# LiU Summer Academy: Alternative Energy: past, present, future, and innovations

LiU Sommaruniversitet: Alternativ energi: dåtid, nutid, framtid och innovationer
7.5 credits

Single subject course

ETES04

Valid from: 2025 Spring semester

| **Determined by** | **Main field of study** | |
|---|---|---|
| Board of Studies for Electrical Engineering, Physics and Mathematics | No main field of study | |
| **Date determined** | **Course level** | **Progressive specialisation** |
| 2024-08-28 | First cycle | G1X |
| **Revised by** | **Disciplinary domain** | |
| | Social sciences | |
| **Revision date** | **Subject group** | |
| | Energy Technology | |
| **Offered first time** | **Offered for the last time** | |
| Summer semester 2022 | | |
| **Department** | **Replaced by** | |
| Institutionen för fysik, kemi och biologi | | |

# Specific information

The course is given within the framework of the Linköping University Summer Academy and is only open to students from Linköping University's partner universities.
The course is on bachelor level and is offered in English.

# Entry requirements

To meet the general entry requirements, students must have completed 1 year full-time studies (passed 60 ECTS credits or equivalent) from one of Linköping University's partner universities upon application.

# Intended learning outcomes

The aim of the course is to give the students an introduction to the historical and economic aspects of scientific-technological progress for sustainable development in the energy sector.

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

- describe alternative energy sources and revolutionary technologies affecting the quality of our life.
- trace the events and causes that are the prerequisites for great discoveries and inventions in the past, present and future.
- förklara and critically compare the technical and economic benefits of system solutions based on resource availability, energy demand and market conditions.
- write, present and discuss a short report on a special topic related to the energy sector in the context of technical efficiency, economic welfare, environmental perspectives, and social needs.

# Course content

The course is based on popular science materials that provide knowledge about the basic principles of using renewable energy sources and energy saving applications, as well as give an understanding of the importance of studying alternative energy sources in terms of technology, environment, economy and social needs. The course includes an overview of innovations that have already changed, are changing, and those that will change our life in the future. In many cases, consideration takes place through the prism of great scientific discoveries, their history, previous difficulties, prerequisites and consequences for society.

Popular science orientation makes the course useful for students of not only technical but also humanistic disciplines.

The following topics are covered:

- Great discoveries that have influenced the generation of electricity and the development of energy-saving technologies.
- Renewable energy sources (solar, geothermal, hydro, wind, biofuel) and their influence on environment and human life.
- Energy transformation and transmission, basic requirements for energy related applications.
- Energy saving technologies for the electronics, transport, industry and buildings.
- Future perspectives in the energy sector and the role of some of today's innovations, e.g. artificial intelligence and quantum computing.

# Teaching and working methods

The scheduled parts of the course consist of lectures, seminars, computer based laboratory works, a tour to industrial enterprises (or similar), and group project work.

# Examination

| | | | |
|---|---|---|---|
| UPG1 | Projects | 2.5 credits | U, G |
| LAB1 | Virtual laboration work | 1 credits | U, G |
| KTR1 | Optional assignments | 0 credits | U, G |
| HEM1 | Distance examination | 4 credits | U, 3, 4, 5 |

The optional assignments may give bonus points at the final exam. The bonus system is presented at course start. The project work consists of group work including writing and presentation of as well as opposition on reports.

Grades for examination modules are decided in accordance with the assessment criteria presented at the start of the course.

# Grades

Four-grade scale, LiU, U, 3, 4, 5