

Engineering Mechanics

Programme course

6 credits

Mekanik

TFYA16

Valid from: 2017 Spring semester

Determined by

Board of Studies for Chemistry, Biology
and Biotechnology

Date determined

2017-01-25

Main field of study

Biotechnology, Applied Physics, Physics

Course level

First cycle

Advancement level

G1X

Course offered for

- Chemical Biology, M Sc in Engineering
- Engineering Biology, 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

Linear Algebra, Calculus

Intended learning outcomes

The course gives an orientation to the students about basic relations in classical mechanics. After the course the student should be able to

- treat basic mechanical
- formulate, simplify and solve simple mechanical problems from different approaches, and verify its correctness through e.g. dimensional analysis

Course content

Lectures and seminars treat:

- Kinematics (linear and plane movement)
- Relative motion (uniform relative translation and rotation, inertial forces)
- Dynamics of particles (Newton's laws, frictional forces, angular momentum, central forces)
- Work and energy (work, power, kinetic and potential energy, conservative and non-conservative forces)
- The dynamics of particle systems (motion of the center of mass, reduced mass, momentum and kinetic energy for systems of particles, laws of conservation, systems of variable mass)
- Dynamics of the rigid body (angular momentum and moment of inertia, the equation for rotation of a rigid body)
- Newton's law of gravitation, orientation about and Kepler's laws
- Fluid mechanics (Pascal's and Archimedes' principles, the continuity equation, Bernoulli's principle)
- Oscillatory motion (simple harmonic motion, damped and forced oscillations, coupled oscillators, the mathematical and physical pendulums)

Teaching and working methods

The course is given in the form of lectures and seminars. The lectures cover the most important chapters and may include simple demonstrations of mechanical problems or solutions of problems. The seminars are aimed at problem-solving and worked examples.

Examination

KTR1	Optional assignment	0 credits	U, G
TEN2	Written examination	6 credits	U, 3, 4, 5

A passed optional assignment will give bonus points on the written exam.

Grades

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

Other information

Supplementary courses: Physics.

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Boman

Examiner

Marcus Ekholm

Course website and other links

<http://www.ifm.liu.se/edu/coursescms/TFYA16/>

Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 112 h

Course literature

Additional literature

Books

Halliday, Resnick & Walker, *Principles of Physics* 10:e upplagan

Nordling & Österman, *Physics Handbook*

Compendia

Ekholm, Övningsuppgifter i mekanik för KB- och TB-programmen

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://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.