

Course Syllabus

Photovoltaics 7.5 Credits*, Second Cycle

Learning Outcomes

Upon completion of this course, students will be able to:

- analyse and discuss the physical processes that determine the output of different types of solar cells, as well as relate this to the mathematical models that can be used to calculate this output
- explain the mechanism of current and voltage generation in illuminated semiconductors
- describe how solar cells are connected into a module, what the losses are and how these can be minimized
- describe the role, operating principle and performance of the main components of a PV system
- demonstrate understanding of the most common types of electronic power conversion circuits in PV system components
- independently design simple stand-alone, as well as grid-connected, solar electricity systems and choose components for optimal system performance

Course Content

The course deals with various semiconductor materials and their suitability for solar cell manufacturing, absorption of solar radiation in semiconductors and the principles of solar cells and their physics. Different types of solar cells are studied, their characteristics and how they are assembled in photovoltaic modules. Identification and minimization of losses, degradation, as well as the interpretation and use of the module datasheets as well as manufacturing of photovoltaic modules and the use of photovoltaic modules in both off-grid and grid-connected systems are covered in the course.

During the course, students study different types of batteries, regulators and inverters. The course ends with computer simulations of photovoltaic systems, the design and selection of components.

Assessment

Two written exam 2 and 2.5 credits (U, 3, 4, 5) , laboratory reports 3 credits (U-G)

Forms of Study

Lectures, exercises, laboratory work, study visits

Grades

The Swedish grades U, 3, 4, 5.

The final grade of the course is set after an overall assessment by the examiner.

Prerequisites

Solar Radiation and solar geometry, 5 credits, Second Cycle level 1

Other Information

Course replaces EG3008.

Number of examination attempts is limited to five.

Subject:

Energy Technology

Group of Subjects:

Energy Technology

Disciplinary Domain:

Technology, 100%

This course can be included in the following main field(s) of study:

1. Energy Technology
2. Solar Energy Engineering

Progression Indicator within (each) main field of study:

1. A1F
2. A1F

Approved:

Approved 5 June 2019

Valid from 15 August 2019