KD2310 Advanced Organic Chemistry 7.5 credits

Organisk kemi, fortsättningskurs

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for KD2310 valid from Autumn 2013

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Chemical Science and Engineering, Chemistry and Chemical Engineering

Specific prerequisites

_Admission requirements for programme students at KTH:
_At least 150 credits from grades 1, 2 and 3 of which at least 110 credits from years 1 and 2, and bachelor's work must be completed, within a programme that includes:
75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding.

_Admission requirements for independent students:
_75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding.
Documented proficiency in English corresponding to English B.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

Describe principles of thermodynamics and kinetics with respect to organic molecules and reactions
• Describe frontier molecular orbital theory and apply it on organic reactions
• Discuss if a reaction is fast or slow and which step within a reaction sequence that is rate determining
• Discuss and explain whether a reaction is exothermic or not
• Account for methods to determine reaction mechanisms
• Identify a reasonable reaction mechanism for a given reaction
• Account for conformational analysis and its effects on organic reactions
• Describe supramolecular effects applied to organic reactions
• Describe basic principles for the rationalization of chemo-, regio- or enantioselective reaction outcomes
• Account for carbonyl/enol/enolate chemistry and apply it in organic synthesis
• Account for pericyclic reactions and rearrangements
• Describe and apply the reactivities of common reactive intermediates
• Describe the properties and synthesis of heterocyclic compounds
• Apply knowledge regarding heteroatoms such as boron, silicon, phosphorous and sulfur in organic chemistry
• Apply organic reactions in multi-step synthesis
• Describe principles concerning green- and sustainable chemistry
• Describe the process of drug discovery in the pharmaceutical industry
• Account for strategies of applying organic synthesis on larger scale
• Apply knowledge in organic chemistry on pharmaceutical chemistry, biochemistry, polymer chemistry, wood chemistry, environmental chemistry, and chemical engineering

Course contents

This course focuses on reactivity and synthesis in organic chemistry. Based on the general understanding of organic chemistry obtained from previous courses, a deepened and widened knowledge of the reactivities of organic structures will be conveyed.

• Discusses principles and factors governing the reactions of organic compounds
• Discusses new reaction mechanisms and pathways to complex molecules
• Involves the concept of green chemistry in organic chemistry for sustainable development
• Discusses the process of drug development in the pharmaceutical industry
• Discusses strategies for production of organic molecules on larger scale
• Comprises applications of organic chemistry in pharmaceutical chemistry, biochemistry, polymer chemistry, environmental chemistry, and chemical engineering

Course literature

Clayden, Greeves and Warren Organic Chemistry, Oxford University Press, 2012 (ISBN 978-0-19-927029-3) or the earlier edition Clayden, Greeves, Warren amd Wothers: Organic Chemistry, Oxford University Press, 2001 (ISBN 0 19 850346 6).

Examination

- PRO1 - Project, 1.5 credits, grading scale: P, F
- TEN2 - Written exam, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

The final grade will be the same as for the examination

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.