



**LUND**  
UNIVERSITY

Faculties of Humanities and Theology

## **ÄFYD12, Physics 2: Environmental Physics and Energy Processes with Didactics of Physics, 15 credits**

*Fysik 2: Miljöfysik och energilära med fysikdidaktik, 15  
högskolepoäng*

**First Cycle / Grundnivå**

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### **Details of approval**

The syllabus was approved by Study programmes board, Faculty of Science on 2020-07-02 to be valid from 2020-07-02, spring semester 2021.

### **General Information**

The course is a component of the teacher education programme at Lund University.

*Language of instruction:* Swedish

*Main field of studies*

Physics

*Depth of study relative to the degree requirements*

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

### **Learning outcomes**

The course aims to provide students with advanced knowledge in the teaching of physics and an introduction to some areas of environmental physics relevant to teachers of physics.

### **Knowledge and understanding**

On completion of the course, the students shall be able to

1. account for and use important basic concepts in thermodynamics and energy processes and other selected areas of environmental physics
2. account for the role of physics in society, particularly within the rational use of energy, environment and information technology
3. account for and analyse issues related to the teaching of physics with regard to the subject content, particularly from an inclusion/exclusion perspective.

### Competence and skills

On completion of the course, the students shall be able to

4. describe and analyse different environmental aspects and make simple calculations
5. plan experiments, carry out measurements and calculations and present, evaluate and communicate the results
6. design educational activities on energy processes and selected areas of environmental physics based on societal issues.

### Judgement and approach

On completion of the course, the students shall be able to

7. review and evaluate some current and future possibilities and limitations of (environmental) technologies
8. critically discuss order of magnitude estimation to analyse physical problems
9. adopt a scientific, analytical and reflective approach to the course content, both didactically and thematically
10. provide arguments based on scientific aspects in complex societal issues and critically review and evaluate the arguments of others
11. problematise the nature and role of science in society and discuss this in relation to pupils' interests in science.

## Course content

### Module 1: Energy Processes and Environmental Physics, 7.5 credits

The course focuses on energy supply issues as well as global environment and sustainability issues. Knowledge of physics is required to analyse these issues.

Energy processes are a key area of physics for this module with concepts such as: sustainable development and energy, Earth's energy balance and climate change, state of aggregation, internal energy, heat transfer, thermal radiation, the principles of thermodynamics, energy quality, exergy and entropy, heat engines.

In addition, the module covers other selected areas of environmental physics such as ionising and non-ionising radiation, electricity production, noise and sound absorption.

The module also provides students with an awareness of and use of tools for the collection, processing and interpretation of physical data.

### Module 2: Didactics of Physics, 7.5 credits

The role of science in society, in school and for individuals is a recurring theme in the course. Different aspects are addressed and problematised: science as a foundation for positions in a democratic society, as a part of our culture and as a factor in technical, financial and social development.

The didactic areas problematised in connection with the course content include societal issues and argumentation in physics teaching, pupils' ideas and learning of physics concepts, models and the features of physics/science, key knowledge phases, pupils' interests and attitudes, and the roles of different activities in physics teaching.

Different aspects of the features and culture of science are studied in depth and analysed. The module specifically focuses on societal issues and the scientific research front based on the subject matter of the course.

## Course design

The course consists of: lectures, laboratory sessions with written reports and seminars as well as planning of teaching sessions with written assignments.

Participation in all laboratory sessions and certain seminars is compulsory. Laboratory reports and certain written assignments are also compulsory.

## Assessment

The assessment is based on:

*Module 1 Energy Processes and Environmental Physics, 7.5 credits:*

An individual written examination at the end of the course and compulsory laboratory sessions with written reports. The final grade for the module is based on the grades awarded for the exam and the laboratory sessions.

*Module 2 Didactics of Physics, 7.5 credits:*

An individual written examination and oral and written presentation of project work. The final grade for the module is based on the grades awarded for the exam and the presentations.

Course components that are not completed - compulsory components and presentations - can be compensated for following an agreement with the lecturer/s and the director of studies.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

*Subcourses that are part of this course can be found in an appendix at the end of this document.*

## Grades

Marking scale: Fail, Pass, Pass with distinction.

Laboratory sessions are awarded the grade of Pass or Fail. For the grade of Pass on the whole course, the student must have been awarded this grade on all modules. For the grade of Pass with Distinction on the course, the student must also have been awarded the grade of Pass with Distinction on both the modules.

## Entry requirements

To be admitted to the course, students must have successfully completed 15 credits from ÄFYD11, ÄFYD01 or the equivalent.

## Further information

The course may not be included in a degree with ÄFYD02 Physics 2, 15 credits, or FYSA 14 Physics: Introduction to University Physics with Thermodynamics, Climate and Experimental Methodology. Module 1 Energy Processes and Environmental Physics coincides with parts of FYSA15 Environmental Physics.

## Subcourses in ÄFYD12, Physics 2: Environmental Physics and Energy Processes with Didactics of Physics

Applies from V21

- 2101 Energy Processes and Environmental Physics, 7,5 hp  
Grading scale: Fail, Pass, Pass with distinction
- 2102 Laboratory in Energy Processes and Environmental Physics, 0,0 hp  
Grading scale: Fail, Pass
- 2103 Didactics of Physics, 7,5 hp  
Grading scale: Fail, Pass, Pass with distinction