## Course Specifications

From the academic year 2017-2018 up to and including the academic year 2018-2019

### Lecturers in academic year 2018-2019
- Van Hoof, Tom (GE38) - staff member
- Segers, Patrick (TW15) - lecturer-in-charge
- Famaey, Nele (TW06) - co-lecturer
- Forward, Malcolm (TW06) - co-lecturer

### Course offerings and teaching methods in academic year 2018-2019

<table>
<thead>
<tr>
<th>Course Level</th>
<th>Language</th>
<th>Semester</th>
<th>Type</th>
<th>Credits</th>
<th>Study Time</th>
<th>Contact Hrs</th>
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</thead>
<tbody>
<tr>
<td>A (semester 2)</td>
<td>English</td>
<td>lecture</td>
<td>40.0 h</td>
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<tr>
<td>A (semester 2)</td>
<td>English</td>
<td>seminar: practical PC</td>
<td>17.5 h</td>
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<tr>
<td>A (semester 2)</td>
<td>English</td>
<td>room classes</td>
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<tr>
<td>A (semester 2)</td>
<td>English</td>
<td>project</td>
<td>10.0 h</td>
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<tr>
<td>B (semester 2)</td>
<td>Dutch</td>
<td>seminar: practical PC</td>
<td>17.5 h</td>
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<tr>
<td>B (semester 2)</td>
<td>Dutch</td>
<td>room classes</td>
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<tr>
<td>B (semester 2)</td>
<td>Dutch</td>
<td>guided self-study</td>
<td>40.0 h</td>
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<tr>
<td>B (semester 2)</td>
<td>Dutch</td>
<td>project</td>
<td>10.0 h</td>
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### Course size
- Credits: 6.0
- Study time: 180 h
- Contact hrs: 67.5 h

### Offered in the following programmes in 2018-2019
- Bridging Programme Master of Science in Biomedical Engineering: 6 crds (A)
- Master of Science in Electrical Engineering (main subject Communication and Information Technology): 6 crds (A)
- Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation): 6 crds (A)
- Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering): 6 crds (A)
- Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems): 6 crds (A)
- Master of Science in Electromechanical Engineering (main subject Maritime Engineering): 6 crds (A)
- Master of Science in Electromechanical Engineering (main subject Mechanical Construction): 6 crds (A)
- Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering): 6 crds (A)
- Master of Science in Biomedical Engineering: 6 crds (A)
- International Master of Science in Biomedical Engineering: 6 crds (A)
- Master of Science in Biomedical Engineering: 6 crds (A, B)
- Master of Science in Chemical Engineering: 6 crds (A)
- Master of Science in Civil Engineering: 6 crds (A)
- Master of Science in Computer Science Engineering: 6 crds (A)
- Master of Science in Computer Science Engineering: 6 crds (A)
- European Master of Science in Photonics: 6 crds (A)
- Master of Science in Chemical Engineering: 6 crds (A)

### Teaching languages
- Dutch, English

### Keywords
- Biomechanics

(Approved)
Aim of the course is to give the students insight in normal and pathological human biomechanical processes and to develop tools and skills for the design and development of biomechanics based diagnosis and therapy.

Contents
- Introduction to biomechanics
- Mechanical characteristics of biological tissue
- Rheology
- Micro- and Macrocirculation
- Computational biomechanics
- Celbiomechanics
- Experimental biomechanics
- Biomechanics of bone, tendon and ligaments
- Biomechanics of cartilage, muscles and nerves
- Biomechanics of hip, shoulder and spine
- Biomechanics of knee, ankle and foot
- Bone adaptation
- Biomechanics of bone regeneration
- Mechanical characteristics of cartilage
- Introduction to kinesiology and motion analysis: theory
- Introduction to kinesiology and gait analysis

Initial competences
- Knowledge about *From Genome to Organism and Modelling of Physiological Processes*.

Final competences
1. The student will be familiar with insight in the human biomechanics and the design requirements for appropriate medical devices.
2. Knowledge of Computer Aided Design, specifically the use of the finite element method for biomechanical challenges
3. Analysis and reporting of finite element studies
4. Searching of scientific, biomedically oriented information (Pubmed, web of science) through project work, processing of this information into input for finite element model
5. Basic knowledge of biomechanics of hard- and soft tissues, gait analysis and mechanobiology

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, lecture, project, seminar: practical PC room classes

Extra information on the teaching methods
- Classroom lectures; Computer-assisted problem solving; Project (with Abaqus)

Learning materials and price
- Hands out

References
- Biodynamics; Y. C. Fung; Springer Verlag; ISBN: 0387908676
- Basic biomechanics of the Musculoskeletal system., M.Nordin, V.Frankel; 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, oral examination, report

Examination methods in case of periodic evaluation during the second examination period
- Written examination, open book examination, oral examination, report

(Approved) 2
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 problems; graded oral presentation and report (project)

Calculation of the examination mark
  Theory exam: 11/20
  Project: 9/20

(Approved) 3