

ENG-410

**Energy supply, economics and transition**

Ballif Christophe, Binder Claudia R., Thalmann Philippe

Cursus	Sem.	Type
Energy Science and Technology	MA2	Obl.

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

**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)**

- Principles: supply and demand, investment decision, internal and external costs, support and incentive schemes, etc.
- Current direct and indirect cost (environmental) and cost perspective of the various energy sources
- Economic growth and energy needs, decoupling
- Energy policy: goals and instruments
- A case study: a CO2 neutral energy system in Switzerland

**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

**Keywords**

Energy resources  
 Energy supply  
 Energy prices  
 Energy costs  
 Energy transition  
 Renewable energy  
 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