



**LUNDS UNIVERSITET**  
Lunds Tekniska Högskola

*Course syllabus*

## **Ytmodellering, rendering och 3D Surface Modelling, Rendering and 3D**

**MMKF25, 7,5 credits, G2 (First Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED M

**Date of Decision:** 2023-04-11

### **General Information**

**Elective for:** M4-pu

**Language of instruction:** The course will be given in English on demand

### **Aim**

The aim for this course is to give the basic insights into the use of advanced computer aided tools for 3D product modelling. From a product idea a computerized model is made (product modelling) of a physical object by surface modeling, 3D scanning and printing. Product simulation gives an insight to the use of real time simulation (Virtual Reality, VR). The created product models give possibilities to simulate the relations between man, product and environment.

### **Learning outcomes**

*Knowledge and understanding*

For a passing grade the student must

- be able to choose an appropriate procedure for 3D surface modelling.
- be able to create computer generated 3D surface models of limited product complexity.
- be able to generate a digital 3D model from a 3D scanning of a product.
- be able to generate necessary data for Rapid Prototyping from a given digital product model.
- be able to generate a suitable real time simulation model from given product data (digital product model).

*Competences and skills*

For a passing grade the student must

- be able to independently create a simple digital 3D product model from a given object with help of a surface modelling program and a rendering program.
- be able to independently generate a data file from a given computerized 3D product model for Rapid Prototyping.
- be able to scan and print in 3D/reverse engineering.
- model and visualize an additional advanced product.

#### *Judgement and approach*

For a passing grade the student must

- be able to evaluate the required qualities of 3D model relevant for product development.
- evaluate 3D model quality in relation to industrial resources.
- assess which methods that are best suited for reverse engineering and 3D printing.

## **Contents**

The course includes parts of 3D product modelling by surface modelling, scanning, product simulation, modelling and Rapid Prototyping in 3D.

The computerized surface modelling (Rhino och Maxwell studio) deals with the following areas:

- Introduction to 3D modelling.
- Interface basics. Primitive objects (spheres, cubes, cylinders). Transformation, mirror and duplicate objects.
- NURBS-curves (CVs, Edit points and Key-points curves).
- Turn curves into different types of NURBS surfaces (skinned, revolved, planar, extruded and swept).
- Edit CV-curves.
- Working with layers and use layer symmetry.
- Trim excess of surfaces.
- Create advanced double bent surfaces.

Other areas are:

- Create STL (Sterio Lithography) file.
- Export model to CAD-program.
- Rendering basics using different types of renders including light setup, shaders and textures.
- Animation basics.

The computerized product simulation deals with the following areas:

- Introduction to Virtual Reality.
- Interface basics.
- Importing 3D objects.

- Associate behaviours with the objects.
- Create interactivity.

The 3D scanning part includes some basic 3D scanning methods; scanning objects and exporting the data to a computer program.

Rapid Prototyping part includes creating a 3D print from a computerized product model to a physical object.

## **Examination details**

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** The examination will be made individually based on passed tutorials and tasks. The 3D scanning and printing is accomplished by a compulsory practice.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

## **Admission**

**Assumed prior knowledge:** MMK010/MMKA15 Manual and Computer Aided drafting in Mechanical Engineering.

**The number of participants is limited to:** No

**The course overlaps following course/s:** MMKF20

## **Reading list**

- Manuals, documents from the department and tutorials.
- 3D scanning practice document.

## **Contact and other information**

**Course coordinator:** Per Kristav, per.kristav@design.lth.se

**Director of studies:** Elin Olander, elin.olander@design.lth.se

**Course homepage:** <http://www.product.lth.se/education/>