AF2011 Structural Dynamics for Civil Engineers 7.5 credits

Strukturdynamik

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

Establishment

Course syllabus for AF2011 valid from Spring 2010

Grading scale

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

Education cycle

Second cycle

Main field of study

The Built Environment

Specific prerequisites

For students not registered on a KTH programme:

150 university credits (hp) including the courses AF2001 Byggkonstruktionslära fk or equivalent (AP students), AF2003 Structural Engineering, advanced course or equivalent (TISEM1 students) and documented proficiency in English corresponding to English B.

For students registered on a KTH programme:

AF2001 Byggkonstruktionslära fk or equivalent (AP students)

AF2003 Structural Engineering, advanced course or equivalent (TISEM1 students)

Language of instruction

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

Intended learning outcomes

This course deals with fundamental methods for theoretic and experimental analysis of dynamic problems. In particular, infrastructures such as railway tracks and bridges are studied.

The aim of this course is to give basic knowledge about theoretical and experimental analysis of dynamically loaded structures as well as their applications. After this course, the student will be able to:

- Understand dynamic problems and create simple models for calculations
- Calculate fundamental frequencies and mode shapes
- Understand the bridge-vehicle interaction problem and calculate the dynamic effects
- Plan instrumentation for simple dynamic tests
- Evaluate dynamic properties from measurements.
- Understand the fundamental behaviour of structures during earthquakes.
- Understand the fundamental behaviour of geo-materials during dynamic loads
- Understand wave propagation from a dynamic source and how the waves might be amplified by layering of the ground and topography
- Understand the phenomenon of liquefaction

Course contents

- Vibration of one- and multidegree-of-freedon systems
- Vibrations of beams and cables
- Numerical methods of analysis
- Vehicle-structure dynamic interaction
- Experimental dynamics and elementary signal analysis
- Wave propagation in solids
- Stress- strain relation
- Machine foundations and supports
- Ground vibrations from construction work and traffic
- Measurement of ground vibrations and the function of the seismometer

The course includes laboratory experiments.

Course literature

- Chopra, Dynamics of Structures - Theory and Applications to Earthquake Engineering, Prentice Hall
- Bodare Anders, Soil and rock dynamics
- Handouts

Examination

- ÖVN1 - Exercises, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, 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.

Other requirements for final grade

Passed written exam (4 ECTS credits)

Passed exercises (3.5 ECTS credits)

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.