# MJ2484 Advanced Mechanics and Finite Element Methods 6.0 credits

**Fortsättningskurs mekanik och FEM**

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

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

## Establishment

On 12/06/2019, the Dean of the ITM School has decided to establish this official course syllabus to apply from spring term 2020 (registration number M-2019-1357).

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Mechanical Engineering

## Specific prerequisites

Engineering mathematics, mechanics, BSc level

**Only for students who follow the Master's programme (two-year) TAETM**

## Language of instruction

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

## Intended learning outcomes

Complex mechanical vibrations are mainly studied with a focus on analytical and numerical methods for application in machine design. Motion equations are derived using Lagrange principle. One-dimensional systems are applied to learn more about free oscillations, forced oscillations, impulse responses and random excitation. Systems with several degrees of freedom are applied to study eigenvectors and modal analysis. Finite Element Methods is used to analyse vibration behaviour of more complex models with several degrees of freedom.

After passing the course, the student should be able to:

1. Explain and apply concepts and approximations in the theory of finite element methods (FEM)
2. analytically model and analyse responses of elastic structures
3. Use a commercial FEM tool to carry out analyses of strength of machine elements

## Course contents

The main focus of the course lies on both developing theoretical concepts and applying the finite element method practically. Based on the mechanical behaviour of simple mechanical systems like pin joint designs, fundamental concepts in solid mechanics analysis are introduced. Thereafter, focus is on demonstrating how general elastic equations established in the continuum mechanics is discretised and how an approximated solution for these equations can be achieved.

## Examination

- PRO1 - Project work, 2.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Written exam, 4.0 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.

## 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.