GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2022-2023

Mechanics, Vibrations and Waves (I002417)

Course size *(nominal values; actual values may depend on programme)*

Credits 5.0 **Study time 150 h** **Contact hrs** 50.0h

Course offerings and teaching methods in academic year 2022-2023

A (semester 1)	Dutch	Gent	lecture	32.5h
			lecture: plenary exercises	17.5h
			online lecture	0.0h

Lecturers in academic year 2022-2023

Poelman, Dirk	WE04	lecturer-in-charge

Offered in the following programmes in 2022-2023	**crdts**	**offering**
Bachelor of Science in Bioscience Engineering(main subject Agricultural Sciences)	5	A
Bachelor of Science in Bioscience Engineering(main subject Cell and Gene Biotechnology)	5	A
Bachelor of Science in Bioscience Engineering(main subject Chemistry and Food Technology)	5	A
Bachelor of Science in Bioscience Engineering(main subject Environmental Technology)	5	A
Bachelor of Science in Bioscience Engineering(main subject Forest and Nature Management)	5	A
Bachelor of Science in Bioscience Engineering(main subject Land, Water and Climate)	5	A
Bachelor of Science in Bio-Engineering (Joint Section)	5	A

Teaching languages

Dutch

Keywords

Mechanics, mechanical vibrations and waves, statics, dynamics

Position of the course

Give the students a thorough training in basic physics, oriented both on basic principles and on practical applications.

Contents

Basic principles: what is physics; units; orders of magnitude; differentiation of kinematics - statics - dynamics
Kinematics in one and more dimensions; axle systems; vector displacement, velocity and acceleration; relative movements; radial and tangential components of the acceleration
Dynamics: laws of Newton; normal forces; frictional forces; free body diagrams
Pseudo-forces: centrifugal and Coriolis force
General gravitation; laws of Kepler
Work, kinetic and potential energy; conservative and non-conservative forces; power
Impulse; impulse and energy conservation; collisions in one and more dimensions
Kinematics of rotational movements; angular displacement, angular velocity and acceleration
Dynamics of rotational movements: torque, moment of inertia, angular momentum
Statics: composition of forces and torques, balance of a rigid body, elasticity and fracture
Vibrations: harmonic vibrations, damping, forced vibrations, quality factor
Waves: transverse and longitudinal waves, standing waves, mathematical description of waves, intensity of waves, energy transport, Doppler effect

Initial competences

Final competences of secondary school or equivalent. Advise: required subjects in the curricula 'Mathematics' of the officially recognized educational networks in Flanders for programmes with at least 6 hours of mathematics training per week in the last two years of the secondary school program (general secundary education) are recommended.

Final competences

1 Have the ability to recognize and analyze forces in mechanical systems.
2 Have the ability to apply Newtons laws for translations and rotations.
3 Have the ability to describe and analyze mechanical vibrations.
4 Be able to solve statics and dynamics problems using concepts of force, impulse, angular momentum and energy.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture: plenary exercises, Online lecture, Lecture

Extra information on the teaching methods

Plenary exercises: guided problem solving. The problems are made available in advance.

Learning materials and price

D.C. Giancoli, Physics for scientists and engineers, volume 1. Cost approx. € 80.
The powerpoint presentations, used in theory lessons, are made available to the students in electronic form.

References

D.C. Giancoli, Physics for scientists and engineers, volume 1
R.C. Hibbeler, Engineering mechanics - Statics

Course content-related study coaching

Opportunity to ask questions before and after the lectures and electronically (through email or the electronic learning platform), both to the teacher and the research assistants.

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written examination with multiple choice questions, Written examination with open questions

Examination methods in case of periodic assessment during the second examination period

Written examination with multiple choice questions, Written examination with open questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

The multiple choice part of the exam is graded with standard setting.

Calculation of the examination mark

Written exam: 40% of the marks on the multiple choice part, 60% on the open questions (theory and problem solving).