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ФАРМАЦЕВТИЧЕН ФАКУЛТЕТ ПЛОВДИВ

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PHYSICAL CHEMISTRY AND COLLOID CHEMISTRY ACADEMIC STANDARD

1. Aim

The primary objective of education in the discipline Physical Chemistry and Colloid Chemistry is the study of chemical systems and the accompanying energy changes, in terms of the general principles of physics and chemistry. The course content includes the sections thermodynamics, solutions theory, phase equilibria, electrochemistry, chemical kinetics, catalysis, surface phenomena, properties of colloid dispersion systems, aerosols, powders, suspensions, emulsions, surfactants and high molecular weight compounds. Colloid chemistry is directly related to the production of medicines and medical cosmetics.

This objective correlates with the:

- university mission and vision;
- discipline's contents and credit rating (according to ECTS), both made apparent in the curriculum;
- qualification characteristics of the speciality;
- master academic degree.

The objective is entirely consistent with the place of the discipline within the overall curriculum in terms of discipline's importance and timing in the curriculum. As a fundamental discipline, it predominantly serves the next stages of education.

2. Learning

The topics and the hours for lectures and practical exercises are posted on the website of the department.

Learning content is organized chronologically in such a way that each consecutive lecture and related practical classes use previously studied topics and terms. The university's priority objectives, such as developing the students' personal qualities, encouraging their initiative, creating habits for self-education and self-learning skills, acquiring key competencies and skills, are reflected in the curriculum of the discipline, which agrees with the respective objectives.

3. Prerequisites

The necessary knowledge and skills the student must have obtained to begin and successfully complete his/her tuition in Physical Chemistry and Colloid Chemistry, include basic knowledge of

General and inorganic chemistry and Physics, which are present in the education programs in master's degree of Pharmacy. In the course of study, students will acquire specific knowledge and practical skills to independently apply modern physical chemistry methods and means to the degree to independently calculate and experimentally determine thermodynamic quantities related to chemical reactions, phase transitions, ideal and real solutions, etc. The laboratory exercises introduce the students to some important experimental methods of physical chemistry and colloid chemistry – conductometric measurements, optical methods, refractometry, tensiometry, spectrophotometry, etc. The acquired knowledge will help to master the material in the special disciplines: Pharmaceutical Chemistry; Pharmaceutical analysis; Pharmacology and others.

4. Academic resources

The academic stuff of the department includes 2 full professors and 2 associated professors, 6 assistant professors. One is a Doctor of Chemical Sciences (DCSc) and 9 of them holding an educational and scientific degree Doctor (PhD).

The course is read by professors and associate professors who have the necessary qualifications, theoretical and practical knowledge in the field of physical and colloid chemistry.

Laboratory exercises are held by professor, associate professor, assistant professor, or assistant, who have the necessary qualifications, theoretical and practical knowledge in the field of physical and colloid chemistry.

5. Material resources

The Department of Chemical Sciences at MU – Plovdiv runs 2 classrooms, 6 laboratories equipped for experimental work (1 research laboratory and 5 training laboratories). The total laboratory area is 282 m^2 (equipped with the necessary equipment for conducting experimental work). There are 6 offices (equipped with computers and peripheral equipment). For experimental work of one researcher, the laboratory area is 26 m^2. The laboratory equipment of the department includes general and special equipment (analytical balances, rectifiers, pH meters, apparatus for determining the melting point, UV/Vis spectrophotometers, FTIR spectrometer, rotary vacuum evaporator, viscometer, tensiometer, potentiometer, polarimeter, electrophoresis apparatus, conductometers, thermostats, centrifuges, dry sterilizers, flasks, electromagnetic stirrers, etc.). Internet access to large scientific and reference databases is provided (Springer, Web of Science, Google Scholar, Science Direct, Scopus, MEDLINE Complete, SciFinder, European Pharmacopeia, etc.).

6. Lecturing

Multimedia presentations have been prepared for the Physical and Colloid Chemistry lecture course, which are provided to students before or after the lectures. The volume and format of the lectures are the choice of the lead speaker.

7. Laboratory/practical classes

Laboratory exercises are conducted in small groups. Before beginning each exercise, students are examined orally, both on the theoretical basis of the specific experience and on its practical part. In this way it is checked:

- student's knowledge for a specific exercise;
- the results of the theoretical knowledge learned.

Students record the results of the experiments in special protocol notebooks prepared by the professor. If necessary, these results are processed and presented graphically to track dependencies or to calculate physical chemistry parameters graphically.

8. Information resources. Basic literature

The Professor has developed lectures and exercises in the discipline, and they are also presented electronically. There is a list of recommended literature for each component (lectures and exercises). For the convenience of the students, the Professor has prepared a textbook "Physical Chemistry and Colloid Chemistry", published by the University Publisher of MU – Plovdiv. The textbook is available both in the university libraries and in its bookstore. Additional literature for students' self-study is cited below.

1. Физикохимия и колоидна химия, Р. Манчева, Кр. Гиргинов, Медицински университет – Пловдив, 2018, ISBN 978-619-7085-98-3
2. Physical Chemistry – R. Mortimer, Elsevier Academic Press, 2008
3. Atkins' Physical Chemistry – P. Atkins and J. de Paula, Oxford University Press, 2009
4. Physical Chemistry for the Life Sciences – P. Atkins and J. de Paula, Oxford, 2011

9. Control assignments

Students are occupied dynamically and intensively during the semester. It is assumed that the way in which knowledge and skills are acquired is an important factor in their depth, durability, and applicability. Tutors should control student progress at least twice in the semester. Ongoing control can be performed through tests or control assignments. Students are provided with timely information and explanations on the control results, which assists their further preparation.

10. Individual work and commitment of the students

The individual work of the students must be led by the assistant professors, who have to guide them in the literary sources, and methods for learning, as well. There are available training tests for individual work and student exercises.

11. Collaboration between students and teaching staff

This collaboration consists of:

- The teacher's commitment to the students' preparation on current difficulties in learning the subject and the opportunities with an individual learning program.
- Use of meeting hours for consultations.
- Scientific research with outstanding students.
- Including students in teams for scientific tasks, research projects, etc.

12. Ongoing evaluation

Ongoing evaluations are given for the following activities:

1. Laboratory experiments, coursework and individual tasks, research work, etc.;
2. At least two written tests.

13. Standards of evaluation

Standards for the evaluation of the students' achievements are carefully thought out, and clearly defined so that the student's assessments are objective and not depended on the lecturer. The final grade is determined based on two criteria: 1. Assessment from the current control, which assesses the student's academic activity during the semester. 2. Assessments from the examination test in the discipline. The examination regulation is designed to minimize the possibility of manipulating the results. Based on the above, clear evaluation standards have been developed as follows:

● Excellent (6) – for shown individual and logical thinking, additional knowledge, and skills, for excellent knowledge of the subject, creativity, interpretation of the concepts, skills to solve complex tasks and right argumentation for the decisions taken, accuracy and rich language culture of the presentation.

● Very good (5) – for well-developed key and additional knowledge, thinking and understanding the subject, good skills to apply the knowledge, adequate use of scientific concepts from the studied field, good language culture.

● Good (4) – for developed additional knowledge, good knowledge of the subject; but without being able to develop learning to analysis; comparatively good language culture; but with inaccuracies in the use of different concepts and terms.

● Satisfactory (3) – simple reproduction and key knowledge of the subject; not ready for analysis of the knowledge gained; poor language culture with a lot of mistakes.

● Poor (2) – for showing scant knowledge and gross errors that cannot be the basis for the next levels of training.

At the beginning of the classes each semester the students must be informed about the evaluation standards, the procedures for conducting the ongoing control and the opportunities for obtaining feedback on their progress during the semester.

14. Final grade formation

The final assessment of the discipline is formed by several components: 1) results of current control of the theory; 2) results of current control over the tasks of the laboratory training; 3) results of the final semester exam. The final exam test includes questions from all syllabus topic sections, with different levels of difficulty. It is evaluated by a point system, which is converted into a six-point system score.

The final grade of the student who fits in the protocol and his student ID is determined by the formula:

$$Q_{\text{final score}} = 0.15Q_{\text{current control (lectures)}} + 0.15Q_{\text{current control (lab)}} + 0.7Q_{\text{final exam}}$$

If one of the components of the final grade is "Poor 2" or "Failed", the final grade is automatically set to "Poor 2".

15. Documentation, results storage, and control of the assessment procedure

Assessed students have the right and obligation to be informed about the assessment regulation procedures and results, and to make claims and complaints in case of violation of the current rules.

• The students' rights, in accordance with the meaning of the preceding paragraph, are guaranteed provided that technical omissions or errors have occurred (e.g. in the calculation or

assessment) or that there are reasons for a vast contrast between the knowledge, skills and competencies the student have shown and his/her final grade.

• Corrections of the grades in cases regarding the provisions of the previous paragraph shall be made in the Student Book, the examination report, or the account in the General Registry only by the leader of the discipline.

• Potential disagreements and claims on the part of the students should be directed in a written form to the assessment team, whose responsibility is to provide an argumented answer by the end of the next working day.

• Revealed and proven cases of serious violation of the rights of the student in terms of assessing his/her knowledge, skills and competences are directed with a written complaint to the Vice-rector for quality and accreditation.

Exam materials are preserved, and the students are informed about them. The period during which the students have access to the examination tests and results is up to 5 working days after the announcement of the results. This requirement shall be met in accordance with the Higher Education Act Art. 56. par. 1, " The members of the academic board shall be obliged to develop and announce in an appropriate way a description of the provided by them course of lectures, including number, titles and sequence of topics of the curriculum, recommended literature, method of evaluation of the mark and form of checking of knowledge and skills."

The academic standard for the discipline Physical Chemistry and Colloid Chemistry was approved by the Departmental Council of Members on January 29, 2024, and published on the University website.

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