Course syllabus

Aerosolteknologi
Aerosol Technology

MAMF55, 7,5 credits, G2 (First Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED C/D
Date of Decision: 2023-02-27

General Information

Main field: Nanoscience.
Elective for: F4, K4, M4, MNAV2, N4-m, W4-ms, MLAK2, R4
Language of instruction: The course will be given in English

Aim

Students should acquire a basic knowledge about aerosols; systems in which particles are suspended in gas. The course should give an overview of the physics and chemistry of airborne particles, the measurement techniques used to characterize them, and their effects on the environment and human health. Our students should learn to discuss these topics as well as technological applications of aerosols. Aerosol science has clear and direct impacts on our efforts to reach the Sustainable Development Goals (SDGs).

Especially

- health and well-being
- sustainable cities and communities
- decent work and economic growth
- affordable and clean energy
- industry, innovation and infrastructure
- climate action.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- Explain fundamental concepts of aerosol science including equivalent diameters and flow regimes.
- Explain the basic generation, dispersion, transformation, and deposition mechanisms of aerosol particles.
- State measurement techniques used in aerosol science and understand their operational principles and limitations.
- State the effects that aerosol particles have our health and environment, and understand the mechanisms causing the effects.

Competences and skills
For a passing grade the student must

- Be able to perform calculations of key aerosol processes such as cloud droplet activation and impaction.
- Be able to carry out and interpret measurements with aerosol instruments, for example particle size measurements.
- Be able to discuss examples from theoretical and applied aerosol science, orally and in written form.

Judgement and approach
For a passing grade the student must

- Be able to motivate suitable aerosol techniques for investigating research questions within the frame of the course.
- Give constructive feedback on the output of fellow students.
- Be able to assess and evaluate measurement results and put them in context.

Contents

Aerosol physics, aerosol chemistry, emergence and occurrence of aerosols in indoor and outdoor environments, lung deposition, particle size distributions, sampling and measurement techniques. Aerosol properties and typical particle pollution in indoor and working environments as well as in ambient air. Overview of particle effects on human health and environment. Application of aerosol technology in nanotechnology and pharmaceuticals. Laboratories are compulsory as they provide opportunity to observe aerosol physical properties as well as give practical experience in measuring particles with various instruments, including data analysis. The lectures are given by researchers with different expertise areas, to ensure that given facts and discussed topics are up to date. During the course students will collect source material and make independent, critical interpretations of it.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Individual written examination, which counts towards 50% of the course grade. Laboratory exercises with written reports, carried out in groups (10% of course grade). Calculation exercises handed in individually (15%). Project with written and oral report, carried out in groups (25%). For passed course, the student needs to pass each assessment.

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: Good knowledge of natural science subjects.
The number of participants is limited to: No
The course overlaps following course/s: TFRG10

Reading list

- Course literature is available on the internet.

Contact and other information

Examinator: Christina Isaxon, christina.isaxon@design.lth.se
Course coordinator: Axel Eriksson, axel.eriksson@design.lth.se
Further information: More information regarding the Departments policy regarding first-cycle education that is linked to research you will find here: http://www.design.lth.se/utbildning/forskningsanknytning.