



# MJ1103 Introduction to Mechanical Engineering 10.5 credits

## Introduktion till maskinteknik

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Course syllabus for MJ1103 valid from Autumn 18

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

**Grading scale:** A, B, C, D, E, FX, F

**Education cycle:** First cycle

**Main field of study:** Technology

### Intended learning outcomes

After completing the course the student should be able to

- Define (and for higher grade, explain) a certain amount of concepts within the area of mechanical engineering such as force, moment, equilibrium, free body diagram, strain, stress, elasticity, energy, heat, power, work, laminar flow, turbulence, production and gears among many parameters brought up in the course.
- Use these definitions for calculations within respective area (mechanics, energy etc) and here also is included the ability to translate units from the American unit system to SI.
- Apply 3D-CAD for drawing, 3D illustration and for higher grade be able to animate the illustration.
- Use MATLAB for technical calculations involving vectors and matrices, and for higher grade be able to use loop constructs.
- Create a functional and technically simpler product from his/her or another group member's idea: From sketch to a final construction. Here is also included project planning.
- Describe constructional work in a technical report and present a project work orally for a group of people.
- Search for information and summarize the content in a written report.
- Reflect on group dynamics and have insight about different roles people have in a team; thereafter the student should be able to work in a team more efficiently.
- Discuss sustainable development within a few technical areas from an introductory viewpoint

The course will furthermore give the student perspective on the profession of engineering

### Course main content

**Part 1: Introductory Mechanical Engineering:** This part of the course gives an overview of the field of mechanical engineering. After completing this course element the student should know about basic mechanical systems and components and additionally use basic equations from mechanics, solid mechanics, fluid mechanics, thermodynamics and industrial production for simple estimations. The book "An introduction to Mechanical Engineering" (J. Wickert) is being used for this course element. The examination takes place in form a written exam (4 ECTS). A two-day study trip to a paper mill in Sweden is also part of this course element.

**Part 2a: Problem solving with MATLAB:** This course element gives the student an introduction to programming and how to use matrices and loop constructs to solve some mathematical and mechanical engineering problems. Examination takes place in front of the computer (1.5 ECTS). This course element introduces the first part of the course book "MATLAB Programming for Engineers" (S.J. Chapman) while the rest of the book is used in the course "DN1212 Numerical methods and basic programming".

**Part 2b: Graphical communication (3D-CAD):** In the course element the students learn how to use the software SolidWorks to be able to present a construction with mechanical drawings, a three-dimensional model and also be able to animate the model. The examination consists of both compulsory computer lab exercises and a home assignment (1.5 ECTS).

**Part 3: Construction project:** A vehicle is to be created. The student practices constructional work from idea/concept to a final and functional product. Furthermore the student experiences group dynamics, co-operation, creativity and fantasy. Finally the student learns how to communicate in a written report and to present his/her work orally. The examination (2 ECTS) consists of a vehicle, a competition, a project report including sketches, CAD-drawings on the vehicle and an oral presentation.

**Part 4: Sustainable Development:** In the course module Introduction to Sustainable Development is sustainable development introduced holistically in a way that is appropriate for engineering students. The module provides basic knowledge in the field and the opportunity for reflection and debate on sustainability issues that are central to engineers. The book "Hållbar utveckling – en introduktion för ingenjörer" (Dahlin) is used. (1.5 ECTS)

## Language of instruction

Language of instruction is specified in the course offering information in the course and programme directory.

## Eligibility

General entrance requirements for university studies as well as the specific entrance requirements for studies at KTH, the M-programme..

*Obligatorisk för åk1, kan ej läsas av andra studenter*

## Literature

Wickert & Lewis, An Introduction to Mechanical Engineering, (SI-upplaga, t.ex. 4 Ed 2016)

Dahlin J.-E. (2014), Hållbar utveckling – en introduktion för ingenjörer

Chapman S. , MATLAB Programming for Engineers , Brookes/Cole, Thompson Learning

CAD compendium will be distributed free of charge as a PDF during the course.

Other material distributed at lectures and exercises

## Examination

- LAB1 - Laboratory Work 1, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB2 - Laboratory Work 2, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- PROA - Project, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- ÖVNA - Exercise, 1.5 credits, grading scale: A, B, C, D, E, FX, F