Mechanics, second course

Programme course

4 credits

Mekanik, fortsättningskurs

TMME32

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Offered for the last time
Spring semester 2023

Replaced by
TFYB04 + ny kurs 2025.

Main field of study
Applied Physics, Mechanical Engineering

Course level
First cycle

Advancement level
G1X

Course offered for
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Basic mechanics, calculus including differential equations, vector and matrix algebra.

Intended learning outcomes
To develop a broader and deeper knovledge of classical mechanics through the study of particle mechanics relative to rotating references, rigid body dynamics and oscillations with several degrees of freedom. After the course, the student should be able to:

- Select a coordinate system for a specific dynamics problem with insight into the consequences of different choices.
- Analyze dynamics problems using numerical solution of systems of ordinary differential equations.
- Use vector algebraic methods to analyze dynamics problems, including eigenvalue analysis and coordinate transformations.

Course content

Newton's equations of motion. The concept of an inertial system. Relative motion in the plane. Angular velocity and acceleration as vectors. The Coriolis equation. Dynamics of paricles in rotating coordinate systems. The equations of motion for systems of particles and for rigid bodies.
Calculation of the moment of momentum for a rigid body.
The inertia tensor and its representation in different coordinate systems.
Oscillations with several degrees of freedom. Interpretation of the eigenvectors as eigenmodes.

Teaching and working methods

The course is given as a series of lectures and computer sessions. Mor emphasis than typical for a course at this level is given to computer sessions where the students implement mechanical models in MATLAB.

Examination

LAB1	Computer assignments	2 credits	U, 3, 4, 5
TEN1	Written examination	2 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses: Courses in Physics, Applied mechanics, Mechatronics Vehicle dynamics and Solid mechanics.

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Peter Schmidt

Examiner

Lars Johansson

Education components

Preliminary scheduled hours: 42 h
Recommended self-study hours: 65 h

Course literature

Kompendium från institutionen.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.