GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2020-2021

Fluid Mechanics (I002438)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

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

Credits 3.0 **Study time** 90 h **Contact hrs** 30.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 2)	Dutch	Gent	seminar: coached exercises	15.0 h
			lecture	15.0 h

Lecturers in academic year 2020-2021

Verhoest, Niko	LA20	lecturer-in-charge

Offered in the following programmes in 2020-2021	**crdts**	**offering**
Bachelor of Science in Bioscience Engineering (main subject Agricultural Sciences)	3	A
Bachelor of Science in Bioscience Engineering (main subject Cell and Gene Biotechnology)	3	A
Bachelor of Science in Bioscience Engineering (main subject Chemistry and Food Technology)	3	A
Bachelor of Science in Bioscience Engineering (main subject Environmental Technology)	3	A
Bachelor of Science in Bioscience Engineering (main subject Forest and Nature Management)	3	A
Bachelor of Science in Bioscience Engineering (main subject Land and Water Management)	3	A
Joint Section Bachelor of Science in Bio-Engineering	3	A

Teaching languages

Dutch

Keywords

Fluidum statics, fluidodynamics, viscious flow in pipes, pumps and turbines, measurement and control devices

Position of the course

This course combines fysics with engineering through, on the one hand, studying the physical concepts of fluid statics and kinematics, and on the other hand, applying these concepts to simple problems of fluid transport. The course focusses on simple conduits, possibly containing pumps or turbines, taking into account energy losses. Several devices for measuring pressure or velocity of fluids are discussed. This course forms the basis for several courses which (amongst others) require momentum transport.

Contents

1 Properties of fluids
2 Fluids at rest (fundamental equation for fluids at rest, hydrostatic force on plane and curved surfaces, Archimedes' principle, measurement of pressure)
3 Fundamental equations of fluid dynamics (Reynolds Transport Theorem, continuity equation, equations of motion (Euler, Navier Stokes, Bernoulli equations), momentum equation)
4 Viscious flow in pipes (laminar flow regime, equation of Poisseuille, turbulent flow regime, laminar boundary layer, major and minor energy losses)
5 Pumps and turbines (description, operation)
6 Measurement and control devices
7 Water hammer
8 Control and design calculations of single and multiple pipe systems (gravitational flow, forced flow, cavitation)

Initial competences

Fluidumtransport builds on certain learning outcomes of course units 'Mechanics, Vibrations and Waves', 'Calculus' and 'Linear algebra'; or the learning outcomes have been achieved differently.

Final competences

1 To know how to theoretically derive and interpret the basic concepts of fluids at rest and in motion
2 To calulate energy losses in laminar and turbulent fluidum transport
3 To explain the working principle of measurement and control devices, and pumps and turbines
4 To calculate hydrostatic forces on plane and curved surfaces.
5 To perform verification and control calculation of single and multiple pipe systems for both gravitational and forced flow.
6 To treat fluidomechanical problems through an engineering approach
7 To have the attitude to constructively work together and to take the lead

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, seminar: coached exercises

Extra information on the teaching methods

The theory is taught during lectures. Exercises exist of solving problems in team that demonstrate the theory

Learning materials and price

A syllabus available (approx. 25 euro)

References

Munson, Okiishi, Heubsch, Rothmayer, Fundamentals of fluid mechanics, 7th edition, 792 p., Wiley, ISBN: 978-1-118-11613-5, 2012

Course content-related study coaching

Possibility to ask questions during and after lectures and availability of the lecturer for questions and additional information with regard to theory and practice.

Evaluation methods

end-of-term evaluation

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

Written examination with open questions

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

Written examination with open questions

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Calculation of the examination mark

Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.