



## Course syllabus

Faculty of Technology

Department of Mechanical Engineering

4MT315 Strukturdynamik, 7,5 högskolepoäng

Structural dynamics, 7.5 credits

### **Main field of study**

Mechanical Engineering

### **Subject Group**

Mechanical Engineering

### **Level of classification**

Second Level

### **Progression**

A1F

### **Date of Ratification**

Approved by Faculty of Technology 2015-05-13

The course syllabus is valid from spring semester 2016

### **Prerequisites**

Bachelor of Science in Engineering (180 credits) in which Algebra and analysis corresponding to 22.5 credits and Solid Mechanics or Structural Mechanics, 7.5 credits are included. In addition, the following courses are also required; Analysis of Structures, 7.5 credits, and Finite Element Method, 7.5 credits, or equivalent.

## Objectives

After the course the students shall:

- be familiar with the basic principles of structural dynamics
- be able to derive the equations of motions for multiple degree of freedom systems
- be able to solve eigenvalue problems
- understand and be able to apply methods for frequency and time domain solutions
- understand and be able to apply reduction techniques
- have insight into experimental dynamics
- have insight into pretest planning together with correlation between test data and data from calculation models

## Content

The course contains:

Fundamental theory and definitions within Structural dynamics

Single degree of freedom systems

- free vibration
- forced vibration
- time domain
- frequency domain

Multiple degree of freedom systems

- free vibration
- forced vibration
- time domain
- frequency domain

Methods for solving eigenvalue problems

Modal orthogonality and superposition

Time-step methods for transient response analyses

Reduction of calculation models

State space models

Experimental dynamics

- data acquisition
- experimental modal analysis
- correlation between test and analysis results
- pretest planning

## Type of Instruction

Theories and examples are presented at lectures. Further, projects in which the computer code MATLAB will be used, assist in the learning process.

## Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

After the course, a written evaluation according to the rules of the university will be made.

The examination is based on projects together with a written final exam.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

## Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed at the Faculty.

## Credit Overlap

The course cannot be included in a degree along with the following course/courses of which the content fully, or partly, corresponds to the content of this course:4MT015

## Other

Grade criteria for the A–F scale are communicated to the student through a special

document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

### Required Reading and Additional Study Material

#### **Required reading**

R. Craig and A. Kurdila: Fundamentals of Structural Dynamics, 2nd ed., Wiley 2006

Additional literature may be used.