Approved

At the meeting of the Council of Faculty of Pharmacy
Minutes No. 4 of 12. 06. 2014

Dean of the Faculty of Pharmacy,
PhD, associate professor _____ N. Ciobanu

Approved

At the meeting of the chair of General Chemistry
Minutes No. 11 of 06. 06. 2014

Head of the chair,
PhD, associate professor _____ C. Cheptănaru

SYLLABUS FOR STUDENTS OF

FACULTY OF PHARMACY

Name of the course: **Colloid Chemistry**

Code of the course: **F040039**

Type of course: **compulsory**

Total number of hours – 68

lectures - 17 hours, practical lessons - 51 hours

Number of credits provided for the course: **3**

Lecturers teaching the course: **PhD, associate professor – Sârbu Vasile**

senior lecturer – Jora Elena

Chisinau 2014

I. Aim of the discipline:

The principal goal of the course of Colloid Chemistry for the students of Faculty of Pharmacy is to study those branches of Colloid Chemistry that form the theoretical basis for the deeper and more complete understanding of biochemistry, physiology, pharmaceutical chemistry, pharmacology, the technology of medicines, toxicological chemistry.

II. Objectives obtained in teaching the discipline:

- At the level of knowledge and understanding

the course should enhance the student's ability

- to understand the goals and objectives of Colloid Chemistry, means and methods of their accomplishment;
- to know theoretical fundamentals of physical and physical chemical processes, occurring in various chemical reactions;
- to know principal factors, influencing the processes of colloidal solutions formation and their significance for the pharmacist's practical activity.

- At the level of application

the course should enhance the student's ability

- to create conditions necessary for the formation of colloidal solutions;
- to perform the coagulation of colloidal solutions using various methods;
- to solve situational problems, processing critically multilaterally acquired information;
- to apply the principle of the connections between causes and effects.

- At the level of integration

the course should enhance the student's ability

- to apply the knowledge, acquired in the course of Colloid Chemistry, in the following core subjects: biochemistry, physiology, pharmaceutical chemistry, pharmacology, the technology of medicines, toxicological chemistry;
- to apply the acquired knowledge for the multitude of physical chemical research methods, frequently used in pharmacy;
- to estimate the significance of Colloid Chemistry in the field of pharmacy;
- to define the connection between Colloid Chemistry and other pharmaceutical disciplines;
- to acquire new directions and achievements in pharmaceutical disciplines.

III. Provisional terms and conditions:

Colloid Chemistry, having been a sub discipline within physical chemistry, has become an independent science and has formed a completely new field of science – nanotechnology, which is viewed now as a top priority in the development of world science.

The methods of creation and purification of colloidal solutions are applied in the technologies of producing pharmaceutical drugs based on condensation and dispersion. The stability and coagulation of colloidal systems are the foundation for developing stable pharmaceutical drugs that is sols and emulsions.

IV. Main theme of the course:

Colloid Chemistry is a 1-semester credit class.

A. Lectures:

№	***Themes***	Hours
	Semester III	
1	The subject of Colloid Chemistry and its significance in pharmacy. The nature, classification and general properties of dispersions.	1
2	Methods of dispersions creation and purification.	1
3	Kinetic properties of colloids.	1
4	Optical qualities of colloids.	1
5	Surface phenomena. Liquid- gas and liquid-liquid interface adsorption.	1
6	Surface phenomena thermodynamics. Solid-gas and solid liquid interface adsorption.	1
7	Surface phenomena physics and chemistry. The adsorption of strong electrolytes and non-electrolytes. Chromatography.	1
8	Electro-kinetic phenomena in colloids.	1
9	Micellar colloids	1
10		1
11	The stability and coagulation of dispersions.	1
12	Aerosols, powders, suspensions, emulsions and their application in pharmacy.	1
13		1
14	Surfactants micellar solutions.	1
15	High-molecular compounds and their interaction with solvents.	1
16	Viscosity and osmotic pressure of high-molecular compounds solutions	1
17	The stability of high-molecular compounds solutions. Gels. Diffusion in gels.	1

B. Practical lessons:

№	***Themes***	Hours
	Semester III	
1	Rules and reculations regarding students' activity in Colloid Chemistry Laboratory. Demands to students' reports (records) presentation. Principal notions.	3

2	Formation, properties and methods of sols purification.	3
3	Determination of the size of dispersed phase particles in the suspensions using sedimentation method.	3
4	Determination of surface tension of aqueous solutions of surface active agents.	3
5	The study of acetic acid adsorptoion on carbon.	3
6	Qualitative experiments on adsoption.	3
7	The separation of pharmaceutical drugs mixtures using chromatography.	3
8	Concluding lesson N 1.	3
9	Electophoretic calculation of electro-kinetic potential.	3
10	Determination of critical coagulation concentration of sols.	3
11	Emulsions formation and properties.	3
12	Determination of critical micelle concentration of sodium oleate using Rebinder's method.	3
13	The volumetric analysis of high-molecular compounds swelling kinetics.	3
14	Determination of molecular mass of high-molecular compounds using viscosimetric method.	3
15	Concluding lesson N 2.	3
16	Determination of gelatine isoelectric point. The analysis of electrolyte influence on the gelatine formation process rate.	3
17	Colloquim.	3

V. Recommended literature:

- *A. compulsory:*

1. Беляев А.П., Кучук В.И., Евстратова К.И., Купина Н.А., Малахова Е.Е. Физическая и коллоидная химия. Москва, 2010.
2. Grigore Junghiety, V.Sârbu. Chimie coloidală. Chisinău, 1996.
3. К.И.Евстратова. Физическая и коллоидная химия. М."Высшая школа",1990.
4. С.С.Воюцкий. Курс коллоидной химии. М. Химия, 1975.
5. V.Sârbu. E.Jora. Culegere de lucrări practice si de laborator la chimie coloidală, 2011.
6. В.А.Сырбу. Сборник методических указаний по коллоидной химии. Кишинёв, 1990.
7. В.А.Сырбу. Методическое пособие к решению задач (МПР3) по коллоидной химии.ч.1,2. Кишинёв, 1985.

- *B. additional:*

1. Ludovic Kurunczi. Curs de chimie fizică si coloidală pentru farmacisti. Editura Mirton, Timisoara, 2000.
2. Emil Făgărăsan, Silvia Imre. Chimie fizică experimentală. Editura Medicală Universitară"Iuliu Hartiegalu". Cluj-Napoca, 2005.
3. Stefan Moisescu. Chimie fizică. Sisteme farmaceutice.Ed. Universitară "Carol Davila", Bucuresti, 2003.

4. Gavril Niac, Ossi Horovitz, Ioana Muresan. Chimie fizică. Vol 1,2. Editura U.T.Press, Cluj-Napoca, 2001.
5. Constantin Ionescu. Chimie fizică. Ed. Didactică si Pedagogic, Bucuresti, 1982.
6. Хмельницкий Р.А. Физическая и коллоидная химия, М., 1988.

VI. Teaching and learning methods:

The course of Colloid Chemistry is delivered in a classical manner, which combines theoretical lectures with practical laboratory classes. During the lectures the theoretical information of the course is presented. At practical laboratory classes students study the most necessary and significant laboratory works, followed by the report presentation and the explanation of the obtained results and the application of the corresponding physical chemical methods, frequently used in pharmacy.

VII. Suggestions for individual activity:

From the pedagogical point of view, the passive acquisition of the course is considered to be one of the least effective methods of teaching, even if it is thoroughly structured and illustrated.

Carrying out practical assignments is regarded to be more effective, than the ordinary explanation as to how it should be performed, and teaching this work to the others is considered to be the most effective.

For the successful understanding of the course of colloid chemistry it is necessary to work actively in the laboratory, which means:

1. At first you should read the new information very thoroughly, not simply looking through it. If it is necessary, make some notes in the workbook. Try to formulate the main ideas, using your own words. Study the schemes and pictures in the textbook. Answer the questions and fulfill the tests from the textbook or the assignment book.
2. Come to the lecture and the practical class, but not just for the sake of being present. Otherwise you won't be able to acquire the new material. Take the notes carefully. Analyze the new information, constantly asking yourself whether you agree with the lecturer, whether you understand everything and whether the presented information doesn't contradict that written in the textbook.
3. Keep on asking the lecturer, each other, yourself various questions. Ask questions in the classroom, laboratory, hall, and the instructor's office. The mere fact of question asking means that you try to figure out and understand the themes under consideration, which is greatly welcomed. Come to the tutorials and consultations according to the schedule.
4. Join into two(three)-person groups in order to discuss lecture and laboratory classes material, to prepare for the seminars and final test-papers. It is acknowledged that working in a group you understand and acquire the information much better.

Besides, the skills of explaining the themes to your comrades will be of great use in the future.

5. Use your time rationally. The course of Colloid Chemistry as well as other disciplines that are taught this year sets very high demands. Therefore, you have to find the golden mean between your studies, other duties and personal life. According to the established rules, students are to work one hour directly with the instructor and 2 or 3 hours independently. In other words, for the successful acquisition of the course of Colloid Chemistry the student has to study independently 5 hours a week.
6. The individual study of Colloid Chemistry implies the analysis of the problems that have been solved, as well as the knowledge control by means of solving the thematic problems, that are included in the textbook or the assignment book.
7. The search for the correct answers to the tests presents another method of studying and understanding of theoretical and practical material.

VIII. Methods of assessment:

Two final test-papers are planned for the one-term course of Colloid Chemistry.

Final test-papers are held in written form, according to the question cards, which have the following structure: a theoretical question, a problem, 10 test items with one correct answer and 10 test items with several answers. The maximal number of point is indicated at each question.

Each test-paper and seminar can be taken not more than two times. Besides, one attempt is possible at the end of each term (the last week). The average grade for the term presents in itself the arithmetic mean of the test-papers and seminar grades.

The students with the average term grade less than 5, 0 as well as those who haven't recovered the absence from the laboratory works are not admitted to the colloquium.

There are two stages of the colloquium: testing (20 tests) and oral answer (a student is allotted 30 minutes for preparation)

At the oral colloquium a student is offered an examination card, which comprises 2 theoretical questions and one problem to solve.

Both stages are graded from "0" to "10"

The questions to the colloquium are approved at the chair meeting and are displayed a month before the examination session.

The final grade is made up of three components: the average grade for the year (coefficient 0, 5), oral colloquium (coefficient 0, 3), testing (coefficient 0, 2)

Methods of mark rounding

The average of current and final marks	Final mark
5	**5**
5,1-5,5	**5,5**
5,6-6,0	**6**
6,1-6,5	**6,5**
6,6-7,0	**7**
7,1-7,5	**7,5**
7,6-8,0	**8**
8,1-8,5	**8,5**
8,6-9,0	**9**
9,1-9,5	**9,5**
9,6-10	**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 exam twice.

IX. Language of study:

Romanian, Russian, English