



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Materialkemi

Materials Chemistry

KASN10, 7,5 credits, A (Second Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED B/K

Date of Decision: 2023-04-18

General Information

Compulsory for: K4-m, N4-m

Language of instruction: The course will be given in English

Aim

The course gives advanced knowledge in solid state structural chemistry and materials chemistry including relevant methods of characterisation and synthesis. The course should also deepen the knowledge of the relationship between atomic structure and the chemical and physical properties of a material. A major focus of the course will be on applying knowledge in materials chemistry to address open-ended problems and to propose solutions for real materials challenges.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to explain and describe industrially important methods for synthesis of solid materials
- be able to understand and describe methods for structural analysis of solid materials.
- be able to explain and describe chemical and physical properties in solid materials.
- be able to discuss the relationship between atomic structure and properties in solid materials.

Competences and skills

For a passing grade the student must

- be able to build, describe and analyze crystal structure models with the aid of software

- in a group project study inorganic materials and summarize the work in a written report.
- perform an oral presentation for colleagues having the same, or higher level of knowledge.

Judgement and approach

For a passing grade the student must

- demonstrate the ability to apply your existing knowledge to open-ended problems in materials chemistry
- demonstrate the ability to identify and locate information require to address material problems

Contents

The course covers the main areas: symmetry, atomic structure and defects in inorganic materials; methods for the characterisation of solid materials; synthesis of crystalline materials; the relationship between atomic structure and physical properties.

Seminars: Group discussions of problems in materials science, with the focus on attaining a deeper understanding of fundamental concepts, as well as on applying knowledge in materials chemistry and from earlier courses to real problems in materials science.

Exercises: Practical exercises aimed at developing a deeper understanding of crystal structures and crystal symmetry together with problem solving, using hands-on building activities together with the software CrystalMaker.

Project assignment: Students will perform a practical research project in a small group, which is closely connected to current research in materials chemistry. The project work is presented as a written report and an oral presentation. Completion of the project along with the report and presentation, including active participation by asking questions to other projects, is mandatory to pass the course.

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Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written final home exam (gives the grade). Passed project including written and oral presentation, and active participation in the project presentations by asking questions.

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.

Admission

Assumed prior knowledge: KOOA15 General Chemistry, KASA10 Inorganic Chemistry and KASF05 Materials- and Polymer Technology or KOKA30 General, Inorganic and Organic Chemistry and KASF10 Functional Materials.

The number of participants is limited to: No

The course overlaps following course/s: KOO045

Reading list

- Hand-out material.
- Elaine A. Moore, Lesley E. Smart: Solid State Chemistry: An Introduction, Fifth edition. CRC Press, 2021, ISBN: 978-0-367-13572-0.

Contact and other information

Course coordinator: Kimberly Thelander, kimberly.dick_thelander@chem.lu.se

Course homepage: <http://www.kilu.lu.se/cas/education/undergraduate-education/>