



PHYSICS

FYP103 Thermodynamics, 7.5 higher education credits

Termodynamik, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2011-09-13 and was last revised on 2017-06-08 to be valid from 2017-07-01, autumn semester of 2017.

Field of education: Science 100%

Department: Physics

Position in the educational system

The course is also given as a standalone course.

The course can be part of the following programmes: 1) Marine Science, Bachelor's Programme (N1MAV), 2) Bachelor of Science in Physics (N1FYS), 3) Medical Physicist Programme (N1SJU) and 4) Teacher Training Programme (L1LÄR)

Main field of studies

Physics

Specialization

G1F, First Cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

Completed courses from the first semester in the Physics program, or that the equivalent knowledge has been acquired in some other way.

Learning outcomes

Knowledge and understanding

- understand the laws of thermodynamics and their relevance
- understand the differences between a macroscopic and a microscopic description of physical systems and their advantages and disadvantages

- be able to describe explain and predict physical phenomena in nature, everyday life and society

Skills and abilities

- be able to apply the laws of thermodynamics to study macroscopic systems
- orally and in writing be able to present simple physical problems
- be able to make calculations on simple physical systems.

Judgement and approach

- have developed an ability to analyse local and global society issues in a scientific perspective with support from ecological, social and economic aspects

The course is sustainability related which means that at least one of the learning outcomes clearly show that the course content meets one of University of Gothenburg's sustainability criteria.

Course content

In this course basic thermodynamics is treated. In connection with the course, also experiments and demonstrations are performed as well as simulations of physical processes using Matlab.

Part 1: Thermodynamics

This part is focused on understanding of the first and the second law of thermodynamics with application to engines, refrigerators and heat pumps. Basic concepts are among others: energy transformation, thermodynamic systems, state variables and thermodynamic processes. Thermal equilibrium and temperature. State equations. Kinetic gas theory. Heat conduction. The first law of thermodynamics, heat, work and internal energy. Heat capacity. Isothermal and adiabatic processes. The second law of thermodynamics and entropy.

Part 2: Laboratory sessions

In this part, laboratory sessions are performed that illustrate how thermodynamics can be used in practice.

Part 3: Demonstrations

The student will specialize around the physics in a specific experiment that shall be presented orally and in writing.

Part 4: Programming with Matlab

In this part the knowledge in programming and Matlab will be developed and deepened. The programming skills are applied on simulations and visualisations of problems in the area of thermodynamics/statistical physics.

Form of teaching

Used forms of teaching:

Compulsory components with requirements to be present: laboratory sessions (part 2) as well as demonstrations and presentations (part 3).

Language of instruction: Swedish

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Assessment

Examination formats:

Part 1: written exam, 5.0 credits

Part 2: Project report, 1.0 credits

Part 3: presentation and written report, 0.5 credits

Part 4: handing in assignments, 1.0 credits

A student has the right to request a change of examiner if failed twice on the same exam, if this is practically possible. The application shall be sent to the board of the department and has to be in writing.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

For grade Pass (G) on the whole course, at least Pass in all parts is required.

For grade Pass with distinction (VG) on the whole course, Pass with distinction is required on part 1 as well as Pass on the parts 2, 3 and 4.

For each part applies:

Part 1: Written exam with grade Fail, Pass or Pass with distinction.

Part 2: For grade Pass, an approved laboratory report is required.

Part 3: For grade Pass, passed presentation as well as passed written report are required.

Part 4: For grade Pass, it is required that given exercises and handing in assignments are passed.

Course evaluation

At the end of the course an anonymous course evaluation is provided. The result is published on the course homepage in University of Gothenburg's learning management system (GUL).

Additional information