

Advanced Course in District Heating Technology, 7.5 credits

Fördjupningskurs i fjärrvärmeteknik, 7.5 hp

Second level

Main field: Energy Engineering AIN

Syllabus is adopted by the Research and Education Board (2015-03-04) and is valid for students admitted for the spring semester 2015.

Placement in the Academic System

The course can be a part of Master's Programme in Renewable Energy Systems

Prerequisites and Conditions of Admission

Bachelor's degree in Energy Engineering or equivalent.

Course Objectives

The course aims to provide in-depth knowledge within district heating technology

Following successful completion of the course the student should:

Knowledge and understanding

- Analyse, describe and compare current and new information about District Heating Technology
- Describe the importance of District Heating Technology in a further biological and energy technology context

Skills and ability

- Arrange and dimension a district heating system and analyse stoppage in the system
- Explain and identify the different interacting parts of the district heating systems in terms of technology, function and economy
- Apply a variety of energy technology methods in problems relating to district heating systems

Judgement and approach

- Value technical growth and research in a larger scientific context
- Criticize own and others results and relevance for the technical field
- Discuss and value technical, economical and environmental assessments and its importance for district heating technology, and how it can contribute to long term sustainable development

Primary Contents

- The fundamental idea of district heating and the energy system benefits
- Space heating demands including hot water supply
- Distribution losses in district heating networks
- Heat load in heat supply units
- Heat generation and heat recovery from CHP-plants, waste, industrial waste heat, geothermal and difficult fuels and heating storages
- The environmental impact from energy conversion in district heating systems
- Heating distribution with different piping technologies
- Substations with connection principles, heat exchangers and heating metering
- System functioning with respect to pressure losses, pressure maintenance, combined temperature and flow control and the overall control system with four independent control loops
- Economy with distribution costs, heat supply optimisation, cost allocation of joint production and the pricing methodologies

Teaching Formats

Education consists of lectures, numerical exercises, study visits and laboratory work.

Examination

The overall grades of Fail, 3, 4 or 5 will be awarded for the course.

The examination is performed with a written exam.

Course Evaluation

Course evaluation is part of the course. This evaluation should offer guidance in the future development and planning of the course. Course evaluations should be documented and made available to the students.

Course Literature

Frederiksen, S., Werner, S. District Heating and Cooling.
Studentlitteratur, Lund 2013