Statistical and Thermal Physics I, 7.5 credits

Statistisk fysik och termodynamik I, 7.5 hp

Third-cycle education course

6FIFM46

Department of Physics, Chemistry and Biology

Valid from: Second half-year 2025

Approved by   **Approved**

Registration number

Entry requirements

Basic knowledge of Quantum Mechanics.

Learning outcomes

By the end of the course the students will be able to:

- Understand the basic principles of equilibrium statistical mechanics and how they related to macroscopic thermodynamics.
- Apply this understanding to solve relevant problems in the field.

Contents

The course content is loosely based on the book "Fundamentals of Statistical and Thermal Physics", F.Reif. The course will cover most of chapters 2-8 and select topics from chapters 9-11.

This includes:

- Basic descriptions of the micro- and macro states of physical systems and the concept of ensembles.
- The basic postulates of equilibirum statistical mechanics.
- Interactions between macroscopic systems and conditions and implications of thermodynamic equilibrium.
- The laws of thermodynamics, concepts of work and heat, and simple applications of macroscopic thermodynamics.
- Methods and applications of statistical mechanics, including calculations of thermodynamic quantities and relations in different statistical ensembles.
- Equilibirum between phases or chemical species. Phase transformations and chemical reactions.
- Select topics in applications of statistical mechanics to areas of physics, chemistry and/or biology. (Can be adjusted to the interest/needs of the students)

Educational methods

The course will consist of a set of lectures and tentatively a set of group seminars where solved home-work problems are presented.

Examination

The course will be examined through a set of hand in assignments. A subset of the problems will be presented at an oral examination. The oral examination can also cover the rest of the course content.

Grading

Two grade scale, older version

Course literature

- *"Fundamentals **of Statistical and** Thermal **Physics"**, Frederick Reif. **ISBN: 978-1-57766-612-7 / ISBN: 1-57766-612-7.** *
- Select handouts/lecture notes.