

МЕДИЦИНСКИ УНИВЕРСИТЕТ – ПЛОВДИВ
MEDICAL UNIVERSITY – PLOVDIV



Фармацевтичен факултет
Faculty of Pharmacy

КАТЕДРА „ХИМИЧНИ НАУКИ“
DEPARTMENT OF CHEMICAL SCIENCES

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ACADEMIC STANDARD FOR THE DISCIPLINE „ORGANIC CHEMISTRY” TAUGHT TO PHARMACY STUDENTS

1. AIM

Organic chemistry is a compulsory subject under the Unified State Requirements for pharmacy students with a minimum number of 120 hours. The course is taught in the 3rd and 4th semester and ends up with an exam at the end of the 4th semester. After successfully passing the exam, students receive 12.4 credits.

The course aims to provide basic knowledge of methods for preparation organic compounds, including those administered as medicines; to outline the basic chemical properties of organic molecules so that students can predict possible drug-drug interactions; and to emphasize the relationship between the spatial structure of organic compounds and their biological activity. This aim is completely consistent with:

- the University mission and concept,
- the place of the discipline within the overall curriculum in terms of discipline’s importance and timing in the curriculum.
- the volume of the material and credit rating of the discipline (according to the ECTS system) as outlined in the curriculum;
- the qualification characteristics of the specialty;
- the educational degree (master degree in pharmacy).

The knowledge of organic chemistry is a necessary and compulsory basis for the next courses in pharmaceutical chemistry, pharmaceutical analysis, biochemistry, pharmacology, toxicology etc. The practical course introduces students to basic techniques for the preparation, isolation, purification, and structural characterization of organic compounds through classical and modern instrumental methods.

2. LEARNING

The topics and the hours for lectures and practical training are posted on the website of the Faculty of Pharmacy of the Medical University of Plovdiv. The learning content of lecture course is organized from the simpler to the more complex matter and all topics are related to each other. The course provides an opportunity for systematic student’s self-

learning and self-education. Practical classes follow the topics of the lectures and allow practicing and learning of the lecture material. In addition to the opportunity for further theoretical preparation, these practical exercises are intended to form students' dexterity, skills to handle harmful chemicals, logical thinking, and the ability to draw lessons from the experiments.

3. PREREQUISITES

The course in organic chemistry uses already acquired knowledge in other major chemical disciplines: general and inorganic chemistry, analytical chemistry and physical chemistry. For better learning and understanding of organic chemistry course, students must know in detail the following basic concepts:

Types of chemical bonds (covalent, ionic, coordination, Van der Waals forces), hybridization of carbon atom, chemical equilibrium and rate of chemical reactions, Arrhenius, Brønsted – Lowry and Lewis theories of acids and bases, pKa value as a measure of acid and base strength, pH value, properties of buffer solutions, determination of oxidation number, oxidant and reductant recognition, oxidation and reduction, basic principles of thermodynamics and related terms (free energy, enthalpy and entropy). The students must build on and upgrade this knowledge throughout the course of organic chemistry.

4. ACADEMIC RESOURCES

The lecture course is taught by a full professor or associate professor who has the necessary qualifications, theoretical and practical knowledge in at least one of the following areas: theoretical organic chemistry, organic synthesis, bioorganic chemistry, natural chemistry, organic analysis, pharmaceutical chemistry. Up to 30% of the lecture course may be assigned to a lecturer who holds a PhD in one of the above fields.

The practical training is conducted by assistant professors who have master degrees in a chemical specialty and have been successfully recruited after a selection exam.

5. MATERIAL RESOURCES

Practical training in organic chemistry is carried out in a specialized laboratory equipped with fireproof and corrosion-resistant working benches. The lab is equipped with a fume cupboard and ventilation system. Another laboratory is provided for research work of academic staff, PhD students and undergraduated students. A wide range of glassware and chemicals are used for the practical training, as well as some specific instruments: balances, thermostats, heaters, electromagnetic stirrers, melting point apparatus, electronic and infrared spectrophotometers, multimedia. Specialized software required for drawing of chemical formulas, image processing, statistical processing of experimental results, etc. is provided in the research laboratories of the Department. Internet access to large scientific and reference databases (Google Scholar, Science Direct, SciFinder, European Pharmacopeia, etc.) is available through University library.

6. LECTURING

Multimedia presentations have been prepared for the organic chemistry lecture course, which are provided by e-mail to the students before or after lectures. All topics covered in

the syllabus are covered during lectures, with a volume of knowledge determined by the leading lecturer.

7. LABORATORY/PRACTICAL CLASSES

The duration of practical classes is 6 academic hours and they are held every other week for each group. Students are provided with a labbook, from which they learn the theoretical background for each experiment, the specific risks and safety measures, and the experimental procedure. In the same labbook they draw the results and conclusions of each experiment. The students' preliminary readiness for the practical class is checked with an entrance test at the beginning of the training, the results of which are considered in the formation of the student's current assessment.

8. SEMINAR CLASSES

Seminars are scheduled during practical classes and topics are given to the students in advance for self-study and self-training. Apart from this, at the beginning of the academic year, each student receives a topic on which they should prepare and present to their classmates a public presentation.

9. INFORMATION RESOURCES. BASIC LITERATURE.

All presentations prepared by the lecturers as illustration of their lecture course are available and sent to the students as handouts in electronic format. A list of the main reference literature is presented below and limited number of copies of these textbooks can be used in the University library (the branch located in the Medical College). Most of them are available in electronic format as well and can be provided by the lecturer on request.

- Галин Петров. Органична химия. Университетско издателство „Св. Климент Охридски”, 2016 или по-раншни издания.
- Paula Y. Bruice. Essential Organic Chemistry. Pearson New International Edition, Second edition, 2013.
- Francis Carey, Robert Giuliano. Organic Chemistry, 10th edition (or earlier editions). McGraw Hill, 2016.
- John McMurry. Organic Chemistry, 9th edition. Cengage Learning, 2016.
- Leroy G. Wade. Organic Chemistry. 8th edition. Prentice Hall; 2012.
- Paul Dewick. Essentials of organic chemistry for students of pharmacy, medicinal chemistry and biological chemistry. John Wiley & Sons, 2009.

10. CONTROL ASSIGNMENTS

The systematic and consistent preparation of the students during the semester is of paramount importance and is verified by the current assessment during practical exercises and by conducting two colloquiums:

- "Nomenclature, Isomerism and Properties of Hydrocarbons" – 1st semester
- "Carboxylic acids and their functional derivatives" – 2nd semester

11. INDIVIDUAL WORK AND COMMITMENT OF THE STUDENTS

The individual work of students is encouraged by all teachers who guide them in the scholarly resources. The sample tasks and problems given in the labbook also support students' self-study and self-assessment

12. COLLABORATION BETWEEN STUDENTS AND THE TEACHING STAFF

Each teacher has hours of consultation to assist in student self-study. Students who are interested in research activities are involved in the realisation of current departmental projects.

13. EXAMS AND FINAL ASSESSMENT

Organic chemistry training ends with a semester exam in June. The exam has two components:

- Written set of problems with 10 multiple choice and 20 open answers;
- Oral discussion on the issues of the written work.

If the evaluation of one of the components is failed (2), then the final evaluation is necessarily failed (2).

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

$$Q_{\text{final score}} = 0.1Q_{\text{current assessment}} + 0.1Q_{\text{colloquiums}} + 0.5Q_{\text{written exam}} + 0.3Q_{\text{oral exam}}$$

This academic standard for the discipline "Organic chemistry" has been adopted by the Faculty council of the Faculty of Pharmacy on 12.10.2016 with protocol № 4.