

Course Specifications

From the academic year 2017-2018 up to and including the

Computational Biomechanics (E092891)

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

Offering	Language	Location	Teaching Methods	Hours
A (semester 1)	English	Gent	self-reliant study activities	7.5 h
			seminar: practical PC room classes	15.0 h
B (semester 1)	Dutch		seminar: practical PC room classes	15.0 h
			guided self-study	7.5 h
			self-reliant study activities	7.5 h

Lecturers in academic year 2020-2021

Famaey, Nele TW06 lecturer-in-charge

Offered in the following programmes in 2020-2021

Programme	crdts	offering
Master of Science in Biomedical Engineering	3	A, B
Master of Science in Biomedical Engineering	3	A, B

Teaching languages

Dutch, English

Keywords

Solid Mechanics; Finite Element; Material model; Geometrical modelling; Pre- and postprocessing.

Position of the course

This course provides an introduction into the Finite Element (FE) method and its application in continuum biomechanics. Basics of the FE method are given insofar they are needed to provide the student with an understanding of the enormous possibilities of the method, as well as its potential pitfalls. Through an assignment the students get practical training in using the method for complicated biomechanical problems.

Contents

- 1 Introduction:
- 2 Solid mechanics for large deformations
 - Strain and stress measures
 - Plasticity
 - Visco-elasticity
 - Hyperelasticity
 - Complex material models (e.g. Nitinol, arterial wall)
- 3 Pre- and postprocessing
 - Geometrical modeling
 - Creating Finite Element models
 - Material data and boundary conditions
- 4 Assignment

Initial competences

Basic knowledge of solid mechanics (linear elasticity) and biomechanics

Final competences

- 1 Judge numerical methods on applicability, relevance and usefulness.
- 2 Apply numerical methods independently.

3 Present project results orally.

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, self-reliant study activities, seminar: practical PC room classes

Extra information on the teaching methods

Lecture, guest lecturers, self-reliant study activities, seminar (practical computer exercises)

Learning materials and price

Software, slides

References

Klaus-Jürgen Bathe, Finite Element Procedures in Engineering Analysis, Prentice-Hall

Course content-related study coaching

Assignment has to be solved with the supplied software under supervision.

Evaluation methods

continuous assessment

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

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

Examination methods in case of permanent evaluation

Report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

Assignment report

Calculation of the examination mark