

Biomechanics (E063682)

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 6.0 Study time 180 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Gent	demonstration lecture	7.5 h 32.5 h
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Lecturers in academic year 2020-2021

Balusubramanya, Amith	TW06	staff member
Bomberna, Tim	TW06	staff member
Gheysen, Lise	TW06	staff member
Debbaut, Charlotte	TW06	lecturer-in-charge
Famaey, Nele	TW06	co-lecturer
Forward, Malcolm	TW06	co-lecturer

Offered in the following programmes in 2020-2021

	crdts	offering
Bachelor of Science in Engineering (main subject Biomedical Engineering)	6	A
Master of Science in Electrical Engineering (main subject Communication and Information Technology)	6	A
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	6	A
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	6	A
Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	6	A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	A
Master of Science in Chemical Engineering	6	A
Master of Science in Civil Engineering	6	A
Master of Science in Computer Science Engineering	6	A
Master of Science in Computer Science Engineering	6	A
European Master of Science in Photonics	6	A
Master of Science in Chemical Engineering	6	A
Preparatory Course Master of Science in Biomedical Engineering	6	A

Teaching languages

English

Keywords

Biomechanics

Position of the course

The aim of this course is to give the students insight in normal and pathological human biomechanical processes, and to develop knowledge and skills for the development and design of biomechanics based diagnosis and therapy. This course covers three main topics: BioFluid Mechanics, Soft Tissue Mechanics, and Human Movement

Analysis.

Contents

- Introduction to biomechanics
- Biofluids: fluid properties and rheology
- Biofluid mechanics: hydrostatics (blood pressure), hydrodynamics and hemodynamics, macro- and microcirculation
- Mechanical characteristics and behavior of biological tissues
- Computational biomechanics (including introduction to computational fluid dynamics)
- Experimental biomechanics
- Human Movement – concepts and measurements: kinematics, kinetics and electromyography
- Introduction to clinical gait analysis
- Biomechanics of joints
- Introduction to sport biomechanics

Initial competences

Courses 'Modelling of Physiological Systems' and 'Transport Phenomena'.

Final competences

- 1 Insight in human biomechanics for both normal and pathological conditions
- 2 Basic knowledge of the biomechanics of soft tissues, biofluid dynamics and human movement analysis
- 3 Practical knowledge on computational biomechanics (more specifically to run simple cases using computational fluid dynamics)
- 4 Processing and analysis of scientific measurement data and computational study results

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

Guided self-study, demonstration, lecture, online discussion group, practicum, seminar, seminar: practical PC room classes, online demonstration, online lecture, online seminar, online seminar: practical PC room classes

Extra information on the teaching methods

If circumstances permit, contact moments will be organized in hybrid form, i.e. a mix of on campus and online classes.

If necessary due to COVID19, other teaching methods might be used.

You will need your own laptop for the PC classes.

Learning materials and price

Lecture slides and documents

Software (e.g. student version of Ansys Workbench)

Use of own laptop

Ufora

References

- Biomechanics: motion, flow, stress and growth; Y.C. Fung; Springer-Verlag; ISBN 0-387-97124-6
- Biodynamics, Y. C. Fung; Springer Verlag; ISBN: 0387908676
- An introduction to biomechanics: solids and fluids, analysis and design, J. Humphrey, S. Delange; Springer; ISBN -0-387-40249-7
- Basic biomechanics of the Musculoskeletal system, M. Nordin, V. Frankel; Uitg. Lippincott Williams & Wilkins

Course content-related study coaching

Evaluation methods

end-of-term evaluation

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

Written examination, open book examination

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

Written examination, open book examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation
not applicable

Extra information on the examination methods

During examination period: written open-book exam - theory and exercises.
If circumstances permit, the exam will be organized on campus. Otherwise, the exam will be organized online.

Calculation of the examination mark

Written open-book exam: 20/20