DALARNA UNIVERSITY

# Course Syllabus

## Solar Thermal Design 7.5 Credits*, Second Cycle Level 1

### Learning Outcomes

Upon completion of the course, the student shall be able to:

- size a solar heating system
- design the hydraulics and control functions of a solar heating system
- analyse the various methods for protecting the system from damage due to frost and overheating as well as be able to choose a suitable method for the specific application
- design collector fields and the associated pipings
- use a simulation tool to calculate the energy gain of a solar thermal system
- evaluate the influence on system performance by varying system component size and system design.

### Course Content

The course is project based, and the work is done in groups. The course starts with lectures on solar thermal systems, hydraulic components and their function. The system function and the control functions and their integration into existing heating systems are further discussed. Students are introduced to a case study (project). Students will calculate the load for the case and size the system.

The next step is to learn about the simulation program Polysun. Students will get a template system in Polysun to modify and to further study the system performance of the case study. By using parametric studies the students optimize the size and dimensions of the system.

Finally the student will write discussions and conclusions with reflections on the project work. Here the decisions made during the design process are debated and the assumptions and limitations in the simulation tool and methods are discussed.

### Assessment

Written home assignment 1, 2 credits

Written home assignment 2, 1.5 credits

* 1 Credit = 1 ECTS

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System simulation task 3, 3 credits

Written individual home assignment 4, 1 credit

**Forms of Study**
Lectures, exercises, assignment, seminar.

**Grades**
The Swedish grades U, 3, 4, 5.

Written home assignment 1, U-G.

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

**Prerequisites**
Solar Thermal, 7.5 credits, Advanced Level

**Other Information**
The course replaces MÖ3023.
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. Solar Energy Engineering

**Progression Indicator within (each) main field of study:**
1. A1F

**Approved:**
Approved 17 September 2015
Valid from 3 December 2015