

Physical Chemistry, Thermodynamics

Programme course

6 credits

Fysikalisk kemi, termodynamik

NKEB02

Valid from: 2017 Spring semester

Determined by

Board of Studies for Chemistry, Biology
and Biotechnology

Date determined

2017-01-25

Main field of study

Chemistry

Course level

First cycle

Advancement level

G1X

Course offered for

- Chemistry, Bachelor's Programme
- Chemical Analysis Engineering, B Sc in Engineering
- Chemical Biology, Bachelor's Programme

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

General chemistry, Organic Chemistry, and also Mathematics with basic algebra and differential and integral calculus.

Intended learning outcomes

The course should give a fundamental knowledge in the theory of thermodynamics and also give an explanation on thermodynamic base of physical and technical processes. To achieve those goals the student should be able to:

- Describe properties of ideal and real gases and the differences between them.
- Account for the condensation of gases and critical phenomena
- Use concepts of thermochemistry to explain the energetics of chemical reactions.
- Describe the concepts of entropy and the second law of thermodynamics, and be able to explain spontaneous processes, and the impacts on them from the conditions applied.
- Use and make up phase diagrams in systems of one or more components and account for practical applications.
- Perform calculations on chemical equilibria and describe the impacts on them from outer conditions, and give some practical examples.
- Analyse, compile and account for laboratory exercise results in written reports.
- Deduce if experimental or calculated results are reasonable.

Course content

Thermodynamics: The idea of a state and the state equations of ideal and real gases. The first law of thermodynamics, heat, work and thermochemistry. The second law, entropy and spontaneous reactions. Gibbs free energy and equilibria. Phase diagrams for one and two component systems. Chemical equilibria and their dependence on the applied conditions

Teaching and working methods

Lectures/lessons, laborations and computer exercises.

Examination

LAB1	Laboratory work	1.5 credits	U, G
TEN1	Written examination	4.5 credits	U, 3, 4, 5

Grades

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

Other information

Supplementary courses: Physical Chemistry, Spectroscopy, Biochemistry 2.

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magdalena Svensson

Examiner

Lars Ojamäe

Education components

Preliminary scheduled hours: 54 h

Recommended self-study hours: 106 h

Course literature

P. Atkins & J. de Paula: Atkins' Physical Chemistry Problemsamling och laborationskompendier

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://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.