



# SE2137 Fatigue 6.0 credits

## Utmattning

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

## Establishment

Course syllabus for SE2137 valid from Autumn 2018

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Technology

## Specific prerequisites

Solid Mechanics basic undergraduate course SE1010, SE1020, SE1055 or the equivalent.

## Language of instruction

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

## Intended learning outcomes

The course purpose is for the participants to understand the onset of fatigue, the damage process for fatigue, be able to use different tools and methods to design against fatigue, determine the risk for failure and determine the expected component life.

After course completion, the participants should be able to:

- understand the origin of fatigue, the damage process and the influence of environment on the process,
- identify fatigue damage compared to other failure modes,
- design against fatigue,
- quantify the risk for failure due to fatigue and
- determine the expected life of a component including the effect of environment.

## Course contents

The course is based on theory and observations on the onset of fatigue. The focus is on engineering methods for assessing the fatigue risk and computation of expected life, including the impact of the environment.

The course contains:

- Stress and strain based methods for design against fatigue at uniaxial loadings with regards to both finite life and fatigue limit.
- Design with damage accumulation at loads with variable amplitude.
- Criteria for design against multiaxial loadings where the multiaxial loads can be proportional or non-proportional.
- Statistical methods to determine the risk of failure of a component.
- Linear fracture mechanics to determine the crack growth rates and predict the expected life of a component.
- Phenomenological identification of fatigue as the cause of failure.
- Different mechanisms for the origin of fatigue.
- Different mechanisms for environmental failures.
- Methods to include environmental effects on fatigue strength.
- Application specific forms of fatigue.
- Fatigue in different types of materials.
- Computer tools and a fatigue database for fatigue evaluation.

## Course literature

Handouts

Handbook in Solid Mechanics, Department of Solid Mechanics, KTH, 2013

## Examination

- HEM1 - Assignment, 6.0 credits, grading scale: P, F
- TEN1 - Examination, 0.0 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.

The examiner, in consultation with the KTH Disability Coordinator (Funka), decides on any adapted examination for students with documented permanent impairment. The examiner may grant another examination form for reexamination of single students.

## Other requirements for final grade

Compulsory home assignments, HEM1, 6hp

Voluntary exam, TEN1, 0hp

## 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.