January, 2024 Periods III-IV 2024

PHYS-C1380 Multi-disciplinary energy perspectives (5 cr)

Background

Energy is one of humankind's grand challenges linked to climate change, human development, sustainability, economy, and innovations, among others. Finding effective solutions to these will require stronger systemic thinking and multiple skills, beyond the specific technology knowledge.

Multi-Disciplinary Energy Studies (MES) is a new Aalto-minded approach to the energy and society nexus. It is an elective master's Minor, with three major perspectives into energy: science & technology, economics & business, and social sciences & human behavior.

The Multidisciplinary Energy Studies (MES) is a collaborative teaching effort between several disciplines of Aalto University, such as system analysis, energy sciences, information technology, business, economics, social sciences and art and design.

PHYS-C1380 Multi-disciplinary energy perspectives

PHYS-C1380 "Multi-disciplinary energy perspectives" is an introductory course to modern thinking in energy. The course deals with key factors that influence the way we use and produce energy, how different disciplines approach energy and why, and to apply your own discipline in energy problems.

The course discusses foundational elements and solutions for energy by combining science and engineering, economics and business, social sciences and human behaviour. Applying multi-disciplinary thinking to real-life energy case problems and understanding the links between different disciplines and the complexity of energy, through cases such as Sustainable Energy, Green-ICT, Energy Markets, Green Business, Smart Power, E-Mobility, among others.

Course Outline

The detailed course schedule is communicated on the course pages in MyCourses. Lectures are normally on Tuesdays 10:15 – 12:00 and Thursdays 14:15 - 16:00, with some exceptions (see schedule on MyCourses). The lectures will be organised physically at the Aalto campus. Note that some lectures are on the exercise session times and *vice versa*. After each lecture, the students write lecture diaries that constitute part of the course grade. The second part of the course consists of a group work project delivered as presentations.

The lectures are recorded and shared with participants via Panopto after each lecture, normally within one working day. Also group presentations will be recorded. Exercise sessions will not be recorded.

The course is obligatory for students, who will take the MES Minor, but all students interested in 'energy and society'-theme are welcome. The course is for master's or post-graduate students mainly, but advanced Bachelor students are also welcome.

Structure of the course

The course has three learning elements, explained below:

1. Lectures and lecture diaries (homework)
2. Exercise sessions
3. Group work (teamwork, project presentations).

1. Lectures and Lecture Diaries

a. Lectures (contact teaching unless otherwise informed; recorded and shared)

Format: physical lectures (recorded), including invited speakers. 8 lectures, total 16 hours.

The lecture slides will become available on MyCourses web pages after the lectures. Some lectures or related pre-reading material will be published before the lecture sessions, in which case students will be informed about those by messages from MyCourses web page of the course and emails in advance. The lectures will be recorded and shared with the participants.

b. Lecture Diaries

The lecture diaries should be submitted either in a pdf or a Microsoft document file format to MyCourses web page of the course before the beginning of the next lecture session each week. The diaries should be written in English language, making use of Times New Roman with font size 12 and 1.5 line spacing. The lecture diary should not exceed 2 pages for each lecture session unless otherwise explicitly mentioned. Instructions on writing the diaries are elaborately published in the MyCourses section for assignments.

2. Exercises (contact teaching unless otherwise informed; not recorded)

Learning and applying methods and cases. Format: Guided exercise session (physical). Three 2-hour exercise sessions, each including group discussions, group work around a key question and unwrapping and discussion within the active session. Exercises are mandatory to attend. Only in very special cases can absences be granted but these must be pre-negotiated with the teacher. Lecture material and exercise instructions will become available through MyCourses.

3. Group project work (presentations are contact teaching unless otherwise informed)

The latter part of the course involves group work on a selected multidisciplinary energy topic. A list of topics with a short description will be given, but participants are also welcome to propose their topic (within the general scope and spirit of the course). Period IV is devoted to group work, but the teams are encouraged to start working as soon as possible, already in period III.

- 9 groups of 3 - 5 persons (ideally 4)
- Project topics are related to the topics of the lectures, but include also other topics
- Progress and results reported through three presentations:
    1. Progress presentations
    2. Dress rehearsal presentation
    3. Final presentation
- Each group acts as an opponent to one other group, giving constructive feedback

Project topics and organisation of the project work part will be introduced in the course.

Attendance

Attendance in the **lectures** is not mandatory, but physical attendance is highly encouraged due to the discursive nature of the course. The recording of the lectures is only meant to serve as a backup for those who cannot physically participate in some of the lectures.

Attendance in the **exercise sessions** is mandatory. Inform the course assistant in advance if you cannot participate in a session. Additional homework may be given to compensate for a missed exercise.

Attendance in the **group work project presentations** is mandatory. This means your own team's progress (1) and dress-rehearsal presentation session (1), and all the final presentation sessions (3). If you cannot participate in some presentation session, agree with your team how to compensate for the absence to others.

Use of Artificial Intelligence tools

Using artificial intelligence tools such as large language models to assist in the overall learning as well as in the preparation of course assignments such as lecture diaries, homework, and groupwork is accepted unless otherwise informed. Aalto University's general guidelines on the use of AI in learning and teaching. The principles and rules for using AI in the course will be discussed and agreed in the first contact teaching session.

Assessment and grading

The **minimum requirements for passing the course** are:

- Attendance to all exercise sessions
- Attendance to team's progress and dress-rehearsal session and all final presentation sessions
  - 1 - 2 missing attendances can be compensated with an extra assignment, or by attending some other energy-related Aalto talk or event and writing the lecture diary assignment on it (the event must be agreed with the teacher in advance).
- All (8) lecture diaries (homework) submitted and accepted
- All three group work presentations given and accepted
- All peer assessments submitted
- Opponent tasks contributed as part of a team

Grading and assessment principle

The course grade is combination of the individual students' grade (40 %) and group grade (60 %) and consists of the following parts:

Individual work	**Weight**	**Scale**
8 lecture diaries / assignments	5 % x 8	0 – 5
Individual grade	**40 %**	
Teamwork		
Group work presentations:		
Progress presentation	10 %	0 – 5
Dress rehearsal pres.	20 %	0 – 5
Final presentation	30 %	0 – 5
Group grade	**60 %**	
Total	**100**	

Note: Note: Poor opponent performance can lower the grade and outstanding opponent performance can increase the grade.

Peer assessments

Peer-assessment will be used also to estimate the amount and quality of the individuals' contributions to the group's work. In the peer assessment, each member of the group evaluates his/her own as well as other group members' contributions to the team's work and results anonymously. The result of the peer assessment can increase or decrease the individual's grade compared to the group's grade.