



KTH Industriell teknik
och management

2026-03-02

Engineering and Global Challenges

Course PM ME2321, HT2026

Engineering and Global Challenges, 3 credits

Grading scale P, F

Main field of study Industrial Engineering and Management

Language of instruction – English

Course content

The course raises awareness of the challenges that engineers in industrial engineering face, and gives the students training in, and understanding of, their role in the development of sustainable companies and a sustainable society. This is achieved through:

- Reflection and awareness raising of previous training in dealing with complex problems through overview and synthesis of previous courses.
- Reflection and awareness-raising on current global societal challenges, e.g. linked to the UN Sustainable Development Goals (SDGs) and identified knowledge areas for work towards the fulfilment of these goals.
- Practice in understanding systems and the relationships between system components through the application of engineering methods and work processes to identify and address complex problems in different types of development work.
- Exercise in collaboration and communication to highlight different perspectives on complex problems, e.g. through exercises in groups of students from the different engineering specializations of the program.

Intended learning objectives (ILO)

After passing the course, the student should be able to:

1. Describe, explain and apply systems theory concepts and methods for analyzing and developing complex systems.
2. Discuss and critically reflect on current global societal challenges from the point of view of the potential professional roles and impact of engineers in technology and business development and contribution to sustainable societal development.
3. Apply engineering methods of systems analysis by identifying a need that addresses a complex challenge, proposing a system change and evaluating it from multiple perspectives and problem formulations.

Examination and grading

In the course a pedagogical format called flipped classroom is applied. It consists of preparatory sessions, mostly recorded material for self-studies preparing for mandatory learning activities in group seminars. Learning objectives are examined through individual and group assignments. Read below details of which assignments are individual and what grading scale is used etc.. A final project synthesizes the course.

Examinations

Seminars, 1 credit, grading scale: P, F (LADOK code SEM2)

Active attendance and short report for each seminar

Seminar 1: Systems thinking, theory and approaches and reflection on prior training in system concepts

Seminar 2: Critical reflection on the role of engineers in addressing global challenges

Seminar 3: Strategic and anticipatory thinking – scenario building for alternative futures

Seminar 4: CONOPS project presentations

Partial exam, 0.5 credits, grading scale: P, F (LADOK code INL4)

A digital quiz on theoretical concepts used in system approaches, performed in CANVAS, individually.

Project, 1.5 credits, grading scale: P, F (LADOK code PRO1)

A group work which is examined through an oral presentation and written material from your developed concept of operations (CONOPS). See further in the course's Project PM.

Grading scheme:

The course is pass or fail and you need to pass all assigned activities. If you fail there will be an opportunity to rework until pass, but assessment will depend on examiners time available after this course.

Based on recommendations 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 or to complement rework.

Learning activities

Lectures will be provided in a mix of theoretical content and instructions preparing for seminars. The lectures are recorded sessions and published on CANVAS. There will be LIVE lectures on ZOOM to give opportunity to speak to examiner, to ask questions and to raise issues (see course PDF-schedule for time slots and ZOOM link in Modules in CANVAS).

Seminars are designed as exercises in groups to provide learning among peers and are part of the examination. Assignments linked to the seminar are individual reflections of your experience. There will be time during the seminar to complete your reflections, and they should NOT require extra work after the seminar. Active participation is required for ALL seminars and required for PASS of the corresponding assignments.

Seminars descriptions

Seminar 1: Systems thinking, theory and approaches and reflection on prior training in system concepts

During this seminar you will perform a learning activity called “expert groups”. First, you will collaborate with a group that together will train on a particular topic. When groups have become experts on their topic then all groups re-arrange. The new groups now consist of experts from different topics. In this phase you will train this new group in your topic, and they will train you in theirs. This is an exercise developing understanding of system concepts and approaches. This will be partly examined in the Quiz, but also in applying these concepts and approaches in your project work.

In this seminar you will also reflect on your education by discussing your prior experiences with others and compare views. You will discuss general and specific methods from your own technology field as well as your common grounds in industrial engineering and management. This will be further developed in seminars 2 and 3.

Seminar 2: Critical reflection on the role of engineers in addressing global challenges

At this seminar you will discuss the role that you, as an engineer, can play in addressing global challenges such as climate change, sustainability, resource depletion, and technological advancement. The assignment is based on the lectures and readings on climate change, energy and climate policy and the different problem formulations that are discussed. In addition, you may find support for this assignment in general understanding of complex systems and suggested approaches to better manage the engineering of and within such systems. This allows you to discuss why climate change has not been addressed adequately and what challenges you, as an engineer, will face in addressing global challenges.

Seminar 3: Strategic and anticipatory thinking – scenario building for alternative futures

In this learning activity you will identify groundbreaking events over time in your technical field, discuss megatrends in technical innovation as well as critical events or factors that have driven the development or contributed to its development and application. You will apply a future studies method called “two-by-two matrix” and reflect on uncertainty in strategic decisions. The methods applied will result in four scenarios. Scenario development is an essential part of strategic methods such as back casting which you will apply in a later course.

Seminar 4: CONOPS project presentations

This seminar is a two-stage process with one draft presentation on ZOOM, including handing in your main material demonstrating your CONOPS process and steps and as second and last step, a final oral presentation in a classroom seminar the following week, including handing in PPT that you show during presentation.

Alternatives to missed activities or tasks

When possible, regarding the course structure and particular activities, it is possible to catch up during the course.

You need to have had a valid excuse for missing a mandatory activity or that your absence was approved by the teacher **well ahead of time**.

Opportunity to complete the requirements via supplementary examination

There will be opportunity in the course to complete examinations in cases of Fx.

Opportunity to raise an approved grade via renewed examination

No opportunity to raise an approved grade.

Ethical approach

- All members in 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.

Specific preparations

The course plan and schedule expect that you study full time at KTH. NOTE mandatory presence and active participation in ALL seminars. Seminars are, when possible, offered with several time slots. You have the responsibility to raise issues, TIMELY in case of schedule conflicts that you cannot manage through your own planning to assure participation in seminars and presentations. You also must take responsibility to plan time when your project group can meet and work together. Also, a note for students that, for example, are entitled to more time for a quiz, note that we as teachers **do not** receive this information, so you need to raise this aspect in the beginning of the course with the teacher.

Communication and groups

You can find all announcements posted via Announcements. Make sure to have settings for daily updates, in case of cancellation or changes in schedule or deadlines.

Under the People tab, you can find the groups you are a part of in this course. Here is also where you sign up for groups in seminars and projects. You will sign up for each seminar slot. Note time and place. In CANVAS you will see if there is room due to size of classroom for each seminar occasion. During the seminar, groups will self-organize. All individuals participating will hand in their own individual reflection.

NOTE that the project group requires 4 students. Groups for other seminars will be created in classroom and can be between 4-6 students. It is encouraged to be in different groups and share experiences with others than those in your own technology track and closest friends.

Literature

See CANVAS for more information. All literature will be provided from common sources.

Support for students with disabilities

Students at KTH with a permanent disability can get support during studies from Funka.

Contacts

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