COURSE SYLLABUS

Continuum Mechanics, 7.5 credits

Materialmekanik, 7,5 högskolepoäng

Course Code:	TMMS22	**Education Cycle:**	Second-cycle level
Confirmed by:	Dean Mar 1, 2021	**Disciplinary domain:**	Technology
Revised by:	Director of Education Feb 24, 2022	**Subject group:**	MA2
Valid From:	Jan 1, 2023	**Specialised in:**	A1F
Version:	2	**Main field of study:**	Product Development

Intended Learning Outcomes (ILO)

After a successful course, the student shall:

Knowledge and understanding
- display knowledge of the transition from observed material behavior to material modelling and simulations
- display knowledge of models within elasticity, viscoelasticity, plasticity and viscoplasticity
- display knowledge of modeling of material failure and transient behavior like creep and relaxation

Skills and abilities
- demonstrate the ability to implement material models in commercial codes
- demonstrate the ability to simulate and predict material behavior
- demonstrate ability to select the appropriate mechanical model

Judgement and approach
- demonstrate the ability to discuss problems and solutions
- demonstrate ability to evaluate the applicability of chosen material model for simulating the observed material behavior

Contents

Continuum mechanics is a branch of mechanics that deals with the mechanical behavior of materials modeled as a continuous mass rather than discrete particles. The framework for this type of modeling, typical models and the study of phenomena in deformation of materials is studied and implemented for solving numerically. This knowledge is important when predicting and optimizing product behaviors.

The course includes the following elements:
• Thermodynamic framework for material modeling
• Viscoelasticity models, like Maxwell, Kelvin-Voigt and Standard linear solid model, for studying phenomenon like creep, relaxation and damping

• Plasticity and viscoplasticity models, with (and without) hardening and damage, for studying behavior of metals as well as non-metallic materials
• Introduction to using material models in a FE-code like ABAQUS
• Implementing and running material models in commercials codes like Matlab and ABAQUS

Type of instruction

Teaching consists of lectures mixed with computational exercises.

The teaching is conducted in English.

Prerequisites

Passed courses at least 90 credits within the major subject Mechanical Engineering, 15 credits Mathematics included multivariable calculus and completed course in Numeric Analysis, proof of English proficiency is required (or the equivalent).

Examination and grades

The course is graded 5,4,3 or Fail.

Registration of examination:

Name of the Test	Value	Grading
Examination[I]	5 credits	5/4/3/U
Assignments	2.5 credits	U/G

[I] Determines the final grade of the course, which is issued only when all course units have been passed.

Course literature

The literature list for the ourse will be provided 8 weeks behfore the course starts.

Lecture notes by L. Mähler