LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Mekanik I
Engineering Mechanics I

FMEA35, 6 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: F1, Pi1
Language of instruction: The course will be given in Swedish

Aim

The aim of the course is that the student shall aquire:

- knowledge about the basic concepts in mechanics for material systems in equilibrium and particles in motion
- knowledge and skills in engineering modeling strategies
- ability to solve problems within a wide range of applications by using knowledge in mechanics and mathematics

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to understand and apply fundamental conceptions and equations within mechanics, and express them as scalars and vectors
- be able to draw a free body diagram of a material body and set up equilibrium equations
- be able to describe velocities and accelerations in a suitable coordinate system
- be able to use knowledge in mechanics for problem solving within a wide range of

different applications in statics and particle dynamics

Competences and skills
For a passing grade the student must

- be able to delimit a problem and identify interfaces starting with a real situation
- apply systematical methods to analyse mechanical systems in equilibrium and particles in motion
- present written solutions to mechanical problems including assumptions, equations and suitable drawings and free body diagrams
- be able to delimit a problem from a given project specification and create a simulation model for solving the problem using computer software
- develop ability to solve problems by applying mathematical methods within, for example, linear algebra and the theori of ordinary differential equations

Judgement and approach
For a passing grade the student must

- evaluate the physical consistency of the obtained results
- in the analysis of a mechanics problem, be able to describe the assumptions made when formulating the physical model and be able to give examples of conditions during which the validity of the model is limited

Contents

Moment and force systems in two and three dimensions. Equivalent force systems. Free-body diagrams and equilibrium. Applications of equilibrium equations on material bodies and parts of bodies. Center of mass and center of gravity. Friction.

Newton's laws. Inertia systems. Kinematics and kinetics of particles in straight and curved motion. Cartesian, natural and polar coordinates. Energy and work. Momentum and angular momentum. Impulse angular impulse. Impact. Moment of
inertia. Free vibrations. Rotation about a fix axis.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Written exam. To pass the course, the student is required to pass the written exam.

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.

Admission

Assumed prior knowledge: FMA420 Linear algebra, FMAA01/FMAA05 Calculus in One Variable.
The number of participants is limited to: No
The course overlaps following course/s: FMEA30

Reading list

- Nocholas Apazidis: Mekanik I, Statik och partikeldynamik. Studentlitteratur, 2019, ISBN: 978-91-44-135-12-0. Apazidis N. : Mekanik I, Statik och partikeldynamik, Studentlitteratur, 2019.

Contact and other information

Course coordinator: Per Hansson, per.hansson@mek.lth.se
Course homepage: http://www.mek.lth.se