

## Course

# KL - design and 3D-CAD

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### ^ General information

<b>Long name</b>	design and 3D-CAD
<b>Approving CModule</b>	<a href="#">KL_BaET</a> , <a href="#">KL_BaOPT</a>
<b>Responsible</b>	Prof. Dr. Michael Gartz Professor Fakultät: IME
<b>Level</b>	Bachelor
<b>Semester in the year</b>	winter semester
<b>Duration</b>	Semester
<b>Hours in self-study</b>	60
<b>ECTS</b>	5
<b>Professors</b>	Prof. Dr. Michael Gartz Professor Fakultät: IME
<b>Requirements</b>	mathematics elementary geometry three-dimensional spatial sense
<b>Language</b>	German
<b>Separate final exam</b>	Yes

## Final exam

### Details

Within the three-part examination the taxonomy ratings like understanding, appliance, analyzing, synthesizing and evaluating are examined.

Within the first part the students have to state their project which they had processed during the term. They have to exemplify the most difficult construction problems and how they have analyzed and solved them. They have to assess the chosen approach.

In the second part of the examination the students will get a freehand sketch, which have to be analyzed and to which they have to create a suitable 3D geometry model using a 3D design program and they have to make the engineering drawing with dimensioning.

In the third part of the examination construction problems have to be analyzed and based on the fundamental terms and on the technique presented in the lecture an appropriate solution has to be stated. The suitability of different construction solutions have to be assessed.

### Minimum standard

50 % of the questions out of all parts of the examination correctly answered  
correct construction and engineering drawing of the component part without any serious errors

### Exam Type

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## ^ Lecture / Exercises

### Learning goals

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#### Knowledge

basic skills of technical drawing  
composition of the engineering detail drawing  
drawing formats  
labelling field and list of parts  
arrangement of the views  
line types and line strength  
technical views  
engineering standards  
dimensioning  
normal dimensioning  
coordinate dimensioning  
sectional view  
representation of a thread  
surface specifications  
tolerances  
fitting  
position tolerances and form tolerances  
suitable for production construction and dimensioning

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Three-dimensional construction  
Introduction to a 3D CAD program  
sketching  
basics  
sketching tools  
Project geometries  
work elements  
work points  
working axes

- work levels
- 3D elements
- extrusion
- rotation
- bores
- thread
- roundings
- subassemblies
- place components
- create components in assemblies
- replace components in assemblies
- create dependencies
- editing components in assemblies
- detailed drawings
- derive detail drawing from 3D component
- create Views
- dimension

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- construction elements in particular precision mechanics
- free from distortion lens holder
- scatter-resistant components
- beam drops

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#### Materials and material science

- ferrous alloy
- non-ferrous metals
- synthetic materials
- special materials
- glassware
- ceramics
- surface refinement
- varnishing
- anodizing
- coating
- burnishing

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#### manufacturing method

- turning
- milling
- drilling
- grinding

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#### analysis of strain and mechanical strength

- fundamentals
- applications

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### **Skills**

- to calculate
- the mechanical strength
- the raw material consumption
- the material costs

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to define  
tolerances  
dimensions

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to determine  
path of rays  
the material  
the manufacturing method

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to assess  
surface quality  
dimensional accuracy  
feasibility of the construction

## Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	1
Exercises (shared course)	0
Tutorial (voluntary)	0

## Separate exam

none

## ^ Project

### Learning goals

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#### Skills

technical drawing

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Create a 3D geometric model using a CAD program

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Checking and evaluating the design in production-orientated manner

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Check and evaluate strength simulation for plausibility

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## Recognizing and understanding interrelationships

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analyse a constructive task  
analyze Independently recognized constructive tasks  
Analyze the given constructive tasks

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design a solution approach for the constructive task  
Consideration of construction possibilities / resources  
Consideration of the available time quota

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Presentation of a project outline  
Describe the task  
outline the approach

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Milestone presentation to check the progress of the project  
Describe the task  
outline the approach  
Present results in a clearly structured way  
Discuss technical and scientific results

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Final presentation with presentation of the realized solution approach  
Describe the task  
outline the approach  
Present results in a clearly structured way  
Discuss technical and scientific results

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optional: realize basic optical structures yourself  
build  
adjust  
Carry out function test

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apply scientific / technical laws  
Calculating and drawing beam paths  
Estimate error influences  
Check the suitability of the construction, check the composition

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Work on complex technical tasks in a team  
Organize into subtasks  
Discuss measurement results  
complement each other meaningfully

## Expenditure classroom teaching

Type	Attendance (h/Wk.)
Project	2
Tutorial (voluntary)	0

## Separate exam

none