FACULTY OF PHARMACY

STUDY PROGRAM 0916.1 PHARMACY

DEPARTMENT OF PHARMACEUTICAL AND TOXICOLOGICAL CHEMISTRY

APPROVED
at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum, Faculty of Pharmacy
Minutes No. 2 of 21.12.2017
Chairman PhD. associate professor
UNCU Livia

APPROVED
at the Council meeting of the Faculty of Pharmacy
Minutes No. 2 of 22.12.2017
Dean of Faculty PhD. associate professor
CIOBANU Nicolae

APPROVED
at the meeting of the chair of Pharmaceutical and Toxicological Chemistry.
Minutes No. 3 of 03.11.2017
Head of chair PhD. professor
VALICA Vladimir

SYLLABUS

DISCIPLINE **SANITARY CHEMISTRY**

Integrated studies

Type of course: **Optional**

Chisinau, 2017

I. INTRODUCTION

- **General presentation of the discipline: place and role of the discipline in the formation of the specific competences of theprofessional / specialty training program**

There is a permanent exchange of matter, energy and information between the human body and the environment that contributes to the development of all biological processes. The quality of the environmental factors - water, air, soil and food - ensures and equally conditions the quality of life, the balance that is established between the human and his living environment.

The **Sanitary Chemistry** Program includes the studies of materials for pharmacists as specialists with knowledge in environmental and food hygiene. It deals with the fundamental principles in a systematic and rigorous manner, despite the great scientific and experimental expansion of developed themes in the recent years.

The knowledge about the theoretical and practical bases of the sanitary chemistry is necessary for the pharmacist for further specialization, in the continuous and competent supervision of the quality of the environmental elements.

- **Mission of the curriculum (aim) in professional training**

The study of the environmental factors being imposed by the necessity to contribute to the improvement of their quality in the conditions in which the continuous degradation of the environment as a result of the development of human civilization has a negative impact on the quality of food resources and implicitly on its health.

- **Language (s) of the course:** romanian; english
- **Beneficiaries:** students of the IV year, Faculty of Pharmacy, specialtyPHARMACY.

II. MANAGEMENT OF THE DISCIPLINE

Code of discipline		**S.08.A.084**	
Name of the discipline		**Sanitary chemistry**	
Person(s) in charge of the discipline		PhD in Pharmaceutical Sciences, associate professor **Cotelea Tamara**	
Year	**IV**	Semester	**8**
Total number of hours, including:			**60**
Lectures	**17**	Practical/laboratory hours	
Seminars	**34**	Self-training	**9**
Form of assessment	**C**	Number of credits	**2**

III. TRAINING AIMS WITHIN THE DISCIPLINE

At the end of the discipline study the student will be able to:

- ***at the level of knowledge and understanding:***

- to know the bases of the legislation for carrying out chemical-sanitary analysis of the environment and implicitly of the food in the Republic of Moldova;
- to understand the principles of ensuring the quality of environmental factors in correlation with the health status of the population;
- to know the principles of biochemical toxicology (toxicokinetics, toxicodynamics);
- to understand the environmental degradation and the impact on food quality;
- to understand the selection of the methods of analysis applied in the specialized laboratories taking into account their endowment;
- to know the methodology of interpreting the chemical-sanitary analysis on the environmental factors;
- to know the methods of isolation of the toxic compounds from the selected samples for carrying out the chemical-sanitary analysis;
- to know the toxic substances of organic and inorganic origin;
- to understand the problems of chemical-sanitary analysis in addressing the issue of food quality and security;
- to know the contemporary methods of analysis and the possibilities of their application in carrying out chemical-sanitary researches for environmental protection;

- to know the general laws of distribution and transformation of toxic compounds in the human body, the occurrence of the toxic effect, of the toxic situation.

- ***at the application level:***

- to select the samples for preliminary preparation and their research;
- to interpret the isolation of different compounds from the selected samples;
- to interpret the screening-analysis;
- to apply the instrumental chemical analysis methods for identifying and determining the selected toxic compounds from the environment;
- to apply the express methods of analysis for preventing acute intoxications;
- to document the chemical-sanitary researches.

- ***at the integration level:***

- to have knowledge for solving problems of chemical-sanitary analysis in addressing the issue of food quality and security;
- to be able to interpret the contemporary methods of analysis and the possibilities of their application in carrying out chemical-sanitary researches for the protection of the environment;
- to integrate the knowledge about the general laws of distribution and transformation of toxic compounds in the human body, the occurrence of the toxic effect, of the toxic situation.

IV. PROVISIONAL TERMS AND CONDITIONS

To acquire the course of Sanitary Chemistry the student requires the following:

- knowledge of the language of teaching;
- confirmed skills in sciences at the university level (toxicological chemistry, pharmaceutical chemistry, biology, biochemistry, biophysics, pathological physiology, anatomy, bioorganic chemistry);
- digital competences (use of the Internet, document processing, electronic tables and presentations, use of graphics software);
- ability to communicate and team work;
- qualities - tolerance, compassion, autonomy.

V. THE MES AND ESTIMATE ALLOCATION OF HOURS

Lectures, practical hours/ laboratory hours/seminars and self-training

No. d/o	THEME	Number of hours		
		Lectures	Seminars	Self-training
1.	Introduction to Sanitary Chemistry. Object and problems.Particularities of sanitary chemistry as an optional pharmaceutical discipline. Main directions of application. The laws of penetration, distribution of chemical toxicities in the body. Pharmacokinetic and pharmacodynamic processes. Water - environmental element.	2	4	2
2.	Atmospheric air - element of the environment. The chemical composition of the air. Influence of atmospheric air on the human body. Pollution of the air basin. Classification of atmospheric air pollutants. Physical, chemical, biological, microbiological, and atmospheric air pollution. Pollutants with allergic action. Factors that condition the effect of pollutants on the human body.	2	4	1
3.	Soil structure. Physical properties of the soil. Chemical composition of soil. Soil pollution. Indicators of soil chemical pollution.Direct and indirect indicators.	2	2	1
4.	Food and nutrition - generalities. Inappropriate intake of nutritional principles.Balanced nutrition - general principles. The nutritional needs of the body. Maturing of food products. Biochemical processes that take place in vegetables and fruits after harvesting. The influence of culinary process on nutritional products.	3	4	1
5.	Microbial alteration of food.Water activity. Microbial alteration of proteins, carbohydrates, fats. Caramelization of sugar. Evaluation and prevention of enzymatic and non-enzymatic browning. Prevention of enzymatic browning of the culinary process.	2	4	1
6.	Keeping food. Preservation methods: keeping at low and high temperatures, lyophilization, chemical methods, salting, smoking.	2	4	1
7.	Toxic substances naturally present in food of animal and vegetable origin. Antinutritive substances. Enzymatic inhibitors. Toxic aminoacids. Favism. Erucic acid.	2	4	1
8	Food additives. Hygienic nutritional aspects. Classification. Legislation. Preservatives. Dyes. Sweeteners. Flavoring. Foodborne illness.	2	4	1
9	*Control assessments* - 1, 2.		4	
Total		**17**	**34**	**9**

VI. REFERENCE OBJECTIVES OF CONTENT UNITS

Objectives	Content units
Theme (chapter) 1. Water - environmental element	
• To define water as an environmental element; • to know the structure, properties and functions of the water; • to know the chemical composition of the water; • to demonstrate the obtaining of quality drinking water; • to comment on the ways of water self-purification; • to apply knowledge to other disciplines; • to draw conclusions; • to develop own opinions for the research into the efficiency of water treatment plants.	Water - environmental element. Water sources. Water properties. Chemical composition of water. Water drinking conditions. Water quality and human pathology.
Theme (chapter) 2. Atmospheric air - environmental element	
• To define air as an environmental element; • to know the influence of atmospheric air on the human body; • to know the chemical composition of the air; • to demonstrate the factors that condition the pollution and self-purification of atmospheric air; • to comment on the effects of air pollution on the environment • to draw conclusions.	Chemical composition of air. Atmospheric air pollution. Global warming as a consequence of atmospheric pollution. Measures to prevent and combat air pollution.
Theme (chapter) 3. Soil - environmental element	
• To define the physical properties of the soil; • to know the structure and composition of the soil; • to demonstrate the indicators of soil chemical pollution; • to comment on the effects of soil pollution.	Soil-environment element. Structure and physical properties of the soil. Soil components. Pollution and indicators of soil pollution.
Theme (chapter) 4. Food and nutrition - health issues	

Objectives	Content units
• To define the general aspects of nutrition; • to know the toxic substances naturally present in food; • to demonstrate the presence of naturally occurring toxic substances in food of animal and plant origin; • to comment on the groups of toxic substances present in food; • to know the food additives; • to define the food pollution; • to comment on the process of food spoilage; • to draw conclusions.	Toxic substances naturally present in food of animal origin. Toxic substances naturally present in food of plant origin. Food additives - definition and classification. Food pollution. Microbial alteration of food. Enzymatic and non-enzymatic browning of foods.

VII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY OUTCOMES

✓ Professional (specific) (SC) competences

- PC1. Knowledge of the definition, structure, composition, properties and functions of water. Developing conclusions about water quality and its role in everyday life.
- PC2. Knowledge of the composition of air as an environmental component, the effects of air polluted in the environment. Design of sanitary activities in case of air pollution to avoid serious human health consequences, etc.
- PC3. Possessing knowledge about the structure, soil composition, physical properties, chemical pollution indicators and toxic effects that can be transmitted to the human body.
- PC4. Demonstration of knowledge about general health aspects of food. Knowledge of naturally occurring toxic substances in food of plant and animal origin, design of rules for prevention of intoxication.
- PC5. Knowledge of the evolution of the process of food alteration, formulation of correct conclusions, inclusion of consumer protection rules.

✓ Transversal competences (TC)

- TC1. Promoting the logical reasoning of practical applicability. Promoting the logical reasoning of assessment and self-assessment in decision-making of chemical-sanitary analysis. Observance of the norms of chemical-sanitary ethics and deontology in the release of medical remedies for the population and medical institutions.
- TC2. Identification of the training needs according to the evolution of the pharmaceutical system. Determining the priorities in the continuous professional training of the pharmacist taking into account the schedule of sanitary chemistry. Appreciation of changes in health care system.

✓ **Study outcomes**

Upon completion of the course the student will be able to:

- to know the bases of the legislation on chemical-sanitary analysis of the environment and implicitly of food in the Republic of Moldova; to interpret the principles of ensuring the quality of environmental factors in relation to the health status of the population;
- to define the toxic substances of organic and inorganic origin; to solve the problems of chemical-sanitary analysis in the argumentation of the issue on food quality and safety;
- to integrate into the contemporary methods of analysis and the possibilities of their application in carrying out chemical-sanitary research for environmental protection;
- to integrate into the contemporary methods of analysis and the possibilities of their application in carrying out chemical-sanitary research for environmental protection;
- to apply the tests for preliminary training and their research;
- to know the documentation of chemical-sanitary research;
- to define the contemporary methods of analysis and the possibilities of their application in carrying out chemical-sanitary researches for environmental protection;
- to know the provisions of the general laws of distribution and transformation of toxic compounds in the human body, the occurrence of the toxic effect, the toxic situation.

Note. Study outcomes (are deduced from the professional competencies and formative valences of the informational content of the discipline).

VIII. STUDENT'S SELF-TRAINING

No.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Working with information sources.	Reading the lecture or the material from the handbook to the relevant theme carefully. Reading the questions on the subject, which require a reflection on the subject. To get acquainted with the list of additional information sources on the relevant topic. To select the source of additional information for the relevant theme. Reading the text entirely, carefully and writing the essential content. Formulation of generalizations and conclusions regarding the importance of the theme / subject.	Ability to extract the essentials; interpretative skills; the volume of work.	During the semester.

2.	Working with the seminar notebook.	Until solving the tasks in the notebook to analyze the information and the images from the respective lecture and handbook theme. Solving consecutive tasks. Formulate conclusions at the end of each lesson. Verifying the finalities of the relevant lessons and the appreciation of their achievement. Selection of additional information, using electronic addresses and additional bibliography.	Workload, situational problem solving, ability to formulate conclusions.	During the semester.
3.	Applying different learning techniques.		Volume of work, degree of insight into the essence of different subjects, level of scientific argumentation, quality of conclusions, elements of creativity, demonstration of understanding the problem, formation of personal attitude.	During the semester.
4.	Working with online materials.	Self-evaluation, study of online materials on the SITE of the chair, expressing your own opinions through forum and chat.	Number and duration of entries on the SITE, self-evaluation results.	During the semester.
5.	Preparation and support of presentations, portfolios.	Selection of the research theme, establishment of the research plan, establishment of the terms of realization. Establishing PowerPoint project / theme components - theme, purpose, results, conclusions, practical applications, bibliography. Reviews of the colleagues. Reviews of the professors.	The volume of work, the degree of penetration in the essence of the project theme, the level of scientific argumentation, the quality of the conclusions, the elements of creativity, the formation of the personal attitude, the coherence of the exposure and the scientific correctness, the graphic presentation, the way of presentation.	During the semester

IX. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

- ***Teaching and learning methods used***

In teaching the discipline of ***Sanitary Chemistry***, different teaching methods and procedures are used, oriented towards the efficient acquisition and achievement of the objectives of the didactic process. During the theoretical lessons, along with the traditional methods (lessons-exposure, lesson-conversation, synthesis lesson), are used modern methods (lesson-debate, lesson-conference). During the practical work there are used forms of individual, frontal, group activity. In order to acquire deeper knowledge of the material, different semiotic systems (scientific language, graphical and computerized language) and teaching materials (tables, diagrams, schemes, transparent sheets) are used. Within the lessons and extracurricular activities are used Communication Technologies - PowerPoint presentations.

- ***Applied teaching strategies / technologies****(specific to the discipline)*

Inductive, deductive strategies, teaching and learning takes place using models ***(analog strategies), algorithmic strategies***: explanatory-demonstrative, intuitive, expository, imitative and actual algorithmic; ***heuristic strategies*** - on developing knowledge through own effort of thinking, using problem-solving, discovery, modeling, hypothesis formulation, heuristic dialogue, investigative experiment, assault of ideas, having the effect of stimulating creativity.

- ***Methods of assessment*** *(including the method of final mark calculation)*

Current: frontal or/and individual control via:

(a) solving problems / exercises;
(b) analysis of case studies;
(c) performing role-plays on the topics discussed;
(d) control assesments – 2;
(e) the current assessment of self-training at the end of the semester.

The average mark is calculated by average of the marks obtained at control assesments and the mark of self-training

Final: Colloquium, the qualifier „pass" – oral answer.

The final grade at *the colloquium* will be composed of the average score during the semester (50%), the oral answer (50%).

Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations.

X. RECOMMENDED LITERATURE:

A. Compulsory:

1. Course support.
2. Cuciureanu R. Elemente de Igienă a mediului şi a alimentaţiei. - Iaşi: Editura Juninea, 2002.
3. Cuciureanu R. Chimia şi Igiena mediului şi a alimentului. Metode de analiză. Ediţia a II-a revizuită. - Iaşi: Editura Gr.T. Popa, 2003.
4. Methodical indications.

B. Additional

1. Adrian J.; Potus J.; Poiffait A.; Dauvillier P. Analisis nutricional de los alimentos. – Editorial Acribia, S.A., Zaragoza (España), 2000.
2. Alpert D.H.; Stenson W. F.; Bier D.M. Manual of Nutritional Therapeutics, Fourth Edition, Lippincott Williams & Wilkins, 2001.
3. Basdevant A. ; Laville M. ; Lerebours E. Traite de nutrition clinique de l' adulte, Medecine-Science, Flammarion, 2002.
4. Fennema O.R (Editor). Food Chemistry, Third Edition, Marcel Deker, Inc. New York, Basel, Hong Kong, 1996.
5. Gârban Z. Nutriţia umană, vol. I.- - Bucureşti: Editura Didactică şi Pedagogică, R. A., 2000.
6. Kathleen L.; Mahan M.S. Krause's Food Nutrition and Diet Therapy, Saunders, 2004.