



Faculty of Health, Science and Technology  
Chemistry

# Syllabus

## Organic Chemistry

<b>Course Code:</b>	KEGA02
<b>Course Title:</b>	Organic Chemistry <i>Organisk kemi</i>
<b>Credits:</b>	7.5
<b>Degree Level:</b>	Undergraduate level
<b>Progressive Specialisation:</b>	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

**Major Field of Study:**  
KEA (Chemistry)

### Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2021-08-27, and is valid from the Spring semester 2022 at Karlstad University.

### Prerequisites

Registered for Introductory Chemistry, 7.5 ECTS credits, or Matter, 7.5 ECTS credits, and Chemical Calculations, 7.5 ECTS credits, or equivalent

### Learning Outcomes

The aim of the course is for students to acquire the basic knowledge of organic chemistry required for further studies in chemistry and chemical engineering.

Upon completion of the course, students should be able to

- give an account of how basic chemical bonding theory can be used to describe electronic structures and chemical bonding in organic molecules,
- give an account of the principles of systematic nomenclature in organic chemistry and apply the IUPACS rules for naming basic organic molecules,
- use different structure representations to describe organic molecules, including the

occurrence of stereoisomers and geometric isomers,

- give an account of the most important functional groups and their properties, and give examples of the preparation and use of different functional groups,
- analyse the relation between molecular structure and physical or chemical properties,
- give an account of the most important mechanisms for substitution, elimination, and addition reactions, and of factors affecting reactivity in such reactions,
- give an account of the electronic structure in conjugated and aromatic systems,
- give examples of the oxidation and reduction of organic compounds and of the reagents used for such reactions,
- outline the production and use of Grignard and organolithium reagents,
- perform simple syntheses and use the unit operations extraction, filtration, crystallisation, and distillation in small-scale laboratory work, including assessment of safety and effects on the working and physical environment.

### **Content**

The course comprises a theory module (4.5 ECTS cr) and laboratory module (3 ECTS cr), which are assessed separately.

The Theory Module (4.5 ECTS cr) comprises:

- Application of chemical bonding theory for organic molecules
- Nomenclature of organic molecules and various forms of graphical descriptions of their structures
- Properties and the most important reactions of alkanes, alkenes, alkynes, aromatics, alkyl halides, alcohols, esters, carbonyl compounds, carboxylic acids, carboxylic derivatives, and amines
- The use of substances of the groups above for synthetic purposes, illustrated by products and processes used in society
- Reaction mechanisms for a selection of addition, substitution, elimination, and rearrangement reactions in relation to the groups of substances above

The Laboratory Module (3 ECTS cr) comprises:

- Safety and hazard regulations
- Simple syntheses including the unit operations extraction, filtration, crystallisation, and distillation
- Thin layer chromatography and melting point determination
- Report writing and routines for laboratory notes

Attendance is mandatory for the scheduled laboratory sessions.

### **Reading List**

See separate document.

### **Examination**

Assessment of the theory module is based on a final written examination.

Assessment of the laboratory module is based on a written exam on safety regulations and on the lab reports from the mandatory lab sessions.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

### **Grades**

One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. For Engineering students, one of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) is awarded in the examination of the course.

### **Quality Assurance**

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

### **Course Certificate**

A course certificate will be provided upon request.

### **Additional information**

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.

The course may include as many as 5 days of mandatory attendance at Karlstad University.