



DEPARTMENT OF CHEMISTRY AND MOLECULAR BIOLOGY

KEM825 Organic and Medicinal Chemistry, 10 credits

Organisk kemi och läkemedelskemi, 10 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Chemistry and Molecular Biology on 2013-07-05 and was last revised on 2024-03-12 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 classified at the level 90-120 credits for Degree of Bachelor and can be counted as a course at second cycle level for Degree of Master (120 credits). The course can be read as a free-standing course. Course substitute course's KEM830 and partly course KEM820 and may not be included at the same time with one of these courses in a qualification.

The course can be part of the following programmes: 1) Master's Programme in Organic and Medicinal Chemistry (N2KEL), 2) Bachelor of Science Programme in Medicinal Chemistry (N1LMK), 3) Master's Programme in Chemistry (N2KEM) and 4) Bachelor of Science Programme in Chemistry (N1KEM)

Main field of studies

Chemistry with Specialization in Medicinal Chemistry

Chemistry

Specialization

A1N, Second cycle, has only first-cycle course/s as entry requirements

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Entry requirements

For admission to course is required approved result on laboratory part (module 2) and on the diagnostic tests in course KEM815 Advanced organic chemistry (15 credits) or

the equivalent knowledge. Applicants must prove their knowledge of English: English 6/English B from Swedish Upper Secondary School or the equivalent level of an internationally recognized test, for example TOEFL, IELTS.

Learning outcomes

The student should on completion of the course have such knowledge and experimental proficiencies in organic chemistry that are required to be able to implement plan, produce and analyse pharmaceutical substances. Knowledge that is received is necessary for continued higher studies in organic chemistry and medicinal chemistry.

After completion of the course, the student should be able to:

Knowledge and understanding

- at a general level explain selected drug structure, pharmacological effects as well as function at molecular level,
- at a general level explain interaction between drug molecules and receptors (biological? targets?),
- describe methods for? lead? generation and optimisation of? lead? compounds.

Competence and skills

- plan and carry out production of drug molecules via multistage synthesis
- characterise the received substances with appropriate methods.

Judgement and approach

- critically review result from own laboratory sessions as well as result from research literature,
- assess and prevent security threats in connection with all activities that include organic compounds.

Course content

Sub-courses

1. Theory (*Teori*), 5 credits

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

- Advanced organic chemistry applied for producing of medicinal substances; ex heteroaromatic chemistry, pericyclic reactions, radical, carbene and organometallic chemistry
- Introduction to medicinal chemistry with short history and future vision
- Pharmaceutical chemistry concepts: agonism, antagonism etc
- Chosen drug synthesis, structures and effects
- Biological activity: interaction between drug molecules and receptors (e.g.

enzymes; nucleic acids)

- Biological models: Definition of goals (measurable aims in well-defined models); in vivo and in vitro screening; high throughput screening (HTS); combinatorial chemistry and synthesis
- Lead generation: natural products;? me too?, endogenic ligands; receptor mapping; substances library, HTS
- Lead optimisation: analogy; rational design; SAR; combinatorial chemistry; HTS; Pharmacophore identification
- Pharmacokinetics: drug absorption; distribution; metabolism; elimination; bioavailability; administration; prodrugs?soft drugs

2. Laboratory Work and Exercises (*Laborationer och övningar*), 3 credits

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

Laboratory sessions consist of multistage synthesis of one or two different target molecules that should illustrate parts of the theoretically treated components. In group work is analysed given target molecules and drug molecules with regard to synthesis and properties.

3. Diagnostic tests (*Diagnostiska prov*), 2 credits

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

A few diagnostic tests (tests) that are organised continuously during the course.

Form of teaching

Language of instruction: Swedish and English

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

Assessment

Part 1: Examination takes place through written examination at the end of the course.

Part 2: Examination takes place through reports and presentations continuously during the course.

Part 3: A few diagnostic tests (tests) that are organised continuously during the course.

Student who has not become passed the regular examination session is offered additional examination sessions.

If a student who has failed the same part of the examination twice wishes to change examiner before the next examination a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons against (Chapter 6, Section 22 of Higher Education Regulation).

In cases where a course has been discontinued or has undergone major changes, the

student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

Whole course:

- For grade Pass (G) in the whole course is required passed results on modules 1 and 2 and 3.
- For grade Pass with distinction (VG) in the whole course is required grade Pass with distinction (VG) on module 1 and grade Pass (G) on module 2 and 3.

Concerning application of the ECTS grading scale please see Vice-chancellor's decision 28/05/2007, dnr G 8 197/07

Course evaluation

A course evaluation is done in relation to the intended learning outcomes and content of the course. It is performed at the end of the course through an individual written questionnaire on the virtual learning environment at University of Gothenburg. A student who participates in or has completed a course should be given possibility to anonymously express experiences of and views in the course in a course evaluation. A compilation of the course evaluation and reflections of the course coordinator should be made available for the students within reasonable time after the end of the course.