



HE1017 Dynamics 7.5 credits

Dynamik

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

Establishment

Course syllabus for HE1017 valid from Autumn 2009

Grading scale

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

Education cycle

First cycle

Main field of study

Physics, Technology

Specific prerequisites

Vector geometry, one variable calculus, differential equations, corresponding to the courses HN1901 Matematik I och HN1001 Tillämpad matematik.

Language of instruction

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

Intended learning outcomes

Participants of this course should achieve basic knowledge of static's and particle dynamics, and an introduction to rotation of rigid bodies.

To obtain the grade E, the student shall be able to

- analyse simple static systems with and without friction, use free-body diagrams and equations of equilibrium, and treat these mathematically.
- describe the general bonds uniting the different properties of particle motion, like displacement, velocity and acceleration, represented in rectangular as well as normal and tangential coordinates.
- analyse simple problems concerning straight and curvilinear motion of particles, write equations of motion based on Newton's laws and derived laws, and treat these mathematically.
- describe the properties of motion of the different cases of linear oscillation.
- solve simple problems of rotation of a rigid body about a fixed axis, using analysis of torque and energy.
- control the possible correctness of proposed solutions, e.g. concerning dimension and geometry.
- analyse and simulate complex mechanical systems using an advanced computing tool.

To obtain higher grades, the student shall be able to

- theoretically derive the laws of mechanics used in the course.
- analyse and manage somewhat harder static and dynamic problems, including more advanced mathematical treatment.

Course contents

- Units, quantities and dimensional analysis.
- Forces, torque.
- Equilibrium. Free-body diagrams.
- Center of mass. Friction.
- Kinematics of particles. Normal and tangential coordinates.
- Newton's laws. Dynamics of particles.
- Work, power, energy.
- Momentum, angular momentum.
- Vibrations.
- Moment of inertia. Rotation of a rigid body about a fixed axis.
- Introduction to computer simulation of mechanical systems.

Course literature

The course literature is posted on the course's homepage at least four weeks before the course starts.

The previous academic year used the following literature:
Nyberg C, Mekanik grundkurs, Liber 2003
Nyberg C, Mekanik problemsamling, Liber 2003

Examination

- ÖVN1 - Exercises, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 4.5 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.

Other requirements for final grade

Passed written exam

Passed lab assignments

The final grade is based on the two parts. Grading A-F.

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.