



Kursplan

för forskarkurs

Advanced Catalysis by Transition Metal Complexes
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10.0 Högskolepoäng
10.0 ECTS credits

Kurskod: KO40004
Gäller från: VT 2020
Institution Institutionen för organisk kemi

Förkunskapskrav och andra villkor för tillträde till programmet

Admitted to a PhD program in chemistry, or a closely related subject.

PhD students can take this course as a part of the fulfillment to a PhD degree if a similar course has not been completed in their previous studies.

Lärandemål

Upon completion of the course, students are expected to be able to:

- * classify chemical bonds between transition metals and ligands in organometallic complexes, and be able to explain the reactivity of transition metal complexes based on the connection between electronic structure and molecular properties.
- * explain fundamental chemical transformations of transition metal complexes in a catalytic cycle, and suggest reaction mechanisms in transformations catalyzed by transition metal complexes.
- * apply the knowledge in organometallic chemistry and catalysis to design synthesis routes to complex organic molecules.
- * gain knowledge from scientific articles within organometallic chemistry.
- * present a scientific article within organometallic chemistry/catalysis with an adequate background, and rationalize the scientific results in the context of the course.

Innehåll

In this course, PhD students will develop their proficiency in organometallic catalysis towards organic synthesis. Topics include:

- An introduction to chemical bonding, with an emphasis on bonding interactions between organic compounds and transition metal complexes.
- The connection between the structure of organometallic complexes and their properties (geometry, bond strength and reactivity). These fundamentals are applied in organometallic chemistry and catalysis.
- Interactions between transition metals and ligands.
- Modern aspects of organometallic catalytic processes, such as C-H activation, cross-couplings and related reactions, oxidations, reductions, carbene chemistry, allyl metal chemistry, carbonylation chemistry, and nucleophilic functionalizations, including asymmetric catalysis.
- Organometallic reaction mechanisms

In addition to the lectures, the PhD students will develop their proficiency in reading and disseminating modern organometallic research articles, as well as in discussing and proposing reaction mechanisms in the exercise classes.

The lectures are backed up by recommended reading of articles and exercise sessions.

Obligatoriska moment

Participation in the lectures, exercise and presentation sessions, and any associated integrated instruction is compulsory. In the event of special circumstances, the examiner may, after consultation with the teacher concerned, grant a student exemption from the obligation to participate in certain compulsory instruction.

Examinationsformer

The course is examined as follows: Knowledge assessment takes the form of a written exam, an oral presentation, and participation in seminars.

The course and examination language is English.

Grading (passed or failed) is related to the intended learning outcomes.

Grading criteria are handed out at the start of the course.

Students who receive a failing grade on a regular examination are allowed to retake the examination as long as the course is still given. Other mandatory course elements are equated with examinations.

The course has at least two examination occasions per year when the course is given.

Arbetsform

Instruction (in English) consists of lectures, seminars and exercises.