



SCAIEM

Scandinavian Academy of Industrial
Engineering and Management



NTNU



Syllabus:

Sustainable Energy Transitions – Technology and Management Perspectives (5 ECTS)

This course syllabus is for the PhD winter school 2023 organized by Royal Institute of Technology KTH, Sweden, in collaboration with Linköping University LiU, Sweden, Norwegian University of Science and Technology NTNU, Norway and Technical University of Denmark DTU, Denmark.

1 Learning objectives, content and target group

1.1 Intended Learning Objectives (ILOs)

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

- 1) Demonstrate an understanding of energy systems today, integrated with energy storage and renewable energy.
- 2) Demonstrate the ability to assess sustainability of energy systems from both technology and management perspectives.
- 3) Demonstrate understanding of holistic appraisals of sustainable transitions of energy systems and energy-related industries.

1.2 Course content

The Winter School “Sustainable Energy Transitions – Technology and Management Perspectives” is an interdisciplinary PhD course package that offers doctoral students a training in innovation and technology management, sustainable business and entrepreneurship, as well as policy processes related to sustainable energy transitions. The course deals with the challenges and opportunities that drive transformations of energy systems and energy-related industries. This includes discussing the relevance of global challenges like climate change and sustainable development and analysing how they contribute to transformations of energy systems and industries.

The course brings together well-respected lecturers from industrial economics and management, energy engineering and social science at the Royal Institute of Technology KTH, the Danish Technical University DTU, the Norwegian University of Science and Technology NTNU and Linköping University.

1.3 Target group & selection

PhD students that are in their 2nd, 3rd and 4th year, with an interest in sustainable energy transitions.

The course participants will be selected based on a motivation letter, outlining their interest in the subject, previous knowledge and their merits.

The course aims for total 20 PhD students as participants.

The course is free of charge. It will take place physically at KTH in Stockholm. Travel costs have to be covered by the PhD students themselves.

2 Structure and schedule

The course runs for three full days on 13-15 March 2023. During Day 1 the focus will be on technological perspectives for renewable energy and energy storage (with special focus on thermal energy storage). On Day 2 the focus will be on sustainable business models and entrepreneurship for energy transitions, while on Day 3 the focus will be on transition theories and innovation management, as well as policy analysis. This will provide an interdisciplinary and holistic perspective to analysing complex energy system transition dynamics to achieve decarbonisation and climate change mitigation. In addition to these subjects, there will be practical training provided on research methods and the opportunity to be mentored by experienced scholars in the energy transitions field.

Day	Time	Activities, content summary & methods	Partners
13 March	09:00-12:00	Lectures and seminars. Technology perspectives for renewable energy technology and energy storage. <i>Research methods focus:</i> numerical and experimental design of thermal energy storage	(EGI) KTH & DTU
	13:00-16:00	Lectures and seminars Modelling for integrated energy planning with climate change mitigation assessment. <i>Research methods focus:</i> integrated energy & climate assessment (e.g. OSeMOSYS)	(EGI) KTH
	16:00-17:00	Lab tour At Energy Technology department at KTH	(EGI) KTH (& all)
14 March	09:00-12:00	Lectures and seminars. Sustainable business models and entrepreneurship for energy transitions. <i>Research methods focus:</i> business plan development.	(INDEK) KTH
	13:00-16:00	Lectures and seminars Circular economy for energy transitions, and battery technologies. <i>Research methods focus:</i> lifecycle analysis (LCA)	(EGI & INDEK) KTH
	16:00-17:00	Career support activity Mentoring, Q&A & Discussion	All

15 March	09:00- 12:00	<i>Lectures and seminars.</i> Socio-technical transitions and innovation management. <i>Research method focus:</i> interviews and focus group discussions	NTNU & (INDEK) KTH
	13:00- 15:00	<i>Lectures and seminars</i> Policy analysis for energy transitions. <i>Research method focus:</i> policy analysis.	LiU
	15:00- 17:00	<i>Assignment & Career support activities</i> Mentoring activities to support academic writing	All

3 Requirements of completion

There will be pre-reading of journal articles and other publications required before the course starts. Students are expected to come prepared to the course. Lecture attendance and active participation in the seminars is required to pass the course. The 4 000 word paper also needs to be completed to pass the course.

4 Requirements concerning participation

Face-to-face on-site at KTH, at the address : Learning Theatre, Brinellvägen 68, 100 400, Stockholm, Sweden. The course is free of charge. It will take place physically at KTH in Stockholm. Travel costs have to be covered by the PhD students themselves.

5 Assessment and grading

5.1 Grading scale:

Pass/Fail

5.2 Examination moments:

- Active participation and discussion in seminars (SEM1): 6 seminars over 3 days, 3 ECTS in total (0.5 ECTS per seminar): P/F
- Compulsory paper writing (inlämningsuppgift INL1): 4 000 words to be submitted until 4 weeks after the course has finished. The paper should focus on at least one area of the course that was discussed and incorporate at least one method that was presented at the course. The exact assignment task will be presented to the students at the start of the winter school: P/F

For the paper, writing support will be offered to the doctoral students, with a mentoring session on day 3 of the winter school. PhD students will be grouped according to their interests in one of five groups with a mentor from DTU, EGI/KTH, INDEK/KTH, LiU, NTNU.

5.3 Evaluation criteria

To pass the course the PhD students need to attend the three days at KTH and participate actively in the discussions and tasks. Pre-reading of papers before the course start is expected of the PhD students. The final paper of 4 000 words also needs to be passed.

Grading scale

Pass: P

- Evidence of capability to undertake original research on energy system transitions given appropriate guidance and support
- Flexibility of thought, and the ability to solve complex research problems
- Evidence of some creativity, originality and independence of thought in research design
- Ability to evaluate published or publicly-presented work and to analyse critically sources of literature and information
- Ability to analyse data critically
- Professional standard of competence, expression and written presentation

Fail on some or most indicators: Fx

- Fragmentary knowledge and understanding of the essential literature and other key sources of information
- Shows little or no grasp of a clear research problem or topic
- No evidence of independent or original thought
- No attempt to analyse data or present results in scientific manner
- Confused written presentation
- Inadequate formatting, style, presentation and referencing
- Work that is below an acceptable professional standard

If you get an Fx you will be asked to retry the examination. Retrying the examination will lead to a re-marking of your work, which can result in any marks between A and F.

Fail on almost all or all indicators: F

- A short submission with no knowledge and understanding of the literature or topic
- No independent thought or analysis
- Incoherent written presentation
- Wholly improper formatting, style, presentation and referencing

An F is basically a persistent non-submitting of your work and a non-passing of the course.

All the three ILOs are fulfilled by the completion of both course activities SEM1 and INL1 as explained in the table below.

ILO #	ILO	SEM1	INL1
1	Demonstrate an understanding of energy systems today, integrated with energy storage and renewable energy.	X	X
2	Demonstrate the ability to assess sustainability of energy systems from both technology and management perspectives.	X	X
3	Demonstrate understanding of holistic appraisals of sustainable transitions of energy systems and energy-related industries	X	X

6 *Enrolment guideline*

- **Call for the PhD Winter School:** Opening in mid-Dec 2022
- **Last day to register:** 01 February 2023
- **Course dates:** 13 - 15 March 2023
- **Winter School duration:** 3 full days
- **Final course assignment submission deadline:** 15 April 2023
- **Grading completed:** 15 May 2023

7 *Contact person and email:*

Dr. Frauke Urban, KTH Royal Institute of Technology, Department of Industrial Economics and Management. (Email: frauke.urban@indek.kth.se)

7.1 Other organizers

Dr. Saman Nimali Gunasekara, KTH Royal Institute of Technology, Department of Energy Technology. (Email: saman.gunasekara@energy.kth.se)

7.2 Teachers

- Dr. Johan Nordensvärd, University of Linköping LiU, Department of Political Science
- Dr. Julius Wesche, NTNU Norwegian University of Science and Technology, Department of Interdisciplinary Studies of Culture, Norway
- Dr. Gerald Englmaier, DTU Danish Technical University, Department of Civil and Mechanical Engineering, Denmark
- Dr. Emrah Karakaya, KTH, Department of Industrial Economics and Management
- Dr. Anissa Nurdiawati, KTH, Department of Industrial Economics and Management
- Dr. Kateryna Morozovska, KTH, Department of Industrial Economics and Management
- Dr. Maryna Henrysson, KTH, Department of Energy Technology
- Prof. Viktoria Martin, KTH, Departments of Energy Technology