GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Biomechanics (E063682)

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

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 1)	English	Gent	lecture
			seminar
			independent work
			practical

Lecturers in academic year 2023-2024

Debbaut, Charlotte	TW06	lecturer-in-charge
Famaey, Nele	TW06	co-lecturer
Forward, Malcolm	TW06	co-lecturer
Segers, Veerle	GE30	co-lecturer

Offered in the following programmes in 2023-2024	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 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 Photonics 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, Human Movement Analysis, and Sport Biomechanics.

Contents

- Introduction to biomechanics

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

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, human movement analysis and biomechanics of running
3 Practical knowledge on computational biomechanics (more specifically to run simple cases using computational fluid dynamics)
4 Collecting, processing and analyzing 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

Seminar, Excursion, Lecture, Practical, Independent work

Extra information on the teaching methods

Contact moments for this course will include a mix of mainly on campus activities and a few online activities.
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

- Biofluid Mechanics: An Introduction to Fluid Mechanics, Macrocirculation, and Microcirculation, Third Edition, D.A. Rubenstein, W. Yin and M.D. Frame; Elsevier, 2021
- 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 Musculoskleletal system, M. Nordin, V. Frankel; Uitg. Lippincott Williams & Wilkins

Course content-related study coaching

Group and individual feedback during contact sessions

Assessment moments

end-of-term and continuous assessment

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

Written assessment open-book

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

Written assessment open-book

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Periodic evaluation: written open book exam (theory and exercises) for the modules on biofluid mechanics, soft tissue mechanics, and human movement analysis.
Non-periodic evaluation: report for the module on human movement analysis and report for the module on sport biomechanics

Calculation of the examination mark

Periodic evaluation: 17/20
Non-periodic evaluation: 3/20