

## Course

# LCSS - Large and Cloud-based Software-Systems

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### ^ General information

<b>Long name</b>	Large and Cloud-based Software-Systems
<b>Approving CModule</b>	<a href="#">LCSS MaTIN</a>
<b>Responsible</b>	Prof. Dr. René Würzberger Professor Fakultät IME
<b>Organisation and materials</b>	<a href="#">llu course</a>
<b>Level</b>	Master
<b>Semester in the year</b>	summer semester
<b>Duration</b>	Semester
<b>Hours in self-study</b>	78
<b>ECTS</b>	5
<b>Professors</b>	Prof. Dr. René Würzberger Professor Fakultät IME
<b>Requirements</b>	<ul style="list-style-type: none"><li>• advanced programming skills</li><li>• basic knowledge of web technologies</li><li>• basic knowledge of databases</li><li>• basic knowledge in software architectures</li><li>• basic knowledge of Unified Modeling Language (UML)</li></ul>
<b>Language</b>	English

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## Overview video



## Final exam

### Details

The final examination is either written or oral. Students must demonstrate that they can apply the knowledge and skills of the course.

### Minimum standard

50% of all achievable points

### Exam Type

The final examination is either written or oral. Students must demonstrate that they can apply the knowledge and skills of the course.

## ^ Lecture / Exercises

## Learning goals

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### Knowledge

Basic concepts of large distributed systems

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Quality attributes and their interdependencies

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Formulate and analyze requirements for response times, throughput and utilization of a system

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Analyze and formulate requirements for the reliability of a system

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Basic concepts of maintainability of a system

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Basic concepts of the security of a system

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System design goals, requirements, principles and patterns

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Decomposition patterns

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Trading the advantages and disadvantages of monolithic architectures against architectures of distributed systems (microservices)

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Patterns for scaling systems

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Communication patterns in distributed systems

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Modeling of large systems from different viewpoints with the Unified Modeling Language (UML)

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Common infrastructure and middleware components in large systems

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Principles and terms of cloud computing

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Virtualization and container technologies

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Application layer protocol, especially HTTP and related technologies and standards such as REST, OpenAPI, GraphQL, gRPC, WebSockets, Server-sent events.

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Web security protocols such as TLS, OAuth, OpenID Connect

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Messaging and streaming

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Database systems, their data models, scaling and consistency models

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Distributed database transaction programming

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## Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	1

## Separate exam

none

## ^ Practical training

### Learning goals

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#### Skills

Be able to formulate and present a research question in the topic area of the course.

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Design an application prototype that serves to investigate the research question.

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Develop the application prototype and run it in the cloud

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Design and conduct test scenarios and experiments with the application prototype to answer the research question.

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Consolidate results into one report according to an IEEE template

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Work collaboratively in a team of about four people

### Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	1

### Separate exam

#### Exam Type

working on projects assignment with your team e.g. in a lab)

#### Details

The lab consists of several milestones and attendance dates, in which the research question, the design of the prototype, a mutual review, the presentation and documentation of the final results must be submitted or presented.

The performance in the lab will be 50% of the final grade.

#### Minimum standard

A qualitatively and quantitatively sufficient contribution of each team member must be evident in the presentations and deliveries.