

ODESSA NATIONAL MEDICAL UNIVERSITY

Medical faculty

Department of Forensic Medicine

Course syllabus

Toxicological and forensic chemistry

Volume	4 ECTS credits, total – 120 academic hours Lectures – 20 academic hours, practical classes – 70 academic hours , SIW- 30 academic hours
Semester, academic year	VIII semester, 4 th academic year
Days, time, month	Discipline is carried out according to the approved schedule, in the premises of the Department of Forensic Medicine
Teachers	Teachers of the Department of Forensic Medicine
Telephone number	(048) 723-76-90
E-mail	Kirilenktat@gmail.com
Workplace	Premises of the Department of Forensic Medicine
Consultations	Online consultations – microsoftteams

COMMUNICATION

Communication with students will be carried out by E-mail, Microsoft Teams, by phone, in the classroom on schedule.

COURSE ANNOTATION

The subject of study of the discipline is the theory and practice of forensic toxicology as a practical branch of medicine.

Prerequisites

The basis for mastering the discipline is the knowledge, skills and abilities acquired in the study of such disciplines as inorganic, organic, bioinorganic, bioorganic, analytical, pharmaceutical, biological, physical, colloidal chemistry, botany, pharmacology, pharmacognosy, pharmacotherapy, clinical pharmacy, medical and biological physics and technology of medicines. "Toxicological and forensic chemistry" is based on the knowledge of the above disciplines, and at the same time integrates with these disciplines.

Postrequisites

Toxicological and forensic chemistry as a discipline involves the study of the relationship with the following disciplines: anatomy, normal and pathological physiology, foreign languages.

Course purpose:

obtaining by the students of the necessary knowledge and on the base of the modern scientific concepts develop necessary theoretical knowledge in the branch of forensic and toxicological chemistry. Also develop an ability of chemical-expert thinking and ability and skills of the application of poisons' extraction from the biological objects, and detection and determination of xenobiotics and their metabolites when performing of chemical-toxicological or forensic-toxicological analyzes.

Tasks of the discipline:

- obtain the knowledge of the subject, tasks and main sections of toxicological and forensic chemistry, fields of its application, classification of poisons and poisonings;

- obtain the knowledge of the classification of toxic substances by methods of their isolation from objects of biological origin;

- obtain the knowledge of the basic normative documents, which regulate forensic toxicological and chemical-toxicological analyzes;

- study safety techniques and rules of work in the chemical and toxicological (forensic toxicology) laboratory, theoretical bases of methods for the separation of toxic substances from a biologic material, their detection, identification and quantitative determination by the chemical and physico-chemical methods;

- obtain the knowledge of the ways of poison introduction inside the body and excretion from the body, its toxicokinetics, distribution in the body, preserving in the corps, influence of these processes on the results of the chemical and toxicological analysis;

Expected results:

As a result of studying the discipline the student must:

know:

subject, tasks and main sections of the discipline "Toxicological and Forensic Chemistry", areas of its application; basics of toxicology, toxicodynamics, toxicokinetics, toxicometry, types of toxic action and determination of toxic doses, features of chemical and toxicological analysis, the procedure and documentation of forensic toxicological (chemical and toxicological) examinations; general principles of interpretation of forensic toxicological research results.

be able to do:

perform preliminary tests (screening) of groups of toxic substances to detect them in the blood, urine, saliva, hair and other objects; to carry out TLC screening of medicinal substances in biological fluids; master the skills to draw up a plan of forensic toxicological analysis in the rapid diagnosis of acute poisoning; be able to isolate substances of these groups from objects of biological origin; be able to detect these substances using chemical, physicochemical and enzyme-linked immunosorbent assays; be able to predict the directions of metabolism in order to take measures to prevent the negative impact of "lethal" synthesis on the body of the victim; be able to predict the effect of poisons on the body in the somatogenous phase of poisoning and propose effective methods of detoxification of the body; be able to predict the impact of combined poisonings on the condition of the victim and on the course of chemical and toxicological research.

DESCRIPTION OF THE COURSE

The course will be presented in the form of lectures (20 hours), practical classes (70 hours), organization of independent work of students (30 hours)

Forms and methods of teaching:

1) lectures (topics of the lecture course reveal the problematic issues of the relevant sections of the discipline. Lecturers can use such options for lectures as educational, informational, lecture-visualization, lecture-discussion, lecture-consultation);

2) practical classes (during the practical class oral and written interviews, solving test tasks, solving situational problems are done);

3) independent work (SIW) with active consultation of the teacher (during independent work students master the material of the next practical lesson. At the consultations the student can get answers to complex questions of the topic).

Content of the discipline

Section 1. Organization of forensic medical examination and general principles of examination of the influence of environmental factors on the human body.

Topic 1. Theoretical bases of toxicological and forensic chemistry, toxicology, forensic toxicology, clinical toxicology.

Topic 2. Definition of the concepts of "poisoning" and "poison". General characteristics of poisonings (intoxications).

Topic 3. Characteristics of the factors determining development of acute poisonings. Clinical and laboratory diagnosis of poisoning (specific symptoms). Methods of detoxification organism.

Topic 4. Toxicokinetics. Distribution of poisonous substances in the organism

Topic 5. Metabolism of poisonous substances, its directions and dependence on the state of the organism.

Topic 6. Toxicodynamics of poisons, specific clinical symptoms of intoxication of the body.

Topic 7. Forensic toxicological and chemical toxicological analysis and their objects of research.

Topic 8. Acquaintance with safety and work in the laboratory. External inspection and preliminary tests of objects of research and drawing up of the plan of forensic toxicological research.

Topic 9. Theoretical bases of methods of isolation of toxic substances from biological material, their detection, identification and quantification using chemical and physico-chemical methods, as well as a combination of methods.

Topic 10. Interpretation of the results obtained during experimental forensic toxicological studies.

Topic 11. Medical care, methods of active and artificial detoxification, specific (antidote) therapy for acute intoxications.

Literature

1. Cazes J., Scott R.P.W. Chromatography Theory. - Avon, Connecticut: CRC Press, 2002. - 496 p.
2. Clark's isolation and identification of drugs. – London: The Pharmaceutical Press, 1986. – 1224 p.
3. Handbook of Toxicology. 2 ed. / Edited by Derelanko M.J., Hollinger_M.A. - N.W.: CRC Press LLC, 2002 – 1380 p.
4. Lars Hagel, Günter Jagschies, Gail K. Sofer. Handbook of Process Chromatography, Second Edition: Development, Manufacturing, Validation and Economics. - Academic Press, 2007. – 384 p.
5. Poisoning and Drug Overdose. Fifth Edition / Edited by Kent R. Olson. - San Francisco: The McGraw-Hill Companies, 2007. – 1132 p.
6. Randall C. Baselt. Disposition of Toxic Drugs and Chemicals in Man. – California, Foster City; Chemical Toxicology Institute, 2000. – 920 p.
7. Robert I. Grob, Eugene f. Barry. Modern practice of gas chromatography. Fourth edition. New Jersey: John Wiley & Sons, 2004. – P. 1048.
8. Scott R.P.W. Liquid Chromatography column theory. - New York: John Wiley & Sons, 2002. - 212 p.

Information resources

University websites and electronic resources of the Internet

Assessment

Methods of assessment of current control:

The following methods of current control are used in each practical lesson:

- 1) tests on the topic of practical class

- 2) oral answer to standardized questions on the material of the current topic, previous topics and lecture material
- 3) filling out oriental cards on the topic of the lesson.
- 4) control of student activity in small groups

Criteria of assessment of student's work on the practical class

«5»	«4»	«3»	«2»
<i>Criteria for assessing the theoretical knowledge of the student</i>			
The student independently, clearly and consistently, completely answered all questions.	the student orients in the material, but in answering made two or three not important mistakes.	Knows the actual material in the full course, but finds it difficult to present answers independently and systematically, forcing the teacher to offer leading questions.	the student does not show knowledge and is poorly oriented in the main theoretical material of the course, which is manifested by offering him additional questions.
<i>Criteria for assessing the performance of test tasks</i>			
90-100 %	70-80 %	50-60 %	Less than 50 %
<i>Criteria for assessing student activity</i>			
Very active	Active	Less active	Passive
The student actively works during the practical class, is able to express own attitude to this problem, shows the ability to independently study the material, to draw independent conclusions. Is the leader in the group.	The student actively works during the practical class, the presentation of the material is logical, with conclusions, is able to perform educational tasks. Able to work in a group, but to show qualities needs a stimulus from the outside.	The student as a whole has mastered the essence of questions on this topic, tries to draw conclusions and solve problems. But in class behaves passively, responds only to the call of the teacher. In the group does not show activity.	The student is not active in independent work and in a group. Shows lack of interest and desire to work.

The final grade for all types of student activities during the practical lesson.

At the end of the course, the current performance is calculated as the average score of all grades obtained by the student on the traditional scale, rounded to 2 (two) decimal places.

Forms and methods of final control:

Exam. Students who have passed all the topics submitted for the current control are admitted to the exam. The score for the toxicological chemistry exam is the sum of the scores for the answer to each of the 4 questions after their conversion from a 4-point to a 200-point scale, in accordance with the Regulation "Criteria, rules and procedures for assessing student learning outcomes".

Accrual and distribution of points received by students.

To assess the discipline on a 4-point traditional (national) scale, the average score for the discipline is first calculated as the arithmetic mean of the two components:

- 1) the average current score as the arithmetic of all current scores (calculated as a number rounded to 2 (two) decimal places, for example, 4.76);
- 2) traditional assessment for the exam.

The average score for the discipline is translated into the traditional grade from the discipline on a 4-point scale and is regarded as the ratio of this arithmetic mean to the percentage of mastering the required amount of knowledge in the subject. The obtained average score for the discipline allows you to convert to a score on a 200-point scale.

Conditions for obtaining additional (bonus) points. Participation in the research of the department, preparation of reports and speeches at student conferences.

Independent work of students.

Tasks for independent work:

- 1) *preparation for practical classes* (theoretical training, work with indicative maps, test tasks, solving situational problems)
- 2) *preparation for the exam.*

Assessment of independent work, which is provided in the topic along with the classroom work, is carried out during the current control on the topic in the relevant classroom.

Policy of the course

Deadline and recompilation policy: Dean's permission is required to clear missed lectures and practical classes (more than 1 day). Practices are carried out daily after classes (not more than one pass) and on Saturday (three passes). After clearing the passes, the student passes an exam by oral answer, which is conducted by the

head of the department together with the associate professor, or two associate professors.

Academic Integrity Policy: Write-offs during the current control test and exam are prohibited (including with the use of mobile devices).

Attendance policy: Attendance at lectures and practical classes is mandatory, points for attending lectures are not accrued, but with lectures not completed during the cycle, the student is not allowed to take the exam. An important reason for absence from classes is an illness, which is confirmed by a certificate from the dean's office.

Mobile devices: not used in class.