MF2010 Component Design 6.0 credits

Komponentkonstruktion

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for MF2010 valid from Spring 2013

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Specific prerequisites

MF101X/MF102X/MF104X/MF111X/MF112X/MF114X/MF116X/

Masterprogram TIPUM

The following courses are required to be admitted: MF1040, MF1045 or MF1015.
Plus one of the following courses:
MF101X/MF102X/MF104X/MF111X/MF112X/MF114X/MF1025 or a Bachelors Degree within Mechanical Engineering

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The main goal is to give the students a deeper insight about the ways of thinking that form the basis of components design. Furthermore the course aims at improving the students' ability to use existing, but also to create new, models that can be used to describe the performance of a component.

A student that has completed the course shall:

• have a good ability to use knowledge from basic subjects, such as mathematics, mechanics and solid mechanics, in the design of machine components;

• be able to calculate deformations and stresses in bending of short and thick beams;

• be able to perform fatigue analyses using the theory of cumulative fatigue damages;

• be able to describe common failure mechanisms which are limiting the performance of a product;

• be able to calculate the degree of efficiency of a product;

• be trained in using international standards when designing standard components;

• be able to use and evaluate analytical and numerical methods from solid mechanics when designing components and also be able to judge the validity of the methods;

• be able to create own models that describe the function of non-standard components and use the models to optimize the performance of the component;

• be able to apply knowledge about bearing design on components with similar contact conditions as in a bearing.

Course contents

The course is based on problem solving. An existing product is used as example throughout the course and most assignments concern analyses and redesign of this product.

Topics treated are:

• failure mechanisms in mechanical components;

• analyses of the forces in a mechanical product;

• estimation of the degree of efficiency in a product

• dynamic loading; periodic loading; transients.

• fatigue: standard analysis; cumulative fatigue damage theory;

• standard design methods for components, such as gears;

• advanced analysis of a components strength and optimization of its weight;

• modeling of non-standard components;

• the use of bearing design analogies applied for other components.

The course includes:

• two laboratory works;

• three group assignments;

• two individual assignments;

• an optional oral examination.

Disposition

The project is a collaborative industrial development projects with an optional exam.
The course is mandatory for track Machine Design in the Master program Industrial Product Development.

Course literature

1 - Publiserat kursmaterial.

2 - Michael F. Ashby, "Materials Selection in Mechanical Design", Elsevier Butterworth-Heinemann, 2005.

3 - Anton van Beek, “Advanced engineering design. Lifetime performance and reliability”, TU Delft, 2006.

Examination

- INL1 - Assignment, 3.0 credits, grading scale: P, F
- TEN1 - Written examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation 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.

If the course is discontinued, students may request to be examined during the following two academic years.

INL1 - Individual assignment, 4.0 credits, grade scale: A, B, C, D, E, FX, F

TEN1 - Examination, 2.0 credits, grade scale: A, B, C, D, E, FX, F

Final grading based on INL1 and TEN1 together with passed laboratory work and group assignments

Other requirements for final grade

Final grading based on INL1 and TEN1 requires passed laboratory work and group assignments

Ethical approach

- All members of 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.