



## Course Analysis MF2114

### Design for sustainability HT 2023

*Date and author: 2024-12-20 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:

Magnus Eneberg

##### Examiner:

Mia Hesselgren

**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 and its interactive learning. Some concerns were raised regarding the clarity of expectations of the design project and also regarding the workload.*

**Response rate of LEQ course evaluation survey:**

14% (4 respondents out of 29 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 felt they were working on relevant issues and that the course was stimulating. Also, they pointed out that they appreciated that there was time to adjust project proposals after the presentation, and they felt assessments were fair. Some pointed out that late lectures (after 17.00) were challenging.

### **Course Committee**

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 and towards 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 very positive and that the students really enjoyed the course and found its content important and relevant. They also discussed that they enjoyed this course as the start of their master's program. They expressed that the class had good dialogue and that it was felt to be easy to talk to everybody. Some concerns were raised about the scheduling, also in parallel to the other courses and that it was felt to be challenging some days with very long school days. There were also some concerns with the ambiguity and openness of the project brief. At the beginning of the course, the course committee suggested a different time slot for the open supervision, which was implemented straight away. At the end of the course, the course committee said they really liked the project and discussed if this could be introduced at the start of the course to make more time for it.

### **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 learning environment, and the relevance of the tasks. For example:

"I quite like the interactive nature of the classes."

"Good feedback on the project."

"I like the scheduled project work."

"I like the flexible deadline of the project."

"I like how the course was structured and scheduled."

"I think the classmates gave good feedback on the concepts we made."

"It was a good intervention theme to work on."

"I appreciate that we created a portfolio that is useful in the future."

From these notes, concerns and issues were raised regarding the ambiguity of the assignment. Also, there were comments regarding the schedule. For example:

"For me, the visual for the schedule was confusing."

"The schedule was confusing, I wish for a better structure."

"I wish there would have been more information regarding the beta version of the individual assignment."

## **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, the course committee comments, and the additional comments made in the final seminar together with the teacher's reflection.*

### **Changes of the course before this course offering:**

This course is fairly newly developed by the course responsible, and HT24 was the fourth time it was given. Based on the feedback from the previous years, the anthology produced in 2023 was presented at the beginning of the course to give some directions for the project, and effort was placed here in

explaining the openness of the design brief and the assignments. Additionally, an effort was made to explain the expectations and assessments of the individual assignment, as well as clarify how many hours were expected to be put into the three-credit course and what to expect in courses at the master's level.

**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 about the ambiguity of the design project. This shows that the expectations regarding the openness of the short design project could be even more clearly communicated. As suggested by the course committee, introducing the design project even earlier in the course could be a good idea.

**Proposed changes to the next course round:**

In the next course round, HT25, emphasis will still be made at the beginning of the course on communicating the expectations of a three-credit master-level course. In particular, a discussion regarding the openness of the design brief and expectations on the design project will be discussed. This will also be done in relation to the students' other parallel courses. Furthermore, some clarifications will be made regarding assessments of the individual assignments, from the beta version to the final version. Also, introducing the project earlier in the course will be tried.