ENG-410

Energy supply, economics and transition

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Cursus	Sem.	Type
Energy Science and Technology	MA2, MA4	Obl.
Managmt, dur et tech	MA2	Obl.
Managmt, tech et entr.	MA2, MA4	Opt.
Minor in Engineering for sustainability	E	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	Written
Workload	60h
Weeks	14
Hours	**2 weekly**
Courses	2 weekly
Number of positions	

Summary

This course examines the supply of energy from various angles: available resources, how they can be combined or substituted, their private and social costs, whether they can meet the demand, and how the transition to a renewable energy system can be fostered.

Content

Energy resources (Christophe Ballif)

- Available resources and their properties (finite resources like fossil, nuclear fuel, vs hydro, non-hydro, renewable resources such as solar, wind, geothermal biomass)
- General aspects of energy management (grid transport, fossil fuel transport, heat and electricity storage, power-to-gas, heat pumps, district heating and cooling…..), including costs aspects and perspectives

Energy economics (Philippe Thalmann)

- The Grand Challenge: Reconciling demographic and economic growth with the limits of our planet
- Decoupling: What it means, what it takes; green growth
- Markets: How they work, why we like them, what can go wrong with them
- Policy: International climate policy; economics of innovation
- Wrap up: energy, human needs and well-being

Energy transition (Claudia R. Binder)

- Governance perspectives and social-technical dimensions
- Energy system transitions (from a fossil fuel to a CO2 neutral system) as socio-technical change processes
- Insights into drivers and barriers for the socio-technical transition of the energy system
- Routines, visions and disruptive change(s) from a resilience perspective
- Governance transitions of urban utilities

Case study: a CO2-neutral energy system in Switzerland

Keywords

Energy resources
Energy supply
Energy prices
Energy costs

Energy transition
Renewable energy
Decarbonisation
Decoupling
Green growth
Sustainability

Learning Outcomes

By the end of the course, the student must be able to:

- Critique theories and proposals related to energy supply
- Propose various scenarios for energy systems and their evolution
- Reason on technical, social, political and economic issues
- Explain the relationships between physical energy resources and energy supply
- Differentiate between scientific and propaganda arguments
- Restate concepts and mechanisms seen in class

Transversal skills

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Set objectives and design an action plan to reach those objectives.
- Communicate effectively with professionals from other disciplines.
- Access and evaluate appropriate sources of information.

Teaching methods

In-depth teaching and educational support.

Assessment methods

Written exam

Supervision

Office hours	No
Assistants	Yes
Forum	Yes

Resources

Moodle Link

- https://moodle.epfl.ch/course/view.php?id=16154

Videos

- http://Many of the courses of 2020 and 2021 are available as videos