



## Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

1FY809 Termodynamik och statistisk fysik, 7,5 högskolepoäng

Thermodynamics and Statistical Physics, 7.5 credits

### **Main field of study**

Physics

### **Subject Group**

Physics

### **Level of classification**

First Level

### **Progression**

G1F

### **Date of Ratification**

Approved 2011-12-10

Revised 2014-06-16 by Faculty of Technology. Objectives and content are revised.

The course syllabus is valid from autumn semester 2014

### **Prerequisites**

Mechanics 7.5 credits (1FY804), Physics – Electricity and Magnetism 7.5 credits (1FY802), Atomic and Nuclear Physics 7.5 credits (1FY801), and Waves and Optics 7.5 credits (1FY803) or equivalent.

## Objectives

The student will after the course have:

- basic knowledge and terminology of thermodynamics, statistical physics and also a basis for further studies in physics
- understanding of the importance of measurement and observation, and the distinct roles of theory and experiment in physics
- be able to plan and conduct experiments
- abilities in problem solving using mathematical tools as well as computer simulation
- skill to work in a group and ability to communicate comprehensive written and orally.

## Content

The course covers:

- temperature: basic concepts, temperature, balance, 0: e main clause, the ideal gas
- thermodynamical processes: equations of state, the gas law, van der Waal's law, thermodynamic processes, phase transitions
- the fundamental laws of thermodynamics, 1st main clause, gases, heat capacity,

the Carnot process, 2nd main clause, Carnot's theorem, the thermodynamic temperature scale, entropy, 3rd main clause, chemical potential, thermodynamic state functions

- energy transfer: radiation, convection, heat conduction, heat equation
- Energy supply and resources
- statistical Physics: quantum effects, fermions, bosons, partition function, Boltzmann gas, equipartition principle, Planck's law of radiation, the electron gas,  $S = k \ln \Omega$ , Zackur-Tetrodes equation

## Type of Instruction

The teaching consists of lectures, problem solving exercises, laboratory measurements and tutorials. Participation in the laboratory work is obligatory. Teaching may also include elements of training in transferable skills adapted to the student's orientation of study.

## Examination

The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

On request, Swedish students may have their credits translated to ECTS-marks. Such request must be sent to the examiner before grading process starts. Foreign students will mandatory receive ECTS-marks.

The examination may be given in writings or orally. At the beginning of the course it will be decided on what types of assessment used. Assessment of lab work and continuous assessment of laboratory skills.

Students who do not pass the regular examination are given the opportunity to do a resit examination shortly after the regular examination.

## Course Evaluation

A course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The result of the course evaluation will be filed at the department.

## Other

Upon request, a Swedish University degree will be issued upon successful completion of the full demands for that degree.

On request, a Swedish University course certificate will be awarded upon successful completion of the course.

## Required Reading and Additional Study Material

### Required reading

Charles Kittel, *Thermal Physics*, Freeman and Worth. Pages 200.