



Course Analysis MF2114

Design for sustainability HT 2022

Date and author: 2022-12-09 by Mia Hesselgren

1 Course information

Course content

The course *Design for sustainability* introduces a range of alternative sustainable design approaches for developing complex technical systems. These approaches are relevant for industrial design engineers to use professionally when engaging in sustainability transitions at various levels. Through contextualising sustainability concepts in relation to design and product development processes with a system focus, this course intends to contribute to creating an overview and understanding of how different design approaches can be used in the sustainability transitions of industrial systems. With a focus on the development of technical systems, the course aims at establishing an understanding of how design can be used to influence relations between people and technologies and, as such, contribute to sustainability transitions. Furthermore, the course contributes to learning by doing, and different design methods are tested and applied in a design project to concretise sustainability complexities.

Intended Learning Outcomes

After completion of the course *Design for sustainability*, the student should be able to:

- ILO 1: Describe and value different possible design approaches that can contribute to sustainability transitions of industrial systems.
- ILO2: Apply relevant design methods to develop proposals for technical systems.
- ILO 3: Critically evaluate design of products and systems in relation to sustainability.

Course responsible teacher:

Mia Hesselgren

Other teachers in the course:

Sara Ilstedt, Magnus Eneberg

Examiner:

Sara Ilstedt

Learning activities:

The course includes the following main course activities:

- The course focuses on developing technical systems and includes lectures and exercises covering various approaches to how design can contribute to sustainability transitions.
- The course contains a team-based design project where proposals for the sustainable development of technical systems are created. The design project is practical and requires attendance and active engagement from the students and includes interactions with teachers through coaching.
- The course includes writing assignments that contribute to revealing tacit knowledge and stimulating critical evaluations and reflections.

Additional Comments

This course aims at preparing future industrial design engineers to be able to contribute to sustainability transitions. As such, the course objectives are to advance students' competencies in eight different areas. As identified by UNESCO (2017), competencies that are crucial for advancing sustainable development include systems thinking competency, anticipatory competency, normative competency, strategic competency, collaboration competency, critical thinking competency, self-awareness competency and integrated problem-solving competency. This course aims at strengthening these competencies by supporting the development of connected abilities through actions, experiences, and reflections. Therefore, to learn sustainable design engineering, the course is based on a design project where different design methods are applied, and sustainability complexities are concretised. The course aims at supporting the development of an overview of the many different approaches available for sustainable design and deepening knowledge of one of the design approaches by trying it out in the design project work. While conducting the design project, actions will be required as various design decisions will have to be made. Moreover, experiences from these actions will arise and be discussed, and reflection-in-action will be required to complete the hand-in assignment that runs parallel to the design project.

2 Students' view of the course

The students have highly appreciated the course. Some concerns were raised regarding the clarity of expectations on hand-ins and deliveries and also regarding the workload.

Response rate of LEQ course evaluation survey:

15% (5 respondents out of 34 students)

Brief summary of students' responses from the LEQ survey and/or other types of course evaluation:

The students were pleased with the course. They appreciated the course content and the focus on sustainability which they expressed as important. Moreover, the students also liked the engaging learning environment and course activities with a mixture of individual work, teamwork, lectures, seminars, and supervision. Some students highly appreciated the structure of the course, with informative lectures at the start and an applied project at the end of the course. They found this engaging, and the interactive learning environment was highly appreciated. The exercises were

mentioned as useful, but some also asked for clearer instructions when initiating these. Furthermore, some students thought the workload was too heavy for a three-credit course.

Additional Comments

At the final seminar in the course, students also wrote post-it notes on a Miro board to describe what they liked about the course and what they wished for. From these notes, most students expressed that they liked the structure, the content and the learning environment. For example:

“I like: Broadening the perspectives on design, what it covers, and how it can contribute in other areas than product design.”

“I like the science-based exercises. They were very educative.”

“I liked the interactive exercise lessons at the beginning of the course.”

“I like the professionalism of the course.”

“I like that the course felt like a master’s course. That we were put to high standards.”

“I like getting feedback from Mia and other students.”

“The supervision sessions stimulated us to think further.”

From these notes, there were also some concerns and issues raised regarding the ambiguity of the assignment and, to some extent, the unclarity of expectations of deliverables. Also, there were comments regarding the workload. For example:

“I felt a bit lost in the first hand-in, so maybe get an introduction to the approaches before the writing assignment.”

“I wish there would be more clear instructions and strategies given for the design projects.”

“I wish more examples could be introduced when going through the methods.”

“I wish it was a little bit clearer what we were going to produce.”

“I wish that the exercises would have been longer. Some of the exercises felt too short where there was not enough time to learn.”

“I wish the workload was a little less.”

Furthermore, a course committee with three student representatives was appointed at the start of the course. The course responsible met with the course committee at the beginning, in the middle and at the end of the course. The course committee prepared for these meetings by asking their fellow students for any feedback. In these meetings, the representatives expressed that the overall comments were highly positive and that the students enjoyed the course and found its content important and relevant. Furthermore, they expressed that the conversations were engaging and that they enjoyed working together on the project and that the feedback in the supervision sessions was highly appreciated. Moreover, they expressed that the students had enjoyed seeing how different the proposals became and that at the end of the course, the similarities and differences between the design approaches became clear. They also expressed some concerns about unclarity regarding what was expected from the assignments and hand-ins. Moreover, some students thought the workload was too heavy for a three-credit course. However, the course committee also discussed how such feedback could possibly be a result of the fact that this course was their first master’s course in design.

3 Teacher analysis of the course

The analysis should present the development of the quality of the course as well as measures that have been taken after previous course analysis. The course's strengths and weaknesses are based on the course evaluation and the teacher's reflection.

Changes of the course before this course offering:

This course is newly developed by the course responsible, and HT22 was the second time it was given. However, based on the feedback from last year, the anthology produced in 2021 was presented at the beginning of the course to give some directions.

The course's strengths (based on the students' experiences and the teacher analysis):

The course MF2114 was developed to support the master students of Industrial Design Engineering to build an understanding of alternative sustainable design approaches available for developing complex systems. As such, the course aims to support the creation of an overview of a large field and an understanding of alternatives available for design engagements when dealing with sustainability issues. To support this theoretical development, the course contains the first module with lectures, exercises, and an academically advanced reading list. Furthermore, the course was developed to also support students in constructing in-depth knowledge on design for sustainability through learning by doing, thereby aiming at enabling deep learning. As such, the course is an applied course with a design project to concretise sustainability complexities. To support this applied knowledge creation, the course contains a second project-based module that includes team-based project work and supervision. To conclude the course, the students produce an anthology describing the various approaches of design for sustainability, including critical reflections on the theories and presentations of the applications in respective projects. As such, the third module of the course contains both group work and an individual assignment, presentations and seminars, peer-to-peer reviews, and feedback sessions, all to stimulate critical thinking and enable deep learning.

The major strength of this course is the combination of theoretical and applied knowledge creation with a learning-by-doing approach that enables deep learning and advanced knowledge construction on design for sustainability. This was also highly appreciated by the students.

Areas for improvement of the course (based on student experiences and teacher analysis):

Some students expressed concerns with unclarities regarding the expectations on the assignments, and some considered the workload to be too high. This indicates a need for even clearer communication regarding master-level courses being at a more advanced level. Furthermore, the expectations regarding the number of working hours, in class and individually, could be more clearly communicated. Moreover, some adjustments could be made to the openness of the individual assignment and the scope of the exercises.

Proposed changes to the next course round:

In the next course round, HT23, more emphasis will be made at the beginning of the course on communicating the expectations of a three-credit master-level course. Also, when planning the exercises together with the other teachers involved in these, there will be more care taken to align the scope of these teaching activities with the hours available in the schedule. Furthermore, some adjustments to the instructions regarding the individual assignment will be made, and possibly, some adjustments to the assessment criteria are needed for a more efficient assessment procedure.

Additional Comments

Based on the experiences from the previous year regarding the difficulties some of the students had in reading and grasping academic English literature, referencing this correctly and expressing themselves correctly when writing in English, there is now an ongoing discussion between several teachers of courses within the master program of how to support the master students to develop their academic English writing skills. Several changes are made in connecting courses to both teaching activities and assessments of writing assignments, and more support should be implemented also at the bachelor's level.