FÖRESKRIFT	Gäller från och med	Diarienummer
	HT2021	
Beslutsfattare	**Ändrad från och med**	**Ansvarig för översyn och frågor**
Skolchef		Skolan för industriell teknik och management

Course PM MF2114 Design for sustainability 3,0 hp

The course *Design for sustainability* contributes to creating an overview of alternative sustainable design approaches (see Figure 1) that are useful for industrial design engineers in professional engagements in sustainability transitions. Furthermore, different design methods are tried out and applied in a design project to concretise the complexities of sustainability.

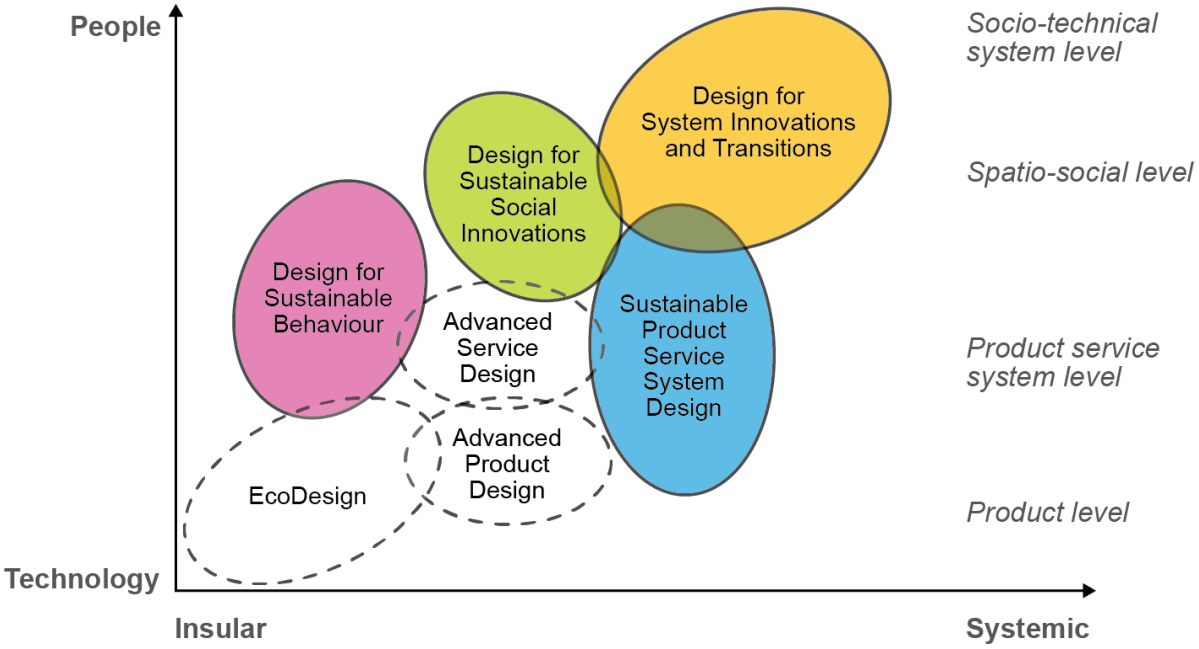

Figure 1. Alternative sustainable design approaches (adapted from Ceschin & Gaziulusoy, 2016) range from insular to systemic attention, technology to people-focused, and concerned with innovations at the product to socio-technical system level.

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 concerning 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 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 influence relations between people and technologies, thereby contributing 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 the design of products and systems in relation to sustainability.

Course Activities

The course includes the following main course activities:

– The course focuses on the developments of 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 sustainable developments of technical systems are created. The design project is practical, requires attendance and active student engagement, and includes interactions with teachers through coaching.

– The course includes writing assignments contributing to revealing tacit knowledge and stimulating critical evaluations and reflections.

Course planning

Weeks	*Course activities*	*Content*	*Preparations*
Week 1 (w. 35)	Individual work		Get course literature
	Lecture	Course introduction	
	Individual work		Initiate workbook
	Exercise	Theme introduction	
Week 2 (w. 36)	Individual work		Watch films + read introduction chapter
	Lecture	Design & sustainability	
	Individual work		Read 1 dedicated chapter + write reflections
	Exercise	Concept mapping	

Weeks	*Course activities*	*Content*	*Preparations*
Week 3 (w. 37)	Individual work		Writing assignment
	Lecture	Socio-technical systems	
	Individual work		Hand-in Beta version of individual writing assignment
	Exercise	Design project kick-off	
Week 4 (w. 38)	Project work	Design project	Framing
	Group work	Framing + Analysis	
	Supervision	Group supervisions	Present framing + analysis
Week 5 (w. 39)	Project work	Design project	Development
	Group work	Development + Proposals	
	Supervision	Group supervisions	Present draft proposals
Week 6 (w. 40)	Project work	Design project	Concept refinements
	Group work	Refinements	Presentation material
	Presentations	Group presentations	Intervention concepts
Week 7 (w. 41)	Project work	Peer-review of design project	Reflections
	Seminar	Final seminar	Peer-reviews
	Group work	Design project	Hand-in project page
	Individual work		Hand-in individual page

Aims and objectives

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 around a design project where different design methods are applied, and sustainability complexities are concretized. The course aims at supporting the development of an overview of the many different approaches available for sustainable design and deepening knowledge in one of the design approaches by trying it out in the design project work. Thereby, while conducting the design project, actions will be required throughout 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.

Prepare before the course starts

Special preparations

Before the course start, please get the course literature, and re-familiarize yourself with the UN's global sustainable development goals.

Course literature

Design for sustainability: A multi-level framework from products to socio-technical systems. (2019). Fabrizio Ceschin & Idil Gaziulusoy. Routledge.
https://doi.org/10.4324/9780429456510 + Other readings will be provided on Canvas.

Equipment needed

You need to prepare a workbook at the beginning of this course. For this you can use any material you feel is convenient for you to collect your thoughts, insights and reflections during the course. The workbook is your diary where you reflect on what you do and learn, and if you like, you can also take the opportunity to use this to practice your graphic design skills. This can be done in a digital or analogue form or a combination of both. Your workbook is also your sketchbook to prepare yourself for your individual part of the D4S Course Anthology.

Examination

DPR1	Designprojektuppgift/Project assignment	1,5 hp	Betygsskala: P/F
INL1	Inlämningsuppgift/Hand-in assignment	1,5 hp	Betygsskala: A-F

Assessment criteria ILOs	Criteria for F	Criteria for E	Criteria for C	Criteria for A
ILO 1: Describe and value different possible design approaches that can contribute to sustainability transitions of industrial systems. This will be assessed through the individual hand-ins, as part of INL1, and through the presentation materials, as part of DPR1.	If descriptions are lacking details or if evaluations are lacking comparisons.	Descriptions of different design approaches that can contribute to sustainability transitions are explained on a basic level. Evaluations of different design approaches are presented by considerations of at least two approaches and with some specific project details.	Descriptions of different design approaches that can contribute to sustainability transitions are well-explained and with examples. Evaluations of different design approaches are presented by considerations of at least two approaches and with specific project details clearly motivated.	Descriptions of different design approaches that can contribute to sustainability transitions are well-explained with nuances and with examples. Evaluations of different design approaches are presented by considerations of at least two approaches and with specific project details clearly and strategically motivated.

ILO2: Apply relevant design methods to develop proposals for technical systems. This will be assessed through the individual hand-ins, as part of INL1, and through the design processes and group presentations, as part of DPR1.	If proposals are lacking applications of system thinking or integrated problem-solving.	Proposals are developed by application of relevant design methods and presented with considerations of several system perspectives.	Proposals are skilfully developed by application of relevant design methods and presented with considerations of several system perspectives that are critically assessed.	Proposals are highly skilfully developed by application of relevant design methods and presented with thoughtful considerations of several system perspectives that are critically and strategically assessed.
ILO3: Critically evaluate design of products and systems in relation to sustainability. This will be assessed through the individual hand-ins, as part of INL1, and presentation material, as part of DPR1.	If evaluations are lacking critical reflections.	Evaluations of different design approaches are presented with critical and personal reflections of how the selected project approach could contribute to sustainability transitions.	Evaluations of different design approaches are presented with critical and personal reflections of how the selected project approach could contribute to sustainability transitions and includes motivations of how project choices led to different results.	Evaluations of different design approaches are presented with critical and personal reflections of how the selected project approach could contribute to sustainability transitions and includes motivations of how project choices led to different results and how alternative project choices could have led to different results.