Linnæus University

Course syllabus

Faculty of Health and Life Sciences

Department of Chemistry and Biomedical Sciences

1KE010 Organisk kemi A, 7,5 högskolepoäng
1KE010 Organic chemistry A, 7.5 credits

Main field of study
Chemistry

Subject Group
Chemistry

Level of classification
First Level

Progression
G1F

Date of Ratification
Approved 2009-11-19
Revised 2016-09-02 by Faculty of Health and Life Sciences.
The course syllabus is valid from autumn semester 2016

Prerequisites
General chemistry or the equivalent.

Objectives

Module 1: Organic chemistry A, theory (6 credits)
After completing the module, the student should be able to:

- name and interpret names of simple organic compounds (aliphatic and aromatic hydrocarbons and compounds containing heteroatoms)
- describe and apply the valence bond theory and molecular orbital theory to organic molecules
- explain the acid-base properties of organic substances and relate them to their reactivity
- describe and apply the phenomenon of resonance and Hückel's rule
- use stereochemical terminology and indicate configuration according to the Cahn-Ingold-Prelog convention for simple organic substances
- describe the principles of racemate resolution
- describe the concept of conformational analysis and apply it to simple organic substances
- describe and identify structural and physical properties of alkanes, alkenes,

alkynes, arenes, alcohols, ethers, thiols, sulfides, carbonyl compounds, amines, and carboxylic acid derivatives, and relate these properties to the reactivity of substances
- describe and implement some fundamental organic reaction types (addition, elimination, substitution)
- describe and implement some basic organic reactions specific to the classes of alkanes, alkenes, alkynes, arenes, alcohols, ethers, thiols, sulfides, carbonyl compounds, amines, and carboxylic acids and their derivatives
- explain the basics of carbohydrate chemistry, including Fischer projection, mutarotation, glycoside formation, and di- and polysaccharides
- describe the principles of how spectroscopic methods (IR, MS, and 1H-NMR) can be utilised for structural determination of simple organic substances.

Module 2: Organic chemistry A, laboratory work
After completing the module, the student should be able to:

- review and implement risk and safety information related to organic chemical laboratory experimental activities, and
- plan, carry out, evaluate, and report in writing on simple organic syntheses and analyses.

Content
Module 1: Organic Chemistry A, Theory (6 credits)
The course will cover the following theoretical aspects:

- organic chemical nomenclature for simple aliphatic and aromatic hydrocarbons and substances containing heteroatoms
- valence bond and molecular orbital theory
- acid-base properties of organic substances
- resonance and Hückel's rule
- stereochemistry, including biological implications of stereochemistry
- fundamental structural, physical, and biological properties of key classes of organic compounds
- conformational analysis of simple organic substances
- reactions of alkanes (substitution)
- cis-trans isomerism
- some methods for the synthesis of, and some reactions of, alkenes, alkynes, aromatics, alkyl halides, alcohols, thiols, ethers, sulfides, carbonyl compounds, carboxylic acids and derivatives, and amines
- carbohydrate chemistry, including classification, Fischer projection, mutarotation, glycoside formation, disaccharides, and polysaccharides
- basic physiological and biological properties of some important di- and polysaccharides
- introduction to spectroscopic analysis of simple organic substances using IR spectroscopy, mass spectrometry, and IH-NMR spectroscopy

Module 2: Organic chemistry A, laboratory work (1.5 credits)
In the practical part of the course, the student will practise:

- conducting risk analyses in preparation for laboratory tasks
- drawing structural formulas for organic compounds using a computer
- planning, performing, and providing written reports on the results of, simple organic syntheses and analyses based on their laboratory work.

Type of Instruction
Instruction is provided in the form of lectures and group exercises in Module 1 and laboratory work in Module 2. Participation in laboratory work is mandatory.

Examination
The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

Examination of the theoretical part (Module 1) is conducted through a written exam at the end of the course. A first resit examination is offered within 6 weeks after the regular exam date.

Laboratory work should be presented in writing during the course. All laboratory work must be approved for a passing grade in Module 2.

For Module 1, one of the following grades is awarded: Fail, Pass, or Pass with Distinction. For Module 2, one of the following grades is awarded: Fail or Pass. For the entire course (Modules 1 + 2), one of the following grades is awarded: Fail, Pass, or Pass with Distinction.

Both the theoretical and laboratory components are assessed holistically.

The criteria for a passing grade are based on the course objectives (see above).

Course Evaluation
During or shortly after the course, a written course evaluation should be conducted. The result and analysis of the course evaluation should be promptly communicated to the students who have taken the course. Students who are taking the course when it is offered the next time should be informed of the result at the course introduction. The course evaluation is anonymous.

Required Reading and Additional Study Material

McMurry, J., *Fundamentals of Organic Chemistry.* Brooks/Cole. The latest edition. Approx. 550 pp.

Wikman, S. *Organisk-kemisk nomenklatur.* Lund: Studentlitteratur. The latest edition. (136 pp; approx. 50 pages are included in the course; the remaining text serves as additional study material) Only available as an e-book.

Laborationskompendium i organisk kemi A. Linnaeus University. 2016

Aylward, G. & Findlay, T. SI *Chemical Data.* Wiley. The latest edition. (To be used as needed, especially in connection with laboratory work).