



FMJ3383 Energy System Economics, Modelling and Indicators for Sustainable Energy Development 6.0 credits

Energisystemekonomi, modellering och indikatorer för hållbar energiutveckling

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

Course syllabus for FMJ3383 valid from Autumn 2018

Grading scale

Education cycle

Third cycle

Specific prerequisites

Admitted to PhD studies at KTH related to Engineering/Science fields or equivalent and corresponding knowledge of course.

Language of instruction

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

Intended learning outcomes

After completion of the course the student will be able to:

1. Understand basic economics and costs of energy infrastructure investments
2. Develop economic screening curves to assess the performance of energy investment and operation
3. Understand the role of long term energy-environment-economic (3E) modeling in the planning process
4. Identify key attributes of 3E modeling families
5. Understand the key relationships that drive bottom-up 3E optimization models
6. Map out the energy system from services to supply in a RES (Reference Energy System) Diagram
7. Understand basic linear programming techniques and interpretation
8. Understand important outputs of bottom-up 3E optimization outputs in terms of their economic implications (including system costs and shadow prices)
9. Use, apply and modify bottom-up 3E optimization tools in a detailed case study, including the representation of key elements of the energy system
10. Understand the role of indicators for sustainable development (ISED) in the modeling and evaluation of an energy system
11. Identify key ISED in terms of their social, economic and environmental dimensions
12. Develop and model scenarios, policies, technology and other interventions and map these to key ISED

Course contents

The course will be conducted in the combination of lectures, computer labs, mandatory seminars, project report and an exam. Lectures and labs will be delivered by some local and external experts coming from various research organizations. After completion of all computer labs students will be required to do two seminars followed by a detailed project report and an exam at the end of course. The course instructors will provide appropriate projects list during the 1st week of course. Each project report will be completed by group of 3 to 4 students. The project report should be documented in a written report in English and also the peer review of project report of opponent group will be done by each group. For the mandatory seminars during the course, the students will prepare the presentation of their progress in each computer lab they performed.

Disposition

Description of Assignments (1-6):

1. Review and provide feedback on initial attempts by students developing optimal national strategies and applying indicators for sustainable energy development (ISED).
2. Assist with all labs and lectures.
3. Undertake a specially designed assignment.
4. Communicate with the purveyors of the software including the IEA and UN Statistical Division.
5. Liaise and oversee communications with national government and other counterparts to assist with data collection where appropriate.
6. Develop simple training material so that the studies undertaken by students can be replicated in the national setting with local experts.

Course literature

Lecture slides and lab literature will be provided by course organizers.

Also the students will perform the self-research for relevant literature for their respective project

Handouts and laboratory exercise material will be distributed by the course coordinator.

The students will also carry out an individual literature search for material relevant to their independent project.

Examination

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.

INL1–Assignment 1, 1hp.

INL2–Assignment 2, 1hp.

INL3–Assignment 3, 1hp.

INL4–Assignment 4, 1hp.

INL5–Assignment 5, 1hp.

INL6–Assignment 6, 1hp.

Other requirements for final grade

Individual grades ranging from P-F will be assigned on the completion of above all six requirements.

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.