Mechanics - Dynamics

Programme course

6 credits

Mekanik - dynamik

TMME13

Valid from: 2017 Spring semester

Determined by
Board of Studies for Mechanical Engineering and Design

Date determined
2017-01-25

Main field of study
Mechanical Engineering

Course level
First cycle

Advancement level
G1X

Course offered for
- Design and Product Development, 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 courses in linear algebra and calculus.

Intended learning outcomes
To give the student familarity with the fundamental laws of classical mechanics and the skill to independently apply these laws to engineering problems. After the course, the student should be able to:

- explain the properties of a force.
- define basic concepts of mechanics such as equilibrium, velocity,acceleration, angular velocity, angular acceleration, momentum, angular momentum, moment of inertia, work, energy.
- write down expressions for and compute the above quantities for engineering problems.
- draw free body diagrams, formulate kinematical relations, apply Euler's laws and thereby find the ordinary differential equations governing the motion of a body.

Course content

Newton's laws of motion. Newtons law of gravitation.
Velocity and acceleration in cartesian and plane polar coordinates. Linear oscillations with one degree of freedom. Momentum and moment of momentum. The moment law for a particle. Work. Kinetic energy. The potentials of a spring and a parallell force field. Coriolis' equation.
Kinematic relations for a rigid body. The moment of momentum for a rigid body. The inertia matrix. Eulers' equations of motion for a rigid body. plane parallell motion. Rolling.

Teaching and working methods

The course is given as a series of lectures and classes.

Examination

TEN1	Written examination	6 credits	U, 3, 4, 5

The exam paper is awarded a maximum of 15 points with 6 points required to pass.

Grades

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

Other information

Supplementary courses: Road Vehicle Dynamics, Mechanics Second Course, Vibration Analysis of Structures, Models of Mechanics, Multi Body Dynamics and Robotics, Biomechanics, Automatic Control, Solid Mechanics, Fluid Mechanics, Machine Elements.

Department

Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent

Peter Schmidt

Examiner

Ulf Edlund

Course website and other links

http://www.mechanics.iei.liu.se/edu_ug

Education components

Preliminary scheduled hours: 54 h
Recommended self-study hours: 106 h

Course literature

Additional literature

Books

Meriam, J.L., Kraige, L.G, *Engineering Mechanics* Vol 1 & 2

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.