



*Course syllabus*

# Konstruktion för X Design for X

**MMKN11, 7,5 credits, A (Second Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED M

**Date of Decision:** 2023-04-11

## General Information

**Elective for:** I4, M4-pu, M4-prr, MD4

**Language of instruction:** The course will be given in English

## Aim

The purpose of this course is to introduce the concept "Design for X" (DfX), that is well established within product development. In any product development project it is essential to ensure that the product satisfies the functions it is designed for. But there are many other issues that are caused by, or affect the properties of the product: is the product reliable, sustainable, is it easy to assemble, inexpensive to manufacture? These aspects need also to be addressed during product development. Specific design guidelines have been developed to address these particular issues, or 'X': design for manufacturing and assembly, design for sustainability, and other "design for X".

In this course, the following "design for Xs" are primarily included:

- Design for manufacturing and assembly (DFMA),
- Design for additive manufacturing (DFAM),
- Robust design,
- Design for environment (DFE)
- Design to cost (DtC)

## Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- be able to analyse and come up with solutions based on the following engineering design aspects eller "Xs": design for manufacturing and assembly

(DFMA), design for additive manufacturing, robust design, design for environment (DFE), Design to cost (DtC)

- for a given product development project, alone or in a group, be able to identify the need to analyse the engineering design aspects or "Xs" that will or should be considered
- for a given product development project, alone or in a group, be able to provide data for an identified "X" as it is described in the course literature or otherwise documented
- in a given product development project, alone or in a group, be able to manage the production of the necessary basis for a previously unknown "X"

#### *Competences and skills*

For a passing grade the student must

- independently or in a group be able to analyse a unique design solution in regards to the following aspects: design for manufacturing and assembly (DFMA), design for additive manufacturing (DFAM), robust design, design for environment (DFE), Design to cost (DtC)
- based on a design solution, be able to analyse the solution with the goal of identifying which of the "Xs" are of interest for the application in question
- be able to independently or in a group provide the necessary data for a given "X"
- be able to independently or in a group present and communicate to an industrial company, or the equivalent, in dialogue, orally and in writing, a complex DfX analysis in a development/design project in the form of process and results.

#### *Judgement and approach*

For a passing grade the student must

- be able to reflect on the design solution that has been developed and based on that, be able to offer recommendations for further and/or alternative design solutions.
- be able to identify possible needs for in-depth analyses of the proposal that has been developed, including further development of the available DfX data.

## Contents

The course starts with a survey of the DfX concept, followed by lectures on design for manufacturing and assembly (DFMA), design for additive manufacturing, robust design, design for environment (DFE). For each of these "Xs", the students, in groups of 3 to 5 students, are required to turn in an assignment that illustrates his or her understanding of the theoretical content.

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** The course includes compulsory assignment(s) performed by groups of three to six students. The grade (Fail, Three, Four, Five) will be based on a combination of the quality of a written report and a product concept prototype. The written report will correspond to 70% of the grade and the product concept prototype to 30%.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

## Admission

**Assumed prior knowledge:** MMKF01 Product Development and Design Methodology or equivalent.

**The number of participants is limited to:** No

**The course overlaps following course/s:** MMKN10

## Reading list

- Boothroyd, G., Dewhurst, P., & Knight W.: Product Design for Manufacture and Assembly. M. Dekker, 2002, ISBN: 0-8247-0584-X. DFMA, e-book available via the Lund University Library homepage.
- Ehrlenspiel, K., Kiewert, A., & Lindemann, U.: Cost-Efficient Design. Springer, 2007, ISBN: 978-3-540-34647-0. DtC, e-book available via the Lund University Library homepage.
- Ulrich, K.T., & Eppinger, S.D.: Product Design and Development. McGraw-Hill. Robust design, chap. 12 (2008, 4th ed.) or chap. 13 (2012, 5th ed.).
- Other needed literature material announced during the course.

## Contact and other information

**Course coordinator:** Glenn Johansson, [glenn.johansson@design.lth.se](mailto:glenn.johansson@design.lth.se)

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**Course homepage:** <http://www.product.lth.se/education/>