

Odessa National Medical University
Faculty of Pharmacy
Department of Pharmaceutical Chemistry
Syllabus of course
Bioactivity of inorganic compounds

Amount	4,3 credits 130 hours
Semester, year of study	1 semester 1 year of study 3 semester 2 year of study
Days, time, place	Days, time and place are determined according to the approved schedule
Teachers	Nikitin Olexii Volodymyrovych, the senior teacher Shyshkin Ivan Olegovych, assistant
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Workplace	Department of Pharmaceutical Chemistry
Consultations	Consultations take place according to the approved schedule, both offline (face-to-face) and online, using ICT available to students and teachers

COMMUNICATION with students: E-mail, social networks, face-to-face meetings.

COURSE ANNOTATION

The subject of study of the discipline:

- the relationship of chemical processes and phenomena that accompany them in living systems
- patterns between the chemical composition, structure of substances and their medical and biological properties;
- establishing the possibility and direction of chemical processes in biological objects;
- determination of the function of substances in protolytic and redox processes of biological systems;
- connection "structure-action" of inorganic substances and their use in medicine and pharmacy.

Prerequisites: based on chemistry and biology in the scope of the secondary education program and integrated with bioorganic, pharmaceutical, biological and toxicological chemistry, pharmacognosy.

Postrequisites builds the foundations for the study of these disciplines and provides for the formation of skills to apply the acquired knowledge for the study of special disciplines and in professional activities.

The purpose of the course: formation of scientific worldview of higher education students, development of modern forms of theoretical thinking and ability to analyze

phenomena, formation of skills for application of chemical laws and processes in future practice, study of the role of chemical elements in physiological processes of living organisms; formation of the initial level of knowledge of students, necessary for successful study of special disciplines and realization of tasks of professional activity. competent use of chemicals and materials in the pharmaceutical industry.

Tasks of discipline: acquainting students with the classification of chemical elements according to their content in the body and biological role; modern data on the role of elements and their inorganic compounds in biochemical processes; the use of physiologically active substances based on inorganic, coordination and organometallic compounds in medicine as drugs, biomaterials, bioprobes, radiopharmaceuticals; mechanisms of toxicity of exogenous compounds of metals - xenobiotics, creation of approaches to detoxification and search of detoxifying agents.

Expected results:

– знати життєво необхідні елементи, їх положення у періодичній системі та електронні

конфігурації їх атомів;

- know the properties inherent in nutrients: the size of atoms and ions capable of forming certain forms of compounds and the ability to form complex compounds;
- know the features of the electronic configuration and position in the periodic table of nutrients;
- know the basic features, structure and functions of metalloproteins;
- know the types of interaction of metals with proteins, nucleic acids, carbohydrates, lipids and other natural compounds;
- know the most important drugs of inorganic nature, which are used in medical practice;
- know the toxicity of exogenous compounds and methods of their detoxification;
- be able to interpret the general patterns underlying the use of inorganic substances in pharmacy and medicine;
- be able to apply the theoretical foundations of general and inorganic chemistry and acquired experimental skills in the study of specialized disciplines.
- be able to classify elements by their content in the body: trace elements, trace elements, ultramicroelements;
- be able to determine the relationship between the toxicity of elements and their compounds with the electronic structure and form of compounds.

COURSE DESCRIPTION

Forms and methods of teaching

The course will be presented in the form of lectures (2 hours) and practical classes (6 hours), organization of independent work of students (122 hours)

The lectures use a multimedia presentation; in practical classes - teaching materials, situational tasks, individual tasks, to test the acquired knowledge and skills - test tasks, for independent work provided a list of necessary literature sources.

The content of the discipline

Topic 1. The role of chemical elements in human life. Organogenic, macro- and microelements. Toxic effects of metals and their compounds

Topic 2. Bioelements - organogens: Oxygen, Carbon, Hydrogen, Nitrogen. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 3. Bioelements - macronutrients: Calcium, Phosphorus, Sulfur, Potassium, Sodium, Chlorine, Magnesium. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 4. Bioelements - vital trace elements. Iron. Zinc. Copper. Manganese. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 5. Bioelements - vital trace elements. Molybdenum. Cobalt. Chrome. Selenium. Iodine. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 6. Conditionally vital trace elements. Fluorine. Boron. Silicon. Nickel. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 7. Conditionally vital trace elements. Vanadium. Bromine. Arsenic. Lithium. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 8. Potentially toxic trace elements. Rubidium. Zirconium. Strontium. Silver. Gold. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 9. Potentially toxic trace elements. Tungsten. Germanium. Gallium. Strontium. Titanium. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 10. Toxic trace elements. Aluminum. Lead. Barium. Bismuth. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

Topic 11. Toxic trace elements. Cadmium. Mercury. Thallium. Beryllium. Antimony. General characteristics. Topography in the body, content and need. Age requirement. Lack. Excess. Toxicity. Biological role in the body. Use in pharmacy and medicine. Sources of income.

List of recommended reading

1. Levitin E. Ya., Vedernikova I.O., Koval AA, Kryskiv OS Bioactivity of inorganic compounds: textbook. manual for audit. and self. student work / ed. prof. E. Ya. Levitin. - X .: NPhaU, 2017. - 83 c.
2. Moroz A.S., Lutsevich D.D., Yavorskaya L.P. Medical chemistry. - Vinnytsia: NEW BOOK, 2006. - 776 p.
3. Medical chemistry: a textbook / V.O. Kalibabchuk, I.S. Chekman, V.I. Galynska and others; for order. prof. V.O. Kalibabchuk. - K .: ВСВ «Медицина», 2013. - 336 p.
4. Levitin E.Ya., Klyuyeva R.G., Bryzytska A.M. General and inorganic chemistry. - 2nd edition Vinnytsia: NEW BOOK. - 2009. - 464p.
5. State Pharmacopoeia of Ukraine: in 3 volumes / State Enterprise "Ukrainian Scientific Pharmacopoeial Center for Quality of Medicines". 2nd type. - Kharkiv: State Enterprise "Ukrainian Scientific and Pharmacopoeial Center for Quality of Medicines". Vol. 1, 2015. - 1128 p., Vol. 2, 2014. - 724 p., Vol. 3, 2014. - 732 p.

EVALUATION

Methods of current control: current control is carried out at each practical lesson in accordance with the specific objectives of the topic. All practical classes use objective control over the performance of independent work, theoretical training and the acquisition of practical skills. The following means of diagnosing the level of preparation of students are used: oral examination, testing, solving situational problems.

The form of final control of knowledge in the discipline "**Bioactivity of inorganic compounds**" is a test.

Students who have fully completed the curriculum in the discipline have no academic debt, their average grade point average is 3,00 or more, in the last class receive a credit, which is set as "passed" / "not credited".

If a student receives a minimum grade point average of 3,00 for current performance, even in the presence of unsatisfactory grades, he receives a credit for the discipline.

Independent work of student is assessed during the current control of the topic in the relevant classroom. Assessment of topics that are submitted for self-study and are not included in the topics of classroom training, are controlled during the final tests and exam.

COURSE POLICY

Deadline and recompilation policy

Students who have completed all types of work provided for in the initial program, completed all training sessions and scored at least the minimum number of points during the study of the module are admitted to the final control.

Rehearsals of missed practical classes, regardless of the reason for admission, and consultations take place in accordance with the departmental schedule of rehearsals and consultations. The practice of missed practical classes is carried out with an entry in the journal of the department's work and a mark on the permit form from the dean's office. Skipping a lecture without a good reason is completed by the student through an interview with the lecturer, or a presentation of the missed topic. Rearrangement of the current and final modules in order to increase the assessment is not allowed,

except for situations provided by the "Regulations on the diploma of the state standard with honors"

Academic Integrity Policy

Adherence to academic integrity by students provides:

- ♦ independent performance of educational tasks, tasks of current and final control of learning outcomes (for persons with special educational needs this requirement is applied taking into account their individual needs and opportunities);
- ♦ links to sources of information in the case of the use of ideas, developments, statements, information;
- ♦ compliance with the legislation on copyright and related rights;
- ♦ providing reliable information about the results of their own (scientific, creative) activities, used research methods and sources of information.

They are unacceptable in educational activities for participants in the educational process:

- the use of family or business ties to obtain a positive or higher assessment in the implementation of any form of control over learning outcomes or advantages in scientific work;
- use of prohibited auxiliary materials or technical means (cheat sheets, abstracts, headphones, telephones, smartphones, tablets, etc.) during control measures;
- passing the procedures of control of learning outcomes by fictitious persons.

For violation of academic integrity, students may be held liable for such academic liability:

- reduction of results of assessment of control work, examination, credit, etc .;
- repeated assessment (test, exam, test, etc.);
- appointment of additional control measures (additional individual tasks, tests, tests, etc.);
- re-passing the relevant educational component of the educational program;
- conducting additional verification of other works by the infringer;
- deprivation of the right to participate in competitions for scholarships, grants, etc .;
- notification of the entity that finances the training (scientific research), the institution that issued the grant for training (research), potential employers, parents of the applicant for higher education about the violation;
- exclusion from the rating of applicants for an academic scholarship or accrual of penalty points in such a rating;
- deprivation of an academic scholarship;
- deprivation of tuition benefits provided by the University;
- expulsions from the University.

Attendance and lateness policy: attendance at all classes: lectures, practical classes, current and final control is mandatory (exception: good reason). Delay of more than 5

minutes without good reason is not allowed. Within two days, in any form convenient for the student, inform the dean's office about the reasons that make it impossible to attend classes and perform other tasks provided by the curriculum.

Mobile devices: it is forbidden to write off during the control of knowledge (including the use of mobile technical means of information transfer).

Behavior in the audience:

- attend lectures, laboratory classes according to the schedule in bathrobes;
- do not be late for class;
- do not talk during classes;
- turn off your mobile phone.