*Course syllabus*

# Modern experimentell mekanik
# Modern Experimental Mechanics

## FHLN10, 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

**Main field:** Nanoscience.
**Elective for:** BME4-bdr, F4, F4-axn, M4-bem, MNAV2
**Language of instruction:** The course will be given in English

## Aim

The aim of the course is to introduce the techniques and possibilities in modern experimental mechanics for the characterisation of the mechanics of solid, porous and granular materials using a range of physics techniques and in particular full-field analyses. The course will pay particular attention to non-destructive and full-field analyses using optical methods (with a focus on digital image correlation), x-ray and neutron imaging and scattering approaches, and wave propagation. Inverse analyses and digital image/signal processing in the context of experimental analyses will also be covered.

## Learning outcomes

*Knowledge and understanding*
For a passing grade the student must

- be familiar with the different modern experimental techniques, and in particular full-field measurements, for studying the mechanics of solid, porous and granular materials
- understand the concepts of digital image correlation approaches and experimental set-ups
- understand the basics of neutron and x-ray techniques applied to experimental mechanics

- understand the basics of wave propagation and wave measurements in experimental mechanics

*Competences and skills*
For a passing grade the student must

- be able to formulate and solve simple inverse problems in experimental mechanics
- be able to formulate and carry out simple digital image/signal processing procedures
- be able to interpret and discuss results from different experimental techniques

*Judgement and approach*
For a passing grade the student must

- be able to propose appropriate experimental methods to answer a given research question
- be able to assess sources of error in experimental analyses
- be able to appreciate the limitations of different experimental methods

## Contents

- Full-field experimental analysis
- Inverse methods in experimental mechanics
- Digital image/signal processing in experimental mechanics
- Optical methods and digital image correlation for kinematic and strain field measurement
- X-ray and neutron techniques for experimental mechanics
- Ultrasonic and acoustic methods

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)
**Assessment:** The course assessment involves 4 short practical assignments during the course plus a summary written assessment submitted at the end of the course. These assignments all contribute to the final course grade, which is given as failed, 3, 4, 5. Procedures for extra assignments, when failed, are arranged after contact with the course coordinator.

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:** Basic courses in mathematics and mechanics or solid mechanics
**The number of participants is limited to:** No

## Contact and other information

**Course coordinator:** stephen hall, stephen.hall@solid.lth.se
**Course homepage:** http://www.solid.lth.se/education/courses/modern-experimental-mechanics-fhln10/