

## Advanced CAD (E620036)

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

Credits	6.0	Study time	180 h	Contact hrs	60.0 h
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Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	Dutch	seminar: practical PC room classes	36.0 h
		lecture	24.0 h

Lecturers in academic year 2018-2019

Rysman, Olivier	TW18	lecturer-in-charge
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Offered in the following programmes in 2018-2019

	crdts	offering
<a href="#">Bachelor of Science in Industrial Design Engineering Technology</a>	6	A
<a href="#">Linking Course Master of Science in Industrial Design Engineering Technology</a>	6	A
<a href="#">Preparatory Course Master of Science in Industrial Design Engineering Technology</a>	6	A

Teaching languages

Dutch

Keywords

CAD, solid parametric modelling, surface modelling

Position of the course

Contents

### Theoretical part

- Flexlm license servers for CAD-software
- degrees of freedom for lines and arcs - geometrical constraints - dimensions
- Standard for CAD - Data Transfer
- Techniques for geometry modelling: CSG, BREP
- Introduction and history of surface modelling
- Bézier and general considerations on multivariable non-linear curves, Cubic Splines, B-splines and NURBS, extension towards surfaces
- Quality-analysis of NURBS geometry: curvature of surfaces and curves - CURVATURE COMB - CURVATURE CIRCLE - ZEBRA analysis - GAUSSIAN, MEAN, MIN RADIUS, MAX RADIUS - G0, G1 en G2 CONTINUITY - demo in Shape Studio

### Excercise part

non-freeform parts:

- Parametric modelling in Siemens NX
  - Parametrisation of a wheel hub (the truth behind fully constrained)
  - setup of a parametric part - interpart parameters within an assembly
- Additional exercises on datum features
- advanced round: exercises on complex edges
- shell-function: exercise on a shell with special ribs
- overview of different sweep/swept options in NX
- exploded views
- Draft-feature + Draft analysis: Molded part validation
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Basic surface modelling:

- introduction to synchronous modelling - history free modelling
- introduction to Shape studio:

- surface creation
- trimming
- projection of curves
- sew: create solid topology
- Hair dryer exercise:
  - Insert image planes
  - curve curvature comb
  - construction planes
  - studio surface
  - surface fillet
  - zebra analysis
- Exercises on alignment of curves and surfaces: setup continuity in NX Shape Studio
- Continuity tolerancing: distance tolerance/angle tolerance + application of Rebuild
- Final assignment: creating of a freeform CAD model

#### Initial competences

- Having followed ontwerptools 1, ingenieursproject and ontwerptools 2 at UGent Campus Kortrijk

When student does not comply with the above:

- Be able to construct fully-constrained 3D mechanical CAD models in Siemens NX
- Be able to construct models and structures within an assembly
- Can produce a technical drawing according to NBN/ISO standards
- Student will learn interface and base functions 3D modelling/assembly modelling/drafting in Siemens NX on individual base

#### Final competences

- 1 Be able to create both mechanical and freeform models in CAD
- 2 insight in the topology of virtual models and in the construction method of the digital CAD model
- 3 be able to work in a multi-user/multi-program CAD environment
- 4 Connect the shape to constructive aspects
- 5 Step-up to designing in virtual reality
- 6 Translate ideas to styled products

#### 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, seminar: practical PC room classes

#### Learning materials and price

- course notes Advanced CAD - O. Rysman (11,15€) delivered by course notes service.
- Siemens NX (free)
- Personal laptop with dedicated graphics card is obligatory

#### References

- NX for designers: S. Tickoo / Schererville : Cadcam Technologies, 2010
- CAD/CAM: Principles, Practice and Manufacturing Management- McMahon/Browne / Harlow : Addison-Wesley, 1993

#### Course content-related study coaching

- continuous feedback during the practical sessions
- mentoring before the exams, including sample exam questions

#### Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, skills test

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

Written examination, skills test

#### Examination methods in case of permanent evaluation

Assignment

#### Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

#### Extra information on the examination methods

Theoretical Part: 2 SP - 33% of end total as exam. Possibility to retake in 2nd exam period

Exercise Part: 4SP - 17% of end total as permanent evaluation (not possible to retake in 2nd exam period) + 50% of end total as exam ( Possibility to retake in 2nd exam period)

#### Calculation of the examination mark

In order to succeed for the course, one has to reach a score of at least 8/20 for both the theoretical and the practical part. In the case of failing for these prerequisites and the grand total of the course is higher then 10/20 the student will receive a 9/20 quotation.