



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Mekanik, grundkurs Engineering Mechanics, Basic Course

FMEA10, 9 credits, G1 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED M

Date of Decision: 2023-04-11

General Information

Main field: Technology.

Compulsory for: I2

Language of instruction: The course will be given in English on demand

Aim

- give knowledge about the basic concepts in mechanics for material systems at rest and at motion, mainly for particles and rigid bodies
- give skills in engineering modeling
- develop ability to solve problems by applying mathematics
- develop engineering modeling skills using a simulation program as a help
- enrich and extend the concept of solving problems using industrial software as a numerical tool

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to explain and apply fundamental conception as force and moment, and express them both as scalars and vectors
- be able to draw a free body diagram of a material body and set up the equations of equilibrium and motion
- be able to formulation physical relation for energy, linear and angular moment, linear and angular impulse
- be ably to interpret and employ velocities, accelerations and balance equations expressed in vector format
- be able to outline the most important result in the project work

Competences and skills

For a passing grade the student must

- starting with a real situation be able to delimit a problem and perform an equilibrium analysis
- apply systematically methods to mechanical systems at motion
- be able to present written solutions to mechanical problems with suitable drawing and free body diagrams
- be able to delimit a problem from a given project specification and create a simulation model for solving the problem
- be able to perform a systematic numerical analysis of a mechanical system in motion
- be able to present a written rapport with detailed description of the problem, made assumption, calculation and results

Judgement and approach

For a passing grade the student must

- evaluate the physical consistence of the obtained results

Contents

Statics: Forces, moments, couples and general force systems. Equivalent force systems. Equilibrium and free-body diagrams. Applications on equilibrium of material bodies. Distributed forces. Frames and machines. Centers of mass. Friction.

Dynamics: Kinematics and kinetics of particles (general) and rigid bodies (plane). Energy, work, linear and angular impulse and momentum. Impact.

Newtins laws. Kinetic for particles in 2D and 3D and kinetic for rigid bodies in plane motion. Vibrations of damped and undamped mechanical systems. Free and forced vibrations. Eigen frequencies and vibration analysis.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Written exam. Written project report.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts

Code: 0122. **Name:** Mechanics, Project.

Credits: 1. **Grading scale:** UG. **Assessment:** Written project report. **Contents:** Vibrations of damped and undamped mechanical systems. Free and forced vibrations. Eigen frequencies and vibration analysis.

Code: 0222. **Name:** Engineering Mechanics, Basic Course, part 1.

Credits: 5. **Grading scale:** TH. **Assessment:** written exam **Contents:** Statics: Forces, moments, couples and general force systems. Equivalent force systems. Equilibrium and free-body diagrams. Applications on equilibrium of material bodies. Distributed forces. Frames and machines. Centers of mass. Friction. Dynamics: Kinematics and kinetics of particles (general). Energy, work, linear and angular impulse and momentum. Impact.

Code: 0322. **Name:** Engineering Mechanics, Basic Course, part 2.

Credits: 3. **Grading scale:** TH. **Assessment:** written exam **Contents:** Dynamics: Kinematics and kinetics of particles (general) and rigid bodies (plane). Newtins laws. Kinetic for particles in 2D and 3D and kinetic for

rigid bodies in plane motion.

Admission

Assumed prior knowledge: Linear Algebra, Calculus in One Variable.

The number of participants is limited to: No

The course overlaps following course/s: FMEA30, FMEA20, FMEA05, FMEA15

Reading list

- Nyberg C.: Mekanik, Grundkurs. Liber, 2014.
- Nyberg C.: Mekanik, Problemsamling. Liber, 2014.

Contact and other information

Course coordinator: Aylin Ahadi, aylin.ahadi@mek.lth.se

Course coordinator: Per Hansson, per.hansson@mek.lth.se

Course homepage: <http://www.mek.lth.se>