Technology
Arts Sciences
TH Köln

Course
KL - design and 3D-CAD

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General information

Long name	design and 3D-CAD
Approving CModule	KL_BaET, KL_BaOPT
Responsible	Prof. Dr. Michael Gartz Professor Fakultät IME
Level	Bachelor
Semester in the year	winter semester
Duration	Semester
Hours in self-study	60
ECTS	5
Professors	Prof. Dr. Michael Gartz Professor Fakultät IME
Requirements	mathematics elementary geometry three-dimensional spatial sense
Language	German
Separate final exam	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. The 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 und 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

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 constructiong and dimensioning

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

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

Skills

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

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to define
tolerances
dimensions

---

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

Skills

technical drawing

Create a 3D geometric model using a CAD program

Checking and evaluating the design in production-orientated manner

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Check and evaluate strength simulation for plausibility

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

Presentation of a project outline
Describe the task
outline the approach

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

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