Course Specifications
Valid as from the academic year 2019-2020

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大小 (nominal values; actual values may depend on programme)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Study time</th>
<th>Contact hrs</th>
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<tr>
<td>6.0</td>
<td>180 h</td>
<td>60.0 h</td>
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Course offerings and teaching methods in academic year 2019-2020

A (semester 1) Dutch HoWest project 18.0 h

- lecture 18.0 h
- seminar: practical PC room classes 24.0 h

Lecturers in academic year 2019-2020

- Monte, Michael TW08 lecturer-in-charge
- Vervisch, Bram TW08 co-lecturer

Offered in the following programmes in 2019-2020 crdts offering

Bachelor of Science in Industrial Design Engineering Technology 6 A

Master of Science in Industrial Design Engineering Technology 6 A

Teaching languages
- Dutch

Keywords
- CAE, Finite element methods, simulation methods

Position of the course

This course offers the student insight in:
- Numerical simulation methods and mathematical models;
- The use of CAE tools to dimension a design according to strength, stiffness, vibrations;
- The use of CAE tools to dimension composite materials
- The use of simulation software for the dynamics of multi-body systems

Contents

**Part I: CAE**
The student gets insight in the theory of finite element modeling in the domain of mechanical dimensioning. He/she has to apply these acquainted knowledge to dimension a design project according to strength, stiffness and vibrations. All principles are illustrated by simple examples and exercises. In addition, commercial CAE tools are used to solve specific engineering problems. Emphasis is laid to analyzing a defined problem correctly, selecting the appropriate solving method, selecting correct boundary conditions and loads for a simplified model, and a correct interpretation of obtained results of CAE calculations.

**Part II: Design oriented applications of CAE**
The student learns to cope with the complexity of digital product development by means of CAD/CAE systems. Following themes are addressed:
1. The design of multi-body systems and mechanisms, analysis of the dynamic behavior and vibrations
2. Laminate theory and dimensioning composite constructions.

**Part III: Final assignment - project**
The student works independently on a predefined design project that offers a founded answer to a predefined research question of hypothesis. CAD/CAE is used to validate the research results and interprete them accordingly. The result is a scientific report.

Initial competences
- Profound knowledge of CAD modelling

笑道: 108

(Approved)
Knowledge on structural mechanics
Designing and dimensioning of mechanical constructions

Final competences
1. Have insight in different aspects of finite element modelling
2. Being able to interpret the results of a finite element analysis correctly
3. Being able to develop a model with the correct boundary conditions into a commercial software (Siemens NX).
4. Define and solve independently an engineering problem using finite element methods
5. Dimension a design using numerical simulation.
6. Obtain insight on the complete digital product development using integrated CAD/CAE systems.

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
Lecture, project, seminar: practical PC room classes

Extra information on the teaching methods
CAE
Excercises and assignments during the year, handed in according to the planning. All information is provided on the electronic learning environment.

Learning materials and price
Online Course material offered by UGent education platform.

References

Course content-related study coaching
The lecturers are available through e-mail or appointment.

Evaluation methods
End-of-term evaluation and continuous assessment

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

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

Examination methods in case of permanent evaluation
Participation, report

Possibilities of retake in case of permanent evaluation
Examination during the second examination period is not possible.

Extra information on the examination methods

CAE (Part 1+3)
- 30% PE CAE: exam on PC (Siemens NX)
- 30% NPE CAE: reports

CAE applications (Part 2)
- 20% NPE report + active participation
- 20% PE CAE applications exam PC (Siemens NX)

Calculation of the examination mark
First examination period:
Final Score (20) = C1*P1 + C2*P2 + C3*P3 + C4*P4
C1, C2, C3 and C4 are weighing coefficients and P1, P2, P3 and P4 are the scores (on 20)
P1: NPE - participation CAE applications + reporting (part 2)
P2: PE - exam CAE applications (part 2)
P3: PE - exam CAE (part 1)
P4: NPE: report CAE (part 1+3)
C1=20%
C2=20%
C3=30%
C4=30%

(Approved)
In order to pass for the course a score of at least 6/20 must be achieved for both CAE applications (score P1+P2) and CAE (score P3+P4). If this condition is not met, a deviation from the calculated score (if 10 or more) will be made and the score will be lowered to 9/20.

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**Second examination period:**

Final Score (20) = C1*P1 + C2*P2 + C3*P3 + C4*P4 + C5*P5

C1, C2, C3, C4 and C5 are weighing coefficients and P1, P2, P3, P4 and P5 are the scores (on 20)

P1: NPE - score first examination period P1
P2: PE - exam CAE applications
P3: PE - exam CAE
P4: NPE - report CAE (score P3 first examination period)
P5: NPE - revised report CAE

C1 = 20%
C2 = 20%
C3 = 30%
C4 = 15%
C5 = 15%

In order to pass for the course a score of at least 6/20 must be achieved for both CAE applications (scores P1+P2) and CAE (scores P3+P4+P5). If this condition is not met, a deviation from the calculated score (if 10 or more) will be made and the score will be lowered to 9/20.

Facilities for Working Students

Self-study is possible if all proposed deadlines are met.