FMJ3387 Energy Technology and Sustainability 6.0 credits

Energiteknik och Hållbarhet

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FMJ3387 valid from Spring 2018

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Bachelor degree in a technology-related topic

Language of instruction

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

Intended learning outcomes

After the completion of this course, the course participants should be able to:

- Demonstrate an understanding and apply different interpretations of Sustainable Energy Development
- Understand energy's role in key sustainable development paradigms:

1. Circular economy
2. Planetary boundaries
3. Hard sustainability
4. Soft sustainability

- Understand and map how the energy system relates to:

1. Agenda 2030 and the Sustainable Development Goals
2. Social sustainability
3. Economic sustainability
4. Environmental sustainability

- Quantifying and mapping how energy development impacts on (and is impacted by):

1. Land-use
2. Water-use
3. Climate mitigation and adaptation
4. Socio-economy (including the macro economy, urban and rural settlements)

- Understand sustainable development challenges to be tackled by key KTH research areas:

1. Applied Thermodynamics and Refrigeration
2. Heat and Power Technology
3. Heating and Ventilation
4. Climate Studies
5. Systems Analysis
6. 6) Low carbon energy supply integration

- To define the so called 'Science-Policy Interface' and understand the importance of communication to a broader public, including decision makers
- PhD students need to point out how their research relates to sustainability paradigms and contextualise it within broader systems.

Course contents

- Defining the energy system. Global, regional, national, rural, urban, to technologies, fuels and key characteristics.
- Mapping energy systems to the SDGs. Direct, indirect impacts of and on other SDGs.
- Defining views of sustainable energy development
- Introducing Reference Resource to Service System (i.e. Mapping how resources are extracted, recycled and used to meet development needs)
- Describe selected KTH research areas and technology sustainable development challenges\

• Quantitatively define sustainable development paradigms.

Course literature

Ytterligare kurslitteratur kommer att uppdateras, baserad på framsteg inom området.

1.Perspectives on Sustainable Energy Development (UNDESA)

https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=637&menu=1515

2. Mapping Synergies & Trade-offs between energy and the sustainable development goals Fuso Nerini et al. Nature Energy. 2017 (https://www.nature.com/articles/s41560-017-0036-5)

3.Integrated analysis of climate change, land-use, energy and water strategies

https://www.nature.com/articles/nclimatel 789

4.Steffen et al. 2015. Planetary Boundaries: Guiding human development on a changing planet. Science Vol. 34 7 no. 6223 (http ://science.sciencemag.org/content/347 /6223/1259855)

5.Watson RT. Turning science into policy: challenges and experiences from the science-policy interface. Philosophical Transactions of the Royal Society B: Biological Sciences. 2005;360(1454):471-477.

doi: 10.1098/rstb.2004.1601.

6.Howarth C and Painter J 2016 Exploring the science-policy interface on climate change: The role of the IPCC in informing local decision-making in the UK Palgrave Commun. 2 16058 Online: http://dx.doi.org/10.1057 /palcomms.2016.58

Additional course literature will be updated, based on advances in the field.

1. Perspectives on Sustainable Energy Development (UNDESA) https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=637&menu=1515

2. Mapping Synergies & Trade-offs between energy and the sustainable development goals Fuso Nerini et al. Nature Energy. 2017 (https://www.nature.com/articles/s41560-017-0036-5)

3. Integrated analysis of climate change, land-use, energy and water strategies https://www.nature.com/articles/nclimate1789

4. Steffen et al. 2015. Planetary Boundaries: Guiding human development on a changing planet. Science Vol. 347 no. 6223 (http://science.sciencemag.org/content/347/6223/1259855)

5. Watson RT. Turning science into policy: challenges and experiences from the science–policy interface. Philosophical Transactions of the Royal Society B: Biological Sciences. 2005;360(1454):471-477. doi:10.1098/rstb.2004.1601.

6.Howarth C and Painter J 2016 Exploring the science–policy interface on climate change: The role of the IPCC in informing local decision-making in the UK Palgrave Commun. 2 16058 Online: http://dx.doi.org/10.1057/palcomms.2016.58

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.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

The students will be examined with a pass or fail criteria, based on the following:

2 versions of the course. 3 credits course, with only PRO1 as requirement. 6 credits course with PRO1 and PRO2 as requirement.

- PRO1 - Project 1, 3.0, grade scale: P/F

Draft article for popular science presenting broad sustainability implications of one´s PhD project

- PRO2 - Project 3, 3.0, grade scale: P/F

Evaluation of an energy policy/project in light of all SDGs´169 Targets to analyse synergies and trade-offs between a policy/project and the broader 2030 Agenda for Sustainable Development

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.