Molecular Physics

Programme course

6 credits

Molekylfysik

TFYA35

Valid from: 2017 Spring semester

Determined by
Board of Studies for Chemistry, Biology and Biotechnology

Date determined
2017-01-25

Offered for the last time
Autumn semester 2023

Replaced by
TFYA78

Main field of study
Engineering Biology

Course level
First cycle

Advancement level
G2X

Course offered for
- Engineering Biology, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Basic knowledge about calculus, probability and statistics, classical mechanics, electromagnetics, thermodynamics.

Intended learning outcomes
The aims of the course are understanding of basic quantum mechanics, understanding of the quantum-mechanical basis of spectroscopic methods for determination of structure in atoms and molecules, and understanding of the relation between quantum-mechanical descriptions and the macroscopic properties of matter
After the first part of the course the student should be able to:

- Account for the fundamental concepts and postulates of quantum mechanics
- Apply fundamental quantum-mechanical principles and analyses to model systems and elementary atomic and molecular models
- Understand and explain spectroscopic methods and results in terms of quantum-mechanical principles
- Quantitatively analyse results from atomic and molecular spectroscopies
- Understand and calculate energy distributions in quantum mechanical systems, using elementary statistical thermodynamics.

Course content

The course involves concepts and methods in quantum mechanics which are required for describing atomic and molecular structure, and the application of these to spectrosopic methods.

- Experimental techniques for the determination of molecular structures: vibrational, electronic and magnetic resonance spectroscopies.
- Relations between microscopic and macroscopic properties of matter: Basic concepts of statistical thermodynamics.
- Molecular physics in biological systems.

Teaching and working methods

The material is presented in lectures and class exercises.

Examination

KTR1	Voluntary test	0 credits	U, G
TEN1	Written examination	6 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses: Surfaces and interfaces, Biosensor technology, Microsystems, Biomaterials.

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Boman

Examiner

Thomas Ederth

Course website and other links

http://people.ifm.liu.se/thoed/TFYA35/

Education components

Preliminary scheduled hours: 48 h
Recommended self-study hours: 112 h

Course literature

Atkins, P. och de Paula, J. "Physical Chemistry" 9th ed., Oxford University Press

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.