



FACULTY OF PHARMACY

Approved

by the Council meeting of Faculty of Pharmacy,
Minutes No. 4 of 13.06.2016

Dean of Faculty of Pharmacy,
PhD in Pharmaceutical Sciences,
Associate professor,

N. Ciobanu Nicolae Ciobanu

Approved

by the meeting of Department
of Pharmaceutical and Toxicological Chemistry,
Minutes No. 10 of 11.05.2016

Head of Department, PhD in Pharmaceutical
Sciences, professor

V. Valica Vladimir Valica

SYLLABUS

DISCIPLINA TOXICOLOGICAL CHEMISTRY

Name of the course: **TOXICOLOGICAL CHEMISTRY**

Code of the course: **S07O071**

Type of course: **Compulsory**

Total number of hours – 85,

including lectures – 34 hours, practical classes – 51 hours

Number of credits provided for the course – 6

Lecturers teaching the course:

– PhD in Pharmaceutical Sciences, Associate Professor **Tamara Cotelea**



I. Aim of the discipline:

The purpose of the discipline "Toxicological Chemistry" is to teach the students the principles of methodological and systemic approach on chemical-toxicological analysis, in the specialty "Pharmacy".

II. Objectives obtained in teaching the discipline:

Knowledge of theoretical and practical bases of toxicological chemistry are required for specialty pharmacist for further chemical expertise in legal, clinical toxicology, processual narcology, clinical pharmacy and ecology.

The aim of the discipline is the formulation of fundamental principles and working methods on chemical-toxicological analysis.

Specific objectives of the discipline are:

- assimilation of parameters and methods used in toxicological chemistry;
- correct interpretation of the results.

III. The conditionings and requirements

Toxicological Chemistry is a multidisciplinary science that combines previously accumulated knowledge of inorganic, organic and physical chemistry and, underlies the other disciplines such as pharmaceutical technology, pharmacology and pharmacognosy.

IV. Basic content of the course:

A. Lectures:

| <i>Semester VI</i> | | |
|--------------------|---|-------|
| No | Contents | Hours |
| 1. | Introduction. Toxicological Chemistry. Purpose and problems. Peculiarities of toxicological chemistry as a specific pharmaceutical discipline. The main directions of application. Biochemical and analytical toxicology. Regularities of penetration, distribution of toxicity in the body. Pharmacokinetic and pharmacodynamic processes. Toxicokinetic parameters. Group of compounds which are isolated from biological material by mineralization. Intoxications with mercury compounds. Preparation of samples for research. Technical mineralization. The method selected for the identification of mercury ions. | 2 |
| 2. | Chemical-toxicological analysis of compounds isolated by mineralization "toxic metals". Ecology. Environment and heavy metal intoxication. Physicochemical properties and mechanisms of toxicity of heavy metals and arsenic compounds. Toxicokinetics (absorption, distribution, elimination). Fractional analysis of heavy metals in biological samples. Peculiarities. Principles of the methods for the separation of heavy metal ions. Organic reagents. Quantitative methods. | 4 |
| 3. | Chemical-toxicological analysis of compounds isolated by steam stripping "toxic volatile". Chemical-toxicological analysis of "toxic volatile." Group of compounds that are isolated by water vapor. General characteristic. Methodological analysis "toxic volatile" in the distillate (analytical screening). Spreading of intoxication. Toxicokinetics. Metabolism. Clinic poisoning. Clinical diagnostics. | 6 |



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|--------------|--|-----------|
| 4. | Gas chromatographic analysis, in the program of analytical screening. Gas chromatography - high performance method for separation and determination of "toxic volatile". Chromatographic parameters. Preparation of biological samples for research. Expertise of alcoholic coma. Toxicokinetics alcohol. Determination of quantity by gas chromatography method. | 2 |
| 5. | Chemical-toxicological analysis of compounds that are separated by extraction and sorption. Compound medications. Preparation of biological samples. General and specific isolation methods for chemical and legal analysis. Peculiarities of the method of isolation, confinement factors determining the effectiveness of biological samples. CSS method - screening is carried out to analyze drug compound. Research chromatographic methods (TLC, HPLC, GLC). Intoxication causing addiction. Chemical-toxicological analysis of acidic and basic compounds. Detoxification methods. | 14 |
| 6. | Chemical-toxicological characteristic of pesticides. Chemical-toxicological analysis of compounds isolated by extraction and sorption. Pesticides. General characteristic. Toxicity. Causes of intoxication. Detoxification methods. Physico-chemical methods for the analysis of pesticides in biological samples (SSC CGL). Isolation toxicity maceration and then dialysis. | 4 |
| 7. | Diagnostics of carbon oxide intoxication Diagnostics of carbon oxide intoxication. Toxicokinetics. Detoxification methods. Determination of quantity of carboxyhemoglobin in the blood. The method of spectroscopic analysis. | 2 |
| Total | | 34 |

B. Practical lessons:

| <i>Semester VIII</i> | | |
|----------------------|---|-------|
| No | Contents | Hours |
| 1. | Introduction. Toxicological Chemistry. Purpose and problems. Peculiarities of toxicological chemistry as a specific pharmaceutical discipline. Main directions of application. Biochemical and analytical toxicology. Regularities of penetration, distribution of toxicity in the body. Pharmacokinetic and pharmacodynamic processes. Toxicokinetic parameters. Group of compounds which are isolated from biological material by mineralization. Intoxications with mercury compounds. Preparation of samples for research. Technical mineralization. The method selected for the identification of mercury ions. | 3 |
| 2. | Chemical-toxicological analysis of compounds isolated by mineralization "toxic metals". Ecology. Environment and heavy metal intoxication. Physicochemical properties and mechanisms of toxicity of heavy metals and arsenic compounds. Toxicokinetics (absorption, distribution, elimination). Fractional analysis of heavy metals in biological samples. Peculiarities. The principles of the methods for the separation of heavy metal ions. Organic reagents. Quantitative methods. | 9 |



| | | |
|--------------|---|-----------|
| 3. | Chemical-toxicological analysis of compounds isolated by steam stripping "toxic volatile". Chemical-toxicological analysis of "toxic volatile." Group of compounds that are isolated by water vapor. General characteristic. Methodological analysis "toxic volatile" in the distillate (analytical screening). Spreading intoxication. Toxicokinetics. Metabolism. Clinic poisoning. Clinical diagnostics. | 6 |
| 4. | Gas chromatographic analysis, in the program of analytical screening. Gas chromatography - high performance method for separation and determination of "toxic volatile". Chromatographic parameters. Preparation of biological samples for research. Expertise alcoholic coma. Toxicokinetics alcohol. Quantitative determination by gas chromatography method. | 9 |
| 5. | Chemical-toxicological analysis of compounds that are separated by extraction and sorption. Compounds medications. Preparation of biological samples. General and specific isolation methods for chemical-legal analysis. The peculiarities of the method of isolation, confinement factors determining the effectiveness of biological samples. CSS method - screening is carried out to analyze drug compound. Research chromatographic methods (TLC, HPLC, GLC). Intoxication causing addiction. Chemical-toxicological analysis of acidic and basic compounds. Detoxification methods. | 15 |
| 6. | Chemical-toxicological characteristic of pesticides. Chemical-toxicological analysis of compounds isolated by extraction and sorption . Pesticides. General characteristic. Toxicity. Causes of intoxication. Detoxification methods. Physical and chemical methods for the analysis of pesticides in biological samples (SSC CGL). Isolation toxicity maceration and then dialysis | 3 |
| 7. | <i>Final practical work.</i> | 3 |
| 8. | Practical skills assessment. | 3 |
| Total | | 51 |

V. Recommended literature:**A. Compulsory:**

1. Brodicico T.M., Valica V. Curs de Chimie toxicologică.–Chişinău: Centrul Editorial-Poligrafic Medicina al USMF, 2003.– 352 p.
2. Butnaru E., Proca M., „Toxicologie”, v. I,II, Iaşi. Editura Timpul. 2001.
3. Cotrau Martian, Popa Lidia, Stan Teodor, Preda Nicolae, Kincses Maria „Toxicologie”. – Bucureşti: Editura Didactica şi Pedagogica, 1991.
4. Еремин С.К., Изотов Б.Н., Веселовская Н.В. «Анализ наркотических средств». Москва, Мысль, 1993
5. Лужников Е.Д. «Клиническая токсикология». – М.: Медицина, 1994.
6. Симонова Л.Л. «Курс лекций по токсикологической химии», Кишинев, 2003.

B. Additional:

1. «Клиническая токсикология детей и подростков» под ред. Марковой И.В. и др., Интермедика, Санкт.Петербург, ч.І - 1998, ч.ІІ – 1999.
2. Веселовская Н.В., Коваленко «Наркотики», Москва, Триада-Х, 2000.
3. Лужников Е.Д. «Клиническая токсикология». – М.: Медицина, 1994.



VI. Teaching and learning methods:

Course, practical work.

VII. Suggestions for individual work:

Additional literature consulted, individual consultations, thematic reports, thematic conferences.

VII. Methods of assessment:

Current: verification along the way, test-control, observation sheet, colloquy;

Final: exams in 3 steps-certification, practical skills test-control and oral.

Method of mark rounding

| The average of current and final marks | Final mark | Equivalent ECTS |
|--|------------|-----------------|
| 1,00-3,00 | 2 | F |
| 3,01-4,99 | 4 | FX |
| 5,00 | 5 | E |
| 5,01-5,50 | 5,5 | |
| 5,51-6,0 | 6 | |
| 6,01-6,50 | 6,5 | D |
| 6,51-7,00 | 7 | |
| 7,01-7,50 | 7,5 | C |
| 7,51-8,00 | 8 | |
| 8,01-8,50 | 8,5 | B |
| 8,51-8,00 | 9 | |
| 9,01-9,50 | 9,5 | A |
| 9,51-10,0 | 10 | |

Absence on examination without good reason is recorded as „absent” and is equivalent to 0 (zero). The student has the right to re-take the on exam twice.

VIII. Language of study:

Romanian.

