UNIVERSITY OF GOTHENBURG

DEPARTMENT OF CHEMISTRY AND MOLECULAR BIOLOGY

KEM031 Organic Chemistry for Students of Pharmacy, 15 credits

Organisk kemi för apotekarstuderande, 15 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Chemistry and Molecular Biology on 2013-08-26 and was last revised on 2024-03-08 to be valid from 2024-09-02, autumn semester of 2024.

Field of education: Science 100%
Department: Department of Chemistry and Molecular Biology

Position in the educational system

The course is given in the pharmacy programme as a compulsory course on semester 3. The course can be read as a freestanding course. This course replaces course KEN030 and corresponds to course KEM030 and may not be included at the same time with one of these in a degree.

The course can be part of the following programmes: 1) Programme in Pharmacy (F2APP), 2) Programme in Pharmacy (F2APO), 3) Bachelor of Science Programme in Medicinal Chemistry (N1LMK) and 4) Bachelor of Science Programme in Chemistry (N1KEM)

Main field of studies	*Specialization*
Chemistry with Specialization in Organic and Medicinal Chemistry	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements
Pharmaceutical Science	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements
Chemistry	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

For admission to the course, passed result on course part A or part B in KEM011, Basic

chemistry 1 (15 credits) and passed results on course KEM022, Basic chemistry 2a (7.5 credits) or equivalent knowledge are required. Completed courses on the pharmacy programme semester 1-2 is also required of which 30 credits must be passed.

Learning outcomes

After successfully completed course, the student should be able to:

Knowledge and understanding

- **explain** important reactions and their mechanisms,
- **use** the IUPAC system of nomenclature,
- **describe** and **interpret** the acid-base properties of organic compounds,
- **predict** the spectroscopic data for organic compounds.

Competence and skills

- **describe** organic molecules their properties and reactivity,
- **predict** the main product and probable by-products of chemical reactions,
- **design** multi-step synthesis paths for organic compounds,
- **synthesise, separate, purify** and **identify** organic compounds,
- **search** and **compile** information from scientific literature.

Judgement and approach

- **assess** and **prevent** security threats in connection with all activities extensive organic compounds,
- **assess** the usability of different chemical methods for the synthesis of drug-like molecules, involving the aspect of chemical waste management.

Course content

The aim of the course is to give advanced and expanded basic knowledge, experimental skills in general organic chemistry in addition to the course Basic chemistry 2a (KEM022) as necessary for further studies at the pharmacy programme or in chemistry.

Sub-courses

1. **Theory part** *(Teoretisk del),* 9 credits

   Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)

   The theoretical part of the course treats the following subjects:

   - The structure of organic molecules, theory of the chemical bond
   - Conformation energy, reaction energy, activation energy
   - Functional groups
   - Transformations between different functional groups
   - Coupling reactions to build complex molecules

- Synthesis strategy
- Spectroscopic structural analysis
- Synthesis, structure and reactivity of biopolymers such as peptides and saccharides
- Chemical reactions in biological environment

2. Laboratory work *(Laborationskurs),* 6 credits

Grading scale: Pass (G) and Fail (U)

In the laboratory part, the most common unit operations in organic synthesis in microscale are carried out, including separation and purifying of products and identification of the products with spectroscopic methods (nuclear magnetic resonance, infrared spectroscopy, mass spectrometry). A risk analysis is carried out for each laboratory session. The laboratory sessions and their result be presented in written laboratory reports.

Form of teaching

Module 1: The teaching includes lectures and group seminars.

Module 2: The teaching includes introductory lectures, a safety lecture with a written safety test, laboratory sessions and computer-based laboratory sessions. All these components are compulsory. Passed result on the safety test is required to may participate in the laboratory sessions.

Language of instruction: English and Swedish
As principal rule, the course is given in Swedish but can be given completely or partly in English if the circumstances require it.

Assessment

Module 1: Examination takes place through written examination at the end of the course and two theoretical tests during the course.

Module 2: Examination takes place through an oral presentation as well as through written laboratory reports. Each individual report is marked and is relevant for grading. A student who has failed on the reports should redo the laboratory exercises, whereat a new occasion for submitting the reports is provided.

If a student who has failed twice on the same part of the examination wants to change examiner before the next examination session the request should be submitted in writing to the department and be approved if there are not special causes against this (HF chapter 6 section 22).

In case a course has been discontinued or undergone major changes the student should normally be guaranteed access to at least four examination sessions (including regular examination session) during a period of at least two years based on the earlier planning of the course.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
Module 1: For the grade Pass, at least 50% of the maximum score in examination as well as participation in the theoretical tests are required.
For the grade Pass with distinction, at least 75% of the maximum score in examination as well as participation in the theoretical tests are required.
The result of the tests can give extra points equivalent up to 4% of the maximum score of the examination.

Module 2: For the grade Pass is required

- passed oral presentation,
- at least 50% of the maximum score for each individual lab report,

Final grade: For Pass in the whole course, Pass on the modules 1 and 2 is required. For Pass with distinction in the whole course, Pass with distinction on module 1 and Pass on module 2 are required.

Regarding application of the ECTS scale for grade it is referred to Vice-Chancellor's decision 28/05/2007, diary nr G 8 1976/07.

Course evaluation

The course evaluation takes place in the form of an anonymous questionnaire on the teaching platform of University of Gothenburg (GUL). A compilation of the questionnaire is done by the course coordinator and the results are to be discussed between course administration and student representatives at a Course Board, where proposals for development of the course are discussed. Notes from the course board meeting should be taken and submitted to the course administration for archiving and to the management as well as council of the pharmacy programme (AUR) for information. Compilation of course questionnaire and any changes in the set-up of the course are made available for both earlier and future students.

Additional information

The course is related to sustainable development.