone derivatives (Norfloxacin hydrochloride, Ofloxacin, Lomefloxacin). Relationship "structure-properties". Pharmaceutical analysis of drugs and modified fragments in the structure of drugs.

Topic 7. Derivatives of barbituric acid. Relationship "structure-properties". Pharmaceutical analysis of drugs (phenobarbital, sodium thiopental, hexenal) and modified fragments in the structure of drugs.

Topic 8. Sulfanilamides. Mechanism of action. Effect of stereoisomerism on properties. Pharmaceutical analysis of drugs (Streptocide, Norsulfasol sodium, Phthalazole).

Recommended literature list

Basic:

1. Chernykh V.P., Shemchuk L.A. Organic Chemistry. – Kharkiv: Original, 2011. – 440 p.
2. Jie Jack Li, Chris Limberakis, Derek A. Pflum Modern Organic Synthesis. – Oxford.: University Press, 2007.
3. Organic Chemistry I by Xin Liu is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted. 2021. – 379p.

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4. Introduction to Chemistry. General, Organic, and Biological v. 1.0. 2011. – 1236 p.
5. ORGANIC CHEMISTRY LABORATORY TECHNIQUES. Lisa Nichols, 2nd Edition. 2016. – 389 p.

Information resources:

1. www.ncbi.nlm.nih.gov/PubMed – free access to the scientific data base in the field of biomedical sciences.
2. <https://pubchem.ncbi.nlm.nih.gov/> free access to the scientific data base in the field of biomedical sciences.
3. www.bpci.kiev.ua – official site of the Institute of Bioorganic Chemistry and Petrochemistry of the National Academy of Sciences of Ukraine.
4. www.bioorganica.org.ua – a scientific publication presenting works on bioorganic and medical chemistry.

ASSESSMENT

Control measures include *current control*. The current educational activity of the applicants is monitored in practical classes. The following tools are used to diagnose the level of training of applicants: oral survey, testing, evaluation of the performance of practical skills, problem solving. Current assessment of students takes place at each practical session (at least 50% of students must be interviewed). The current educational activity of the recipient is evaluated on a 4-point (traditional) scale: "5", "4", "3", "2".

Criteria for assessing students' knowledge during practical classes:

- the grade "excellent" is assigned to a student of higher education who worked systematically during the semester, showed versatile and deep knowledge of the program material during the assessment, is able to successfully perform the tasks provided for in the program, mastered the content of basic and additional literature, showed creative abilities in understanding and the use of educational program material, showed the ability to independently update and replenish knowledge; level of competence - high (creative);
- the grade "good" is assigned to a student of higher education who has demonstrated complete knowledge of the curriculum material, successfully performs the tasks provided for by the program, has mastered the basic literature recommended by the program, has shown a sufficient level of knowledge in the discipline and is capable of their independent updating and renewal in the course of further training and professional activity; the level of competence is sufficient (constructive and variable);
- the grade "satisfactory" is assigned to a higher education applicant who has demonstrated knowledge of the main curriculum material to the extent necessary for further education and subsequent work in the profession, copes with the tasks provided for in the program, has made individual errors in answering questions and

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in completing assessment tests tasks, but has the necessary knowledge to overcome the mistakes made under the guidance of a scientific and pedagogical worker; level of competence - average (reproductive);

- an "unsatisfactory" grade is assigned to a student of higher education who did not demonstrate sufficient knowledge of the main curriculum material, made fundamental mistakes in the performance of tasks provided for by the program, cannot use the knowledge in further studies without the help of a teacher, did not manage to master the skills of independent work; the level of competence is low (receptive-productive).

The work program of the course does not provide for the *individual independent work of the applicant* (IIW).

Forms and methods of final control: applicants who have completed the training program in the discipline in full, have no academic debt, set their current grade point average to 3.00 or more, receive credit in the last lesson, which is presented as "passed" / "failed".

If the student has received a minimum grade point average of 3.00 for the current performance, even in the case of unworked unsatisfactory grades, he receives credit for the discipline.

The possibility and conditions of obtaining additional (bonus) points: not provided.

INDEPENDENT WORK OF HIGHER EDUCATION ACQUIRES

Independent work of the acquirer, which is provided by preparation for each practical lesson.

EDUCATIONAL DISCIPLINE POLICY

Deadlines and Rescheduling Policy: corresponds to the general rules of ONMedU. Absences of classes for non-respectable reasons will be worked out according to the schedule of the teacher on duty. Absences for valid reasons are worked out according to an individual schedule with the permission of the dean's office.

Observance of academic integrity by students of education involves: independent performance of educational tasks. The use of prohibited auxiliary materials or technical means during control measures is unacceptable in educational activities for participants of the educational process. For violations of academic integrity, students may be held academically liable: reduction of assessment results; retaking the assessment.

Attendance and Tardiness Policy:

Uniform: medical gown.

Equipment: notebook, pen.

State of health: applicants suffering from acute infectious diseases, including

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respiratory diseases, are not allowed to attend classes.

A student who is late for a class can attend it, but if the teacher has put "nb" in the journal, he must complete it in the general order.

Use of mobile devices:

Mobile devices may be used by students with the permission of the instructor if they are needed for the assignment.

Behavior in the audience:

The behavior of applicants and teachers in the classrooms should be working and calm, strictly comply with the rules established in accordance with the Code of Academic Ethics and Relations of the University Community of Odesa National Medical University.