



MJ2510 Methods of research in sustainable energy 7.5 credits

Metoder för forskning om hållbar energi

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

On 15/10/2021, the Dean of the ITM school has decided establish this official course syllabus to apply from spring term 2023, registration number: M-2021-2015.

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

English B/English 6, and 15 credits in the subject of Energy at master level (e.g. the equivalent of MJ2508 Energy Systems for Sustainable Development, 6 credits, or MJ2411 Renewable Energy Technology, 6 credits, and MJ2509 Energy in the Built Environment, 9 credits, or MJ2405 Sustainable Power Generation, 9 credits)

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student should be able to:

1. Carry out a systematic literature survey in a delimited field related to energy systems and – technology.
2. Problematise a well described (via literature survey) field, and out of that formulate research questions and suggest relevant aims for research.
3. Compare and discuss alternative research methods in relation to given research objectives, and based on this give a well justified proposal for a method.
4. Discuss and propose how both sustainable development and ethical dimensions should be handled in relation to a specific research assignment.
5. Analyse and interpret, and discuss uncertainty in research results by means of established methodology.

Course contents

The course introduces theory and methods of special relevance for research about sustainable energy. As a course participant, you are thereby prepared for your degree project, according to the requirements of KTH Royal Institute of Technology, and for a future career full of possibilities in research and development:

Research starts with an understanding of the research subject, followed by a clear definition of research questions and methods to address these. Of importance to the research process is also sources of data, and to treat and analyse data and results. Whether qualitative or quantitative, experimental or theoretical methods are used, scientific research requires systematic treatment of data and methods so that the research results can be validated and knowledge be built. An important starting point is that new knowledge is based on previous knowledge in a perpetual process.

The intended learning outcomes of the course are about how you can problematise in a defined field, and from that retrieve relevant research questions and formulate objectives for your research. As a support to the process, the course trains you to carry out a literature survey with high quality that also becomes a part of the research process. This is connected to learning outcomes 1 and 2.

Furthermore, the course focuses on critical assessment of methods -- you should learn to analyse and evaluate the research process as a whole and carefully consider alternative methods in relation to the objectives and research questions that are treated. Likewise, at the end of the course, you should be able to discuss and propose how both sustainable development and ethical dimensions should be handled in relation to a specific research assignment. This is also reflected in the intended learning outcomes 3 and 4 of the course.

Furthermore, we practice critical assessment of results so that you after completing the course can evaluate and analyse research results, your own or that of others, and assess their

relevance and weaknesses. Data and result analysis, interpretation and evaluation as well as analysis of statistical relevance is therefore also included in the course. Here, e.g. regression analysis and correlations is applied, as well as statistical evaluations such as covariance and standard deviation, and this is assessed according to intended learning outcome 5.

Examination

- INL1 - Assignment, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- SEM1 - Seminars, 1.0 credits, grading scale: P, F
- SEM2 - Seminars, 1.0 credits, grading scale: P, F
- TEN1 - Written exam, 3.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.