



LUND
UNIVERSITY

Faculty of Science

KEMM52, Chemistry: Coordination Chemistry and Organometallic Chemistry, 15 credits

Kemi: Koordinationskemi och metallorganisk kemi, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2018-11-23 to be valid from 2018-11-23, autumn semester 2019.

General Information

The course is an elective second-cycle component of a Master of Science (120 credits) degree in Chemistry.

Language of instruction: English

Main field of studies

Chemistry

Depth of study relative to the degree requirements

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

Learning outcomes

The aim of the course is to enable students to acquire specialised theoretical and practical knowledge within coordination chemistry, organometallic chemistry and bioinorganic chemistry. The course has a molecular perspective and a further aim to enable students to develop their ability to describe the structure and reactivity of coordination compounds and their applications in organometallic chemistry and homogeneous catalysis, and the significance of metals in biological systems.

Knowledge and understanding

On completion of the course, the students shall be able to

- describe in detail different models for chemical bonding in transition metal complexes including organometallic compounds

- use electron counting to assess the reactivity and stability of organometallic compounds
- describe typical reactions of coordination compounds and organometallic compounds, as well as their reaction mechanisms and the methods for studying them
- describe a number of homogeneous catalysis reactions in which organometallic compounds play an important role and the mechanisms of such reactions
- describe in detail the chemistry of d-block elements including common oxidation states
- describe the significance of transition metals in biological systems

Competence and skills

On completion of the course, the students shall be able to

- search for, analyse and understand reports of primary research in coordination chemistry, organometallic chemistry and, to a certain extent, bioinorganic chemistry
- plan, perform and evaluate the synthesis of coordination compounds and organometallic compounds
- use modern methods to characterise coordination compounds and organometallic compounds
- use databases to find sources in inorganic chemistry
- compile research literature and present the result orally and in writing

Judgement and approach

On completion of the course, the students shall be able to

- use acquired knowledge to investigate unknown reactions of metal complexes and suggest plausible mechanisms
- assess and interpret spectroscopic and kinetic data with regard to the structure and reactivity of metal complexes

Course content

Lectures and exercises (7.5 credits): The course deals with coordination chemistry and organometallic chemistry. The topics studied in this area include structure and bonding theories, reaction mechanisms and characterisation methods (NMR and molecular spectroscopy). The course also covers typical reactions within organometallic chemistry, the use of organometallic reagents in catalysis and organic synthesis, and databases in chemistry. Furthermore, the role of metals in biological systems is addressed.

The *laboratory sessions* (5 credits) are intended to provide students with practical skills in inorganic synthesis and other experimental techniques. The course also provides training in oral and written presentation.

Seminar (2.5 credits): The aim is to provide students with practical skills in compiling research literature and present this orally and in writing.

Course design

The teaching consists of lectures, exercises, laboratory sessions and a seminar. Compulsory participation is required in the laboratory sessions, seminar and associated elements.

Assessment

The assessment is based on a written exam at the end of the course and on the compulsory components throughout the course.

Students who fail an assessment will be offered another opportunity for assessment soon thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

For a grade of Pass on the whole course, the student must have passed the exam, the seminar and the laboratory sessions.

The grades awarded for the exam are Fail, Pass and Pass with Distinction. The grades awarded for the compulsory components are Fail and Pass.

The final grade is determined by the grade for the exam.

Entry requirements

To be admitted to the course, students must meet the general entry requirements for higher education and requirements for English proficiency corresponding to English 6 from Swedish upper secondary school, and have passed 90 credits in science courses including courses equivalent to:

- KEMA20 General Chemistry 15 credits, or KEMA10 General Chemistry 7.5 credits and KEMA12 Inorganic Chemistry- Basic Course 7.5 credits, KEMA01 Organic Chemistry- Basic Course 7.5 credits and KEMA03 Biochemistry- Basic Course 7.5 credits,
- KEMB09 Physical Chemistry- Basic Course 15 credits,
- KEMB21 Organic Chemistry 15 credits, and

- KEMB22 Inorganic Chemistry 7.5 credits

Students who have obtained the equivalent knowledge by other means may also be admitted to the course.

Further information

The course may not be included in a degree together with KEMM12 Organometallic Chemistry 15 credits and KEMM22 Coordination Chemistry 7.5 credits.

Subcourses in KEMM52, Chemistry: Coordination Chemistry and Organometallic Chemistry

Applies from H19

- 1901 Coordination Chemistry and Organometallic Chemistry, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 1902 Coordination Chemistry and Organometallic Chemistry, Seminar, 2,5 hp
Grading scale: Fail, Pass
- 1903 Coordination Chem. and Organometallic Chem., Laboratory Work, 5,0 hp
Grading scale: Fail, Pass