Advanced Computer Aided Design, PPU080

7.5 Higher education credits

Course Outline for the Academic Year 2025/2026

1. Background

Today most companies use CAD-systems to develop the geometry of their products. Also PLM-systems are more and more commonly used to handle all kinds of data related to the product. Another area of geometry development where IT-tools are starting to become more commonly used is geometry assurance.

2. Course Objective

After completion of this course, the student should be able to

- Evaluate the need for and potential of using IT support for the product development process
- Create parameterized, rule-based solid models of parts and assemblies
- Create advanced surface models
- Describe the functionality of CAD and CAT systems
- Describe fundamental mathematical and computer science methods used in CAD systems
- Describe fundamental mathematical methods used in modern CAT systems
- Use CAD, CAT and PDM systems as tools in integrated product development processes
- Describe important trends in the area of IT support for geometry development
- Independently obtain knowledge about how to solve engineering tasks
- Instigate designing specific to manufacturing processes
- Practically implement and learn the design guidelines using CAD tools

3. Course Organization and Contents

The course consists of lectures and project work.

Lectures

The lectures will cover various aspects of the geometry development process and its IT support. The emphasis will be put on theories and support for geometry modelling and geometry assurance. Also product data management will be covered to some extent.
Lectures will be held Tuesdays 13.15-15.00 and Thursdays 13.15-15.00, see Timetable below for details.

Project Work

The project work is a large part of the course where the student will train their skills on using CAD and CAT (Computer Aided Tolerancing) software for geometry development, see separate PM.

Supervised classes (most weeks, see TimeEdit for details):

- Tuesday 15.15-17.00 in MT11, MT12 and MT13,
- Thursday 15.15-17.00 in MT11, MT12 and MT13
- Friday 13.15-15.00 in MT11, MT12 and MT13.

The mandatory parts of the project shall be done in groups of two. Registration of the groups will be done in Canvas.
The project will require a lot of time. The working hours for this course are at least 20 hours per week, i.e., you will have to work outside the scheduled classes.

Course Literature

- CATIA BASIC TRAINING, downloadable from Canvas (Part 1-3)
- CATIA SURFACE TRAINING, downloadable from Canvas
- Lecture Slides, downloadable from Canvas
- RD&T training material, downloadable from Canvas

4. Examination

The course grade will be based on the project work (50%) and a written exam (50%). Grades for the course are based on the Chalmers system (not approved, 3, 4 or 5).

To receive a passing grade in the course, the student must write and pass the final exam as well as the mandatory parts of the project work.

The mandatory parts of the project work will give a grade of 3.0 on the project part. In order to receive a higher grade on the project part, extra assignments have to be made and approved. See the project PM for details.

The final grade of the course is the combination of the grade for the written exam (50%) and the grade for the project (50%).

Example 1: 42 points on the exam gives grade 5.2, this together with a project grade 4.3 gives a total grade of (5.2+4.3)/2 = 4.75 which is rounded downwards to the final grade 4.

Example 2: 20 points on the exam gives grade 3.0, this together with a project grade 5.3 gives a total grade of (3.0+5.3)/2 = 4.15 which is rounded downwards to the final grade 4.

5. Teachers

Examiner and Lecturer

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6. Preliminary Timetable for Lectures

Date	Time	Activity	Lecturer
2/9	13.15-15.00	Course Introduction Introduction to CATIA V5	Lars Lindkvist
4/9	13.15-15.00	Geometry Modeling 1 Geometry Assurance 1	Lars Lindkvist
9/9	13.15-15.00	**Workshop: Advanced Surfaces** **Bring your laptop!**	Diogo and Elham
11/9	13.15-15.00	Introduction to the CAT Software RD&T **Workshop Geometry Assurance**	Lars Lindkvist Roham
16/9	13.15-15.00	Presentation of the Project Work Geometry Modelling 2 Geometry Assurance 2 Design for manufacturing	Lars Lindkvist
18/9	13.15-15.00	Computer Graphics Analysis Tools Parametric Design	Lars Lindkvist
23/9	13.15-15.00	Virtual Reality	Lars Lindkvist
25/9	13.15-15.00	Extra (if needed)	Lars Lindkvist
	Recorded	Product Lifecycle Management (PLM)	Dag Bergsjö
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7. Timetable for the Project Work

- Weeks 36 and 37: CATIA V5 and RD&T training.
- **NOTE!** You shall upload one Catia and one RD&T exercise in Canvas on September 15
    - Catia: Drill exercise
    - RD&T: Exercise 3
- Weeks 38 to 43: Project work

8. Written Exam

2025-10-30, 8.30-12.30

9. Course Objective Matrix

Learning Outcome After completion of this course, the student should be able to:	**Activity**	**Examination**
Evaluate the need for and potential of using IT support for the product development process	Lecture	Written exam
Create parametrized, rule-based solid models of parts and assemblies	Project (Lecture)	Project
Create advanced surface models	Project (Lecture)	Project
Describe the functionality of CAD and CAT systems	Lecture	Written exam
Describe fundamental mathematical and computer science methods used in CAD systems	Lecture	Written exam
Describe fundamental mathematical methods used in modern CAT systems	Lecture	Written exam
Use CAD, CAT and PDM systems as tools in integrated product development processes	Project Lecture	Project
Describe important trends in the area of IT support for geometry development	Lecture	Written exam
Independently obtain knowledge about how to solve engineering tasks	Project	Project
Instigate designing specific to manufacturing processes	Lecture	Written exam
Practically implement and learn the design guidelines using CAD tools	Project	Project

10. Changes since last year

- Only minor modifications