



Course syllabus

Faculty Board of Science and Engineering
School of Computer Science, Physics and Mathematics

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 by the Board of the School of Computer Science, Physics and Mathematics
2011-12-10

The course syllabus is valid from autumn semester 2011

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.

Expected learning outcomes

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
- basic skills 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
- 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.