

## Computational Biomechanics (E092891)

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 2018-2019

A (semester 1)	English	seminar: practical PC room classes	15.0 h
		self-reliant study activities	7.5 h
B (semester 1)	Dutch	guided self-study	7.5 h
		self-reliant study activities	7.5 h
		seminar: practical PC room classes	15.0 h

### Lecturers in academic year 2018-2019

Famaey, Nele TW06 lecturer-in-charge

### Offered in the following programmes in 2018-2019

	crdts	offering
<a href="#">Master of Science in Biomedical Engineering</a>	3	A, B
<a href="#">International Master of Science in Biomedical Engineering</a>	3	A, B
<a href="#">Master of Science in Biomedical Engineering</a>	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