SYLLABUS

Environmental System Analysis 7.5 credits F0058T

Miljösystemanalys

Course syllabus admitted: Spring 2024 Sp 3 - Present

DECISION DATE
2023-06-15

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LULEÅ TEKNISKA UNIVERSITET

Environmental System Analysis 7.5 credits F0058T

Miljösystemanalys

First cycle, F0058T

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Energiteknik	Energy Technology

Main field of study

Energy Engineering

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and At least 90 academic credits (ECTS) in a program of engineering, or natural science, or equivalent, which includes basic university mathematics (eg C0004M,) and basic knowledge about environmental problems (eg F0040T). It is recommended to have done S0001M and C0004M and knowledge in how to use computational tools (eg Excel) and. Good knowledge in English, equivalent to English 6.

Selection

The selection is based on 1-165 credits.

Course Aim

Knowledge and understanding

The student should after passing the course be able to

EXPLAIN how environmental impact can be included in energy related decision-making situations, which means being able to describe environmental impacts from different parts of the energy system on a basic level, as well as being able to IDENTIFY the most important environmental effects and make a simplified comparison between different alternatives

DISTINGUISH between different kinds of basic decision-making situations on micro, meso and macro level, with a focus on individual, company, and governmental levels, for identifying the decision-makers' actual objective. A Decision-making situation is about comparing two or more options, in which not doing anything could be one option.

DESCRIBE how to think from a holistic perspective when solving energy engineering problems and improving energy systems.

GIVE EXAMPLE on different tools used to address environmental impacts in energy-related decision-making situations concerning both strengths and weaknesses of different tools and their suitability in different decision-making situations.

Skill and ability

The student should after passing the course be able to

DESCRIBE basic environmental impacts and their potential consequences (positive/negative) on the ecology and human wellbeing, and be able to DIFFERENTIATE between big and small environmental impacts from a given energy-related technology, product, or system, and SELECT which environmental impacts to focus on. (Environmental Systems)

DESCRIBE different ways of viewing the environment, to be able to include these differences when valuing the environmental impacts in a decision-making situation. (Environmental Ethics)

DESCRIBE the different steps commonly used to make an environmental impacts assessment of a potential project, policy, plan, or program. Including describing how the views from different actors in society can be included in the final decision. (Environmental Impact Assessment)

DESCRIBE different ways on how the environment can be included in the decision situation in a profit-oriented world. (Environmental Economics).

EXPLAIN on a general level how an optimization framework may help solve holistic energy system problems by first DESCRIBING the five kinds of information needed to be identified and by thereafter APPLYING the framework when assessing a basic energy system problem (System Analysis)

- DISTINGUISH the system objective of a given energy related problem concerning the stakeholder/decision-maker.
- IDENTIFY basic system components and system boundary of a given energy-related problem concerning the stakeholder/decision-maker.
- IDENTIFY what are the system variables and constraints in a given energy-related problem concerning the stakeholder/decision-maker.

DISCUSS different ways of incorporating environmental impacts in models to support decision-making, and DESCRIBE the difficulties of finding desired information, the necessity of making assumptions, and how to approach this uncertainty.

Judgement and approach

The student should after passing the course be able to

DISCUSS the limitation in looking at a system or problem from one perspective. (System Analysis and Environmental Ethics)

BREAK DOWN a given system into different parts to identify key environmental impacts from different parts of the system. This also includes exemplifying different kinds of environmental impacts and how they can be compared, while this does not include knowing all environmental impacts.

Contents

Environmental Systems Analysis aims at supporting decision-making towards sustainable development by assessing the interaction and impacts of socio-technical systems on the environment.

After passing the course, students should be able to describe how environmental impacts – from energy related technologies, products, and/or systems – can be addressed in different decision-making situations, both decisions made by individuals, companies, and governments. Thus, be able to compare different technologies, products, potential projects, policies, plans, or programs in terms of environmental impacts and other decision variables. Taking into account the circumstances and needs of individuals and the targets for economically, socially, and ecologically sustainable development set by the community.

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.

In this course, you will work with five ‘theme areas’ and three case studies. The different themes represent different topics, areas of knowledge, which are important for understanding how the environment (natural and built) may be incorporated in decision-making. In the case studies, you will be introduced to different ‘methods’ for comparing environmental impacts from different activities. The case studies go across the theme areas.

This course is to a large extent based on ‘flipped classroom’, which means that you first read and reflect by yourself, thereafter together with fellow students and finally with us teachers. The reason why we do this is that we believe that you can get the initial knowledge by yourself, and thereafter get the more advanced knowledge from us/lectures. You also learn more by first trying by yourself.

Flipped classroom applied on different theme areas: Before each lecture, you try **to identify and understand** the key concepts within the area – first by yourself and then together with fellow students. During the lecture, you will be given a further introduction to the area with the aim to provide a deeper understanding of the topic (make sure to ask questions before and during the lecture, in case there is something that need to be clarified). After each lecture, you will be given the task **to apply** the concepts to a given industry/firm.

Flipped classroom applied on the case studies: For each case study, we will first introduce the method (case study lecture) and thereafter introduce the case study. Each case study is carried out during supervision and is divided into different steps (sets of questions). For each step, each group first try to solve the defined step and thereafter discuss ways to solve the step with the teacher (make sure to understand a step, before proceeding to the next step). At the end of the session, the group writes a memo, evaluating their process and identifies critical aspects of the method introduced in the specific case study.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

The examination consists of participation in lectures, group discussions, case studies, assignments and an oral exam. The final grade is based on the quality of the oral exam with written preparation. Consideration may also be taken to the activity during lectures, group discussions, case studies, and submitted assignments. Attendance at compulsory lectures is required. Oral or written additional task(s) are offered for the students to be able to pass the course, as well as to verify the individual contributions.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Remarks

Information about schedule and litterature is introduced in the CANVAS course room. This is also where we will announce changes to the schedule and will be the primary place to answer questions that you have with the course.

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0007	Case Study I	U G#	1	Mandatory	S24	
0008	Case Study II	U G#	1	Mandatory	S24	
0009	Case Study III	U G#	1	Mandatory	S24	
0010	Group discussions	U G#	1	Mandatory	S24	
0011	Oral examination	G U 3 4 5	3.5	Mandatory	S24	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Mats Näsström, acting Head of Undergraduate Education 2023-06-15

Syllabus established

by HUL Mats Näsström 2017-02-14