

**SYLLABUS**

# **Atomic and Molecular Physics 7.5 credits F7008T**

**Atom- och molekylfysik**

**Course syllabus admitted: Autumn 2023 Sp 1 - Present**

**DECISION DATE  
2021-06-16**

# Atomic and Molecular Physics 7.5 credits F7008T

## Atom- och molekylfysik

### Second cycle, F7008T

| Education level | Grade scale | Subject | Subject group (SCB) |
|-----------------|-------------|---------|---------------------|
| Second cycle    | G U 3 4 5   | Fysik   | Physics             |

## Entry requirements

Basic course in Quantum Mechanics from physics or chemistry courses, for example MTF131/F0018T or Physical Chemistry.

## Selection

The selection is based on 30-285 credits

## Course Aim

To establish a connection between physical properties of individual atoms and molecules and their characterization by spectroscopic technique. To get acquainted with principles and methods of modern spectroscopy and its applications.

## Contents

Basic concepts of quantitative description of physical properties of atoms/molecules through quantum mechanics. Their structure and interaction with electric and magnetic fields. Spectroscopic methods and their quantum mechanical origin. Energy spectra of atoms and molecules, hyperfine structure of spectra, periodic table of elements. etc. Capabilities of modern spectroscopic methods (Infra-Red, Raman, Nuclear Magnetic Resonance, Fluorescence, X-ray Emission, etc.), review of their practical applications in research, industry and medicine for studies and characterization of atomic/molecular species.

## Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Lectures, laboratory work and a seminar.

## Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Home work assignments, completed laboratory exercises and presentation at the course seminar.

## Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

## Course offered by

Department of Engineering Sciences and Mathematics

## Modules

| Code | Description         | Grade scale | Cr  | Status    | From period | Title |
|------|---------------------|-------------|-----|-----------|-------------|-------|
| 0004 | Homework assignment | G U 3 4 5   | 4.5 | Mandatory | A14         |       |
| 0005 | Laboratory work     | G U 3 4 5   | 1.5 | Mandatory | A21         |       |
| 0006 | Seminar assignment  | G U 3 4 5   | 1.5 | Mandatory | A21         |       |

## Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

## Last revised

by Niklas Lehto, Head Faculty Programme Director 2021-06-16

## Syllabus established

The syllabus was established by the Department of Applied Physics and Mechanical Engineering 2007-02-28, and remains valid from autumn 2007.