# Subdivided Module Catalogue
## for the Module studies (Master)

# Computer Science

Examination regulations version: 2019
Responsible: Faculty of Mathematics and Computer Science
Responsible: Institute of Computer Science

# Abbreviations used

Course types: **E** = field trip, **K** = colloquium, **O** = conversatorium, **P** = placement/lab course, **R** = project, **S** = seminar, **T** = tutorial, **Ü** = exercise, **V** = lecture

Term: **SS** = summer semester, **WS** = winter semester

Methods of grading: **NUM** = numerical grade, **B/NB** = (not) successfully completed

Regulations: **(L)ASPO** = general academic and examination regulations (for teaching-degree programmes), **FSB** = subject-specific provisions, **SFB** = list of modules

Other: **A** = thesis, **LV** = course(s), **PL** = assessment(s), **TN** = participants, **VL** = prerequisite(s)

# Conventions

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

# Notes

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.

Should the module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

# In accordance with

the general regulations governing the degree subject described in this module catalogue:

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

> **15-May-2019 (2019-36)**
>
> **27-Jun-2019 (2019-41)**
>
> **14-Nov-2019 (2019-52)**
>
> **22-Jan-2020 (2020-13)**
>
> **06-May-2020 (2020-39)**
>
> **22-Jul-2020 (2020-57)**
>
> **17-Dec-2020 (2020-110)**
>
> **10-Mar-2021 (2021-17)**

**09-Jun-2021 (2021-58)**

**22-Dec-2021 (2021-85)**

**05-Jul-2022 (2022-52)**

**31-Jan-2023 (2022-86)**

**15-Jun-2023 (2023-58)**

**13-Dec-2023 (2023-107)**

**07-Aug-2024 (2024-82)**

**22-Jan-2025 (2025-1)**

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.

# The subject is divided into

| Abbreviation | Module title | | Method of grading | page |
|---|---|---|---|---|
| **Summer Term 2019** | | | | |
| 10-I=3D-161-m01 | 3D Point Cloud Processing | 5 | NUM | 12 |
| 10-I=AA-152-m01 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-m01 | Computational Geometry | 5 | NUM | 16 |
| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-161-m01 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-m01 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-m01 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-m01 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-161-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 29 |
| 10-I=AKIT-161-m01 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
| 10-I=AKITS-172-m01 | Selected Topics in IT Security | 5 | NUM | 34 |
| 10-I=AKLR-161-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKT-161-m01 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=AGE-191-m01 | Selected Topics of Games Engineering | 5 | NUM | 18 |
| 10-I=AKSE-161-m01 | Selected Topics in Software Engineering | 5 | NUM | 40 |
| 10-I=LVS-161-m01 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-182-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 47 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-161-m01 | Practical course - Current Topics in Computer Science | 10 | B/NB | 50 |
| 10-I=SEM3-161-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 54 |
| 10-I=SEM4-161-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 57 |
| 10-I=SSS-172-m01 | Security of Software Systems | 5 | NUM | 60 |
| 10-I=ST-161-m01 | Discrete Event Simulation | 8 | NUM | 63 |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |
| **Winter Term 2019** | | | | |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |
| 10-I=3D-161-m01 | 3D Point Cloud Processing | 5 | NUM | 12 |
| 10-I=AA-152-m01 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-m01 | Computational Geometry | 5 | NUM | 16 |
| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-161-m01 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-m01 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-m01 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-m01 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-161-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 29 |
| 10-I=AKIT-161-m01 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
| 10-I=AKITS-172-m01 | Selected Topics in IT Security | 5 | NUM | 34 |
| 10-I=AKLR-161-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKT-161-m01 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=AGE-191-m01 | Selected Topics of Games Engineering | 5 | NUM | 18 |

| 10-I=AKSE-161-m01 | Selected Topics in Software Engineering | 5 | NUM | 40 |
|---|---|---|---|---|
| 10-I=LVS-161-m01 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-182-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 47 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-161-m01 | Practical course - Current Topics in Computer Science | 10 | B/NB | 50 |
| 10-I=SEM3-161-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 54 |
| 10-I=SEM4-161-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 57 |
| 10-I=SSS-172-m01 | Security of Software Systems | 5 | NUM | 60 |
| 10-I=ST-161-m01 | Discrete Event Simulation | 8 | NUM | 63 |
| **Summer Term 2020** | | | | |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |
| 10-I=3D-161-m01 | 3D Point Cloud Processing | 5 | NUM | 12 |
| 10-I=AA-152-m01 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-m01 | Computational Geometry | 5 | NUM | 16 |
| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-161-m01 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-m01 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-m01 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-m01 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-161-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 29 |
| 10-I=AKIT-161-m01 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
| 10-I=AKITS-172-m01 | Selected Topics in IT Security | 5 | NUM | 34 |
| 10-I=AKLR-161-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKT-161-m01 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=AGE-191-m01 | Selected Topics of Games Engineering | 5 | NUM | 18 |
| 10-I=AKSE-161-m01 | Selected Topics in Software Engineering | 5 | NUM | 40 |
| 10-I=LVS-161-m01 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-182-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 47 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-161-m01 | Practical course - Current Topics in Computer Science | 10 | B/NB | 50 |
| 10-I=SEM3-161-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 54 |
| 10-I=SEM4-161-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 57 |
| 10-I=SSS-172-m01 | Security of Software Systems | 5 | NUM | 60 |
| 10-I=ST-161-m01 | Discrete Event Simulation | 8 | NUM | 63 |
| **Winter Term 2020** | | | | |
| 10-I=3D-161-m01 | 3D Point Cloud Processing | 5 | NUM | 12 |
| 10-I=AA-152-m01 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-m01 | Computational Geometry | 5 | NUM | 16 |
| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-161-m01 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-m01 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-m01 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-m01 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-161-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 29 |

| 10-I=AKIT-161-m01 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
|---|---|---|---|---|
| 10-I=AKITS-172-m01 | Selected Topics in IT Security | 5 | NUM | 34 |
| 10-I=AKLR-161-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKT-161-m01 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=AGE-191-m01 | Selected Topics of Games Engineering | 5 | NUM | 18 |
| 10-I=AKSE-161-m01 | Selected Topics in Software Engineering | 5 | NUM | 40 |
| 10-I=LVS-161-m01 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-182-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 47 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-161-m01 | Practical course - Current Topics in Computer Science | 10 | B/NB | 50 |
| 10-I=SEM3-161-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 54 |
| 10-I=SEM4-161-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 57 |
| 10-I=SSS-172-m01 | Security of Software Systems | 5 | NUM | 60 |
| 10-I=ST-161-m01 | Discrete Event Simulation | 8 | NUM | 63 |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |
| **Summer Term 2021** | | | | |
| 10-I=3D-161-m01 | 3D Point Cloud Processing | 5 | NUM | 12 |
| 10-I=AA-152-m01 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-m01 | Computational Geometry | 5 | NUM | 16 |
| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-161-m01 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-m01 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-m01 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-m01 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-161-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 29 |
| 10-I=AKIT-161-m01 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
| 10-I=AKITS-172-m01 | Selected Topics in IT Security | 5 | NUM | 34 |
| 10-I=AKLR-161-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKT-161-m01 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=AGE-191-m01 | Selected Topics of Games Engineering | 5 | NUM | 18 |
| 10-I=AKSE-161-m01 | Selected Topics in Software Engineering | 5 | NUM | 40 |
| 10-I=LVS-161-m01 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-182-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 47 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-161-m01 | Practical course - Current Topics in Computer Science | 10 | B/NB | 50 |
| 10-I=SEM3-161-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 54 |
| 10-I=SEM4-161-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 57 |
| 10-I=SSS-172-m01 | Security of Software Systems | 5 | NUM | 60 |
| 10-I=ST-161-m01 | Discrete Event Simulation | 8 | NUM | 63 |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |
| **Winter Term 2021** | | | | |
| 10-I=3D-212-m01 | 3D Point Cloud Processing | 5 | NUM | 13 |
| 10-I=AA-152-m01 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-m01 | Computational Geometry | 5 | NUM | 16 |

| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
|---|---|---|---|---|
| 10-I=AKA-161-m01 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-m01 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-m01 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-m01 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-212-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 30 |
| 10-I=AKIT-161-m01 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
| 10-I=AKITS-212-m01 | Selected Topics in IT Security | 5 | NUM | 35 |
| 10-I=AKLR-161-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKT-161-m01 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=AGE-191-m01 | Selected Topics of Games Engineering | 5 | NUM | 18 |
| 10-I=AKSE-161-m01 | Selected Topics in Software Engineering | 5 | NUM | 40 |
| 10-I=LVS-161-m01 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-212-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 48 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-212-m01 | Practical Course - Current Topics in Computer Science | 10 | B/NB | 51 |
| 10-I=SEM3-212-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 55 |
| 10-I=SEM4-212-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 58 |
| 10-I=SSS-212-m01 | Security of Software Systems | 5 | NUM | 61 |
| 10-I=ST-212-m01 | Discrete Event Simulation | 8 | NUM | 64 |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |
| **Summer Term 2022** | | | | |
| 10-I=3D-212-m01 | 3D Point Cloud Processing | 5 | NUM | 13 |
| 10-I=AA-152-m01 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-m01 | Computational Geometry | 5 | NUM | 16 |
| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-161-m01 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-m01 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-m01 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-m01 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-212-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 30 |
| 10-I=AKIT-161-m01 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
| 10-I=AKITS-212-m01 | Selected Topics in IT Security | 5 | NUM | 35 |
| 10-I=AKLR-161-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKT-161-m01 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=AGE-191-m01 | Selected Topics of Games Engineering | 5 | NUM | 18 |
| 10-I=AKSE-161-m01 | Selected Topics in Software Engineering | 5 | NUM | 40 |
| 10-I=LVS-161-m01 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-212-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 48 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-212-m01 | Practical Course - Current Topics in Computer Science | 10 | B/NB | 51 |
| 10-I=SEM3-212-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 55 |
| 10-I=SEM4-212-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 58 |
| 10-I=SSS-212-m01 | Security of Software Systems | 5 | NUM | 61 |

| 10-I=ST-212-mo1 | Discrete Event Simulation | 8 | NUM | 64 |
|---|---|---|---|---|
| 10-I=SAR-161-mo1 | Software Architecture | 5 | NUM | 53 |
| **Winter Term 2022** | | | | |
| 10-I=3D-212-mo1 | 3D Point Cloud Processing | 5 | NUM | 13 |
| 10-I=AA-152-mo1 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-mo1 | Computational Geometry | 5 | NUM | 16 |
| 10-I=APA-161-mo1 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-161-mo1 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-mo1 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-mo1 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-mo1 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-212-mo1 | Selected Topics in Intelligent Systems | 5 | NUM | 30 |
| 10-I=AKIT-161-mo1 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
| 10-I=AKITS-212-mo1 | Selected Topics in IT Security | 5 | NUM | 35 |
| 10-I=AKLR-161-mo1 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKT-161-mo1 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=AGE-191-mo1 | Selected Topics of Games Engineering | 5 | NUM | 18 |
| 10-I=AKSE-161-mo1 | Selected Topics in Software Engineering | 5 | NUM | 40 |
| 10-I=LVS-161-mo1 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-212-mo1 | Machine Learning for Natural Language Processing | 5 | NUM | 48 |
| 10-I=PEB-182-mo1 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-212-mo1 | Practical Course - Current Topics in Computer Science | 10 | B/NB | 51 |
| 10-I=SEM3-212-mo1 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 55 |
| 10-I=SEM4-212-mo1 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 58 |
| 10-I=SSS-212-mo1 | Security of Software Systems | 5 | NUM | 61 |
| 10-I=ST-212-mo1 | Discrete Event Simulation | 8 | NUM | 64 |
| 10-I=SAR-161-mo1 | Software Architecture | 5 | NUM | 53 |
| **Summer Term 2023** | | | | |
| 10-I=3D-212-mo1 | 3D Point Cloud Processing | 5 | NUM | 13 |
| 10-I=AA-152-mo1 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-161-mo1 | Computational Geometry | 5 | NUM | 16 |
| 10-I=AGE-191-mo1 | Selected Topics of Games Engineering | 5 | NUM | 18 |
| 10-I=AKA-161-mo1 | Selected Topics in Algorithms | 5 | NUM | 20 |
| 10-I=AKES-161-mo1 | Selected Topics in Embedded Systems | 5 | NUM | 23 |
| 10-I=AKHCI-182-mo1 | Selected Topics in HCI | 5 | NUM | 25 |
| 10-I=AKII-182-mo1 | Selected Topics in Computer Science | 5 | NUM | 27 |
| 10-I=AKIS-212-mo1 | Selected Topics in Intelligent Systems | 5 | NUM | 30 |
| 10-I=AKIT-161-mo1 | Selected Topics in Internet Technologies | 5 | NUM | 32 |
| 10-I=AKITS-212-mo1 | Selected Topics in IT Security | 5 | NUM | 35 |
| 10-I=AKLR-161-mo1 | Selected Topics in Aerospace Engineering | 5 | NUM | 37 |
| 10-I=AKSE-161-mo1 | Selected Topics in Software Engineering | 5 | NUM | 40 |
| 10-I=AKT-161-mo1 | Selected Topics in Theory | 5 | NUM | 42 |
| 10-I=APA-161-mo1 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=LVS-161-mo1 | Performance Evaluation of Distributed Systems | 8 | NUM | 45 |
| 10-I=NLP-212-mo1 | Machine Learning for Natural Language Processing | 5 | NUM | 48 |

| 10-I=PEB-182-mo1 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
|---|---|---|---|---|
| 10-I=PRAK-212-mo1 | Practical Course - Current Topics in Computer Science | 10 | B/NB | 51 |
| 10-I=SAR-161-mo1 | Software Architecture | 5 | NUM | 53 |
| 10-I=SEM3-212-mo1 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 55 |
| 10-I=SEM4-212-mo1 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 58 |
| 10-I=SSS-212-mo1 | Security of Software Systems | 5 | NUM | 61 |
| 10-I=ST-212-mo1 | Discrete Event Simulation | 8 | NUM | 64 |

**Winter Term 2023**

| 10-I=3D-232-mo1 | 3D Point Cloud Processing | 5 | NUM | 14 |
|---|---|---|---|---|
| 10-I=AA-152-mo1 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-232-mo1 | Computational Geometry | 5 | NUM | 17 |
| 10-I=APA-161-mo1 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-232-mo1 | Selected Topics in Algorithms | 5 | NUM | 21 |
| 10-I=AKES-232-mo1 | Selected Topics in Embedded Systems | 5 | NUM | 24 |
| 10-I=AKHCI-232-mo1 | Selected Topics in HCI | 5 | NUM | 26 |
| 10-I=AKII-232-mo1 | Selected Topics in Computer Science | 5 | NUM | 28 |
| 10-I=AKIS-232-mo1 | Selected Topics in Intelligent Systems | 5 | NUM | 31 |
| 10-I=AKIT-232-mo1 | Selected Topics in Internet Technologies | 5 | NUM | 33 |
| 10-I=AKITS-232-mo1 | Selected Topics in IT Security | 5 | NUM | 36 |
| 10-I=AKLR-232-mo1 | Selected Topics in Aerospace Engineering | 5 | NUM | 38 |
| 10-I=AKT-232-mo1 | Selected Topics in Theory | 5 | NUM | 43 |
| 10-I=AGE-232-mo1 | Selected Topics in Games Engineering | 5 | NUM | 19 |
| 10-I=AKSE-232-mo1 | Selected Topics in Software Engineering | 5 | NUM | 41 |
| 10-I=LVS-232-mo1 | Performance Evaluation of Distributed Systems | 5 | NUM | 46 |
| 10-I=NLP-212-mo1 | Machine Learning for Natural Language Processing | 5 | NUM | 48 |
| 10-I=PEB-182-mo1 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-232-mo1 | Practical Course - Current Topics in Computer Science | 10 | B/NB | 52 |
| 10-I=SEM3-232-mo1 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 56 |
| 10-I=SEM4-232-mo1 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 59 |
| 10-I=SSS-232-mo1 | Security of Software Systems | 5 | NUM | 62 |
| 10-I=ST-232-mo1 | Discrete Event Simulation | 5 | NUM | 65 |
| 10-I=SAR-161-mo1 | Software Architecture | 5 | NUM | 53 |

**Summer Term 2024**

| 10-I=3D-232-mo1 | 3D Point Cloud Processing | 5 | NUM | 14 |
|---|---|---|---|---|
| 10-I=AA-152-mo1 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-232-mo1 | Computational Geometry | 5 | NUM | 17 |
| 10-I=APA-161-mo1 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-232-mo1 | Selected Topics in Algorithms | 5 | NUM | 21 |
| 10-I=AKES-232-mo1 | Selected Topics in Embedded Systems | 5 | NUM | 24 |
| 10-I=AKHCI-232-mo1 | Selected Topics in HCI | 5 | NUM | 26 |
| 10-I=AKII-232-mo1 | Selected Topics in Computer Science | 5 | NUM | 28 |
| 10-I=AKIS-232-mo1 | Selected Topics in Intelligent Systems | 5 | NUM | 31 |
| 10-I=AKIT-232-mo1 | Selected Topics in Internet Technologies | 5 | NUM | 33 |
| 10-I=AKITS-232-mo1 | Selected Topics in IT Security | 5 | NUM | 36 |

| 10-I=AKLR-232-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 38 |
|---|---|---|---|---|
| 10-I=AKT-232-m01 | Selected Topics in Theory | 5 | NUM | 43 |
| 10-I=AGE-232-m01 | Selected Topics in Games Engineering | 5 | NUM | 19 |
| 10-I=AKSE-232-m01 | Selected Topics in Software Engineering | 5 | NUM | 41 |
| 10-I=LVS-232-m01 | Performance Evaluation of Distributed Systems | 5 | NUM | 46 |
| 10-I=NLP-212-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 48 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-232-m01 | Practical Course - Current Topics in Computer Science | 10 | B/NB | 52 |
| 10-I=SEM3-232-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 56 |
| 10-I=SEM4-232-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 59 |
| 10-I=SSS-232-m01 | Security of Software Systems | 5 | NUM | 62 |
| 10-I=ST-232-m01 | Discrete Event Simulation | 5 | NUM | 65 |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |
| **Winter Term 2024** | | | | |
| 10-I=3D-232-m01 | 3D Point Cloud Processing | 5 | NUM | 14 |
| 10-I=AG-232-m01 | Computational Geometry | 5 | NUM | 17 |
| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
| 10-I=AKA-232-m01 | Selected Topics in Algorithms | 5 | NUM | 21 |
| 10-I=AKES-232-m01 | Selected Topics in Embedded Systems | 5 | NUM | 24 |
| 10-I=AKHCI-232-m01 | Selected Topics in HCI | 5 | NUM | 26 |
| 10-I=AKII-232-m01 | Selected Topics in Computer Science | 5 | NUM | 28 |
| 10-I=AKIS-232-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 31 |
| 10-I=AKIT-232-m01 | Selected Topics in Internet Technologies | 5 | NUM | 33 |
| 10-I=AKITS-232-m01 | Selected Topics in IT Security | 5 | NUM | 36 |
| 10-I=AKLR-232-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 38 |
| 10-I=AKNA-232-m01 | Selected Topics in Computer Science and Sustainability | 5 | NUM | 39 |
| 10-I=AKT-232-m01 | Selected Topics in Theory | 5 | NUM | 43 |
| 10-I=AKDS-232-m01 | Selected Topics in Data Science | 5 | NUM | 22 |
| 10-I=AGE-232-m01 | Selected Topics in Games Engineering | 5 | NUM | 19 |
| 10-I=AKSE-232-m01 | Selected Topics in Software Engineering | 5 | NUM | 41 |
| 10-LURI=AMS-232-m01 | Autonomous Mobile Systems | 10 | NUM | 66 |
| 10-I=LVS-232-m01 | Performance Evaluation of Distributed Systems | 5 | NUM | 46 |
| 10-I=NLP-212-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 48 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-232-m01 | Practical Course - Current Topics in Computer Science | 10 | B/NB | 52 |
| 10-I=SEM3-232-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 56 |
| 10-I=SEM4-232-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 59 |
| 10-I=SSS-232-m01 | Security of Software Systems | 5 | NUM | 62 |
| 10-I=ST-232-m01 | Discrete Event Simulation | 5 | NUM | 65 |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |
| **Summer Term 2025** | | | | |
| 10-I=3D-232-m01 | 3D Point Cloud Processing | 5 | NUM | 14 |
| 10-I=AA-152-m01 | Advanced Automation | 8 | NUM | 15 |
| 10-I=AG-232-m01 | Computational Geometry | 5 | NUM | 17 |

| 10-I=APA-161-m01 | Approximation Algorithms | 5 | NUM | 44 |
|---|---|---|---|---|
| 10-I=AKA-232-m01 | Selected Topics in Algorithms | 5 | NUM | 21 |
| 10-I=AKES-232-m01 | Selected Topics in Embedded Systems | 5 | NUM | 24 |
| 10-I=AKHCI-232-m01 | Selected Topics in HCI | 5 | NUM | 26 |
| 10-I=AKII-232-m01 | Selected Topics in Computer Science | 5 | NUM | 28 |
| 10-I=AKIS-232-m01 | Selected Topics in Intelligent Systems | 5 | NUM | 31 |
| 10-I=AKIT-232-m01 | Selected Topics in Internet Technologies | 5 | NUM | 33 |
| 10-I=AKITS-232-m01 | Selected Topics in IT Security | 5 | NUM | 36 |
| 10-I=AKLR-232-m01 | Selected Topics in Aerospace Engineering | 5 | NUM | 38 |
| 10-I=AKT-232-m01 | Selected Topics in Theory | 5 | NUM | 43 |
| 10-I=AGE-232-m01 | Selected Topics in Games Engineering | 5 | NUM | 19 |
| 10-I=AKSE-232-m01 | Selected Topics in Software Engineering | 5 | NUM | 41 |
| 10-I=LVS-232-m01 | Performance Evaluation of Distributed Systems | 5 | NUM | 46 |
| 10-I=NLP-212-m01 | Machine Learning for Natural Language Processing | 5 | NUM | 48 |
| 10-I=PEB-182-m01 | Performance Engineering and Benchmarking of Computer Systems | 5 | NUM | 49 |
| 10-I=PRAK-232-m01 | Practical Course - Current Topics in Computer Science | 10 | B/NB | 52 |
| 10-I=SEM3-232-m01 | Seminar 1 - Current Topics in Computer Science | 5 | NUM | 56 |
| 10-I=SEM4-232-m01 | Seminar 2 - Current Topics in Computer Science | 5 | NUM | 59 |
| 10-I=SSS-232-m01 | Security of Software Systems | 5 | NUM | 62 |
| 10-I=ST-232-m01 | Discrete Event Simulation | 5 | NUM | 65 |
| 10-I=SAR-161-m01 | Software Architecture | 5 | NUM | 53 |

| Module title | Abbreviation |
|---|---|
| **3D Point Cloud Processing** | 10-I=3D-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science XVII | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Laser scanning, Kinect and camera models, basic data structures (lists, arrays, oc-trees), calculating normals, k-d trees, registration, features, segmentation, tracking, applications for airborne mapping, applications to mobile mapping.

**Intended learning outcomes**

Students understand the fundamental principles of all aspects of 3D point cloud processing and are able to communicate with engineers / surveyors / CV people / etc. Students are able to solve problems of modern sensor data processing and have experienced that real application scenarios are challenging in terms of computational requirements, in terms of memory requirements and in terms of implementation issues.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Separate written examination for Master's students.
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IS,LR,HCI,GE

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **3D Point Cloud Processing** | 10-I=3D-212-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science XVII | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Laser scanning, Kinect and camera models, basic data structures (lists, arrays, oc-trees), calculating normals, k-d trees, registration, features, segmentation, tracking, applications for airborne mapping, applications to mobile mapping.

**Intended learning outcomes**

Students understand the fundamental principles of all aspects of 3D point cloud processing and are able to communicate with engineers / surveyors / CV people / etc. Students are able to solve problems of modern sensor data processing and have experienced that real application scenarios are challenging in terms of computational requirements, in terms of memory requirements and in terms of implementation issues.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
Separate written examination for Master's students
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): KI,L-R,HCI,GE

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **3D Point Cloud Processing** | 10-I=3D-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science XVII | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 5 | numerical grade | -- | |

| Duration | Module level | Other prerequisites | |
|---|---|---|---|
| 1 semester | graduate | -- | |

**Contents**

Laser scanning, Kinect and camera models, basic data structures (lists, arrays, oc-trees), calculating normals, k-d trees, registration, features, segmentation, tracking, applications for airborne mapping, applications to mobile mapping.

**Intended learning outcomes**

Students understand the fundamental principles of all aspects of 3D point cloud processing and are able to communicate with engineers / surveyors / CV people / etc. Students are able to solve problems of modern sensor data processing and have experienced that real application scenarios are challenging in terms of computational requirements, in terms of memory requirements and in terms of implementation issues.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): KI,L-R,HCI,GE

**Workload**

150 h

**Teaching cycle**

Teaching cycle: if announced

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | | | Abbreviation |
| --- | --- | --- | --- |
| **Advanced Automation** | | | 10-I=AA-152-m01 |

| Module coordinator | | Module offered by | |
| --- | --- | --- | --- |
| holder of the Chair of Computer Science VII | | Institute of Computer Science | |

| ECTS | Method of grading | | Only after succ. compl. of module(s) |
| --- | --- | --- | --- |
| 8 | numerical grade | | -- |

| Duration | Module level | Other prerequisites |
| --- | --- | --- |
| 1 semester | graduate | -- |

**Contents**

Advanced topics in automation systems as well as instrumentation and control engineering, for example from the field of sensor data processing, actuators, cooperating systems, mission and trajectory planning.

**Intended learning outcomes**

The students have an advanced knowledge of selected topics in automation systems. They are able to implement advanced automation systems.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (4) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IT,IS,ES,LR,GE

**Workload**

240 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Computational Geometry** | 10-I=AG-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science I | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 5 | numerical grade | -- | |

| Duration | Module level | Other prerequisites | |
|---|---|---|---|
| 1 semester | graduate | -- | |

**Contents**

In many areas of computer science -- for example robotics, computer graphics, virtual reality and geographic information systems -- it is necessary to store, analyse, create or manipulate spatial data. This class is about the algorithmic aspects of these tasks: We will acquire techniques that are needed to plan and analyse geometric algorithms and data structures. Every technique will be illustrated with a problem in the practical areas listed above.

**Intended learning outcomes**

The students are able to decide which algorithms or data structures are suitable for the solution of a given geometric problem. The students are able to analyse new problems and to come up with their own efficient solutions based on the concepts and techniques acquired in the lecture.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
AT,HCI,GE

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Computational Geometry** | 10-I=AG-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science I | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 5 | numerical grade | -- | |

| Duration | Module level | Other prerequisites | |
|---|---|---|---|
| 1 semester | graduate | -- | |

**Contents**

In many areas of computer science -- for example robotics, computer graphics, virtual reality and geographic information systems -- it is necessary to store, analyse, create or manipulate spatial data. This class is about the algorithmic aspects of these tasks: We will acquire techniques that are needed to plan and analyse geometric algorithms and data structures. Every technique will be illustrated with a problem in the practical areas listed above.

**Intended learning outcomes**

The students are able to decide which algorithms or data structures are suitable for the solution of a given geometric problem. The students are able to analyse new problems and to come up with their own efficient solutions based on the concepts and techniques acquired in the lecture.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
AT,HCI,GE,IN

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics of Games Engineering** | 10-I=AGE-191-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science IX | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected chapters of Games Engineering.

**Intended learning outcomes**

The students understand the basic approach of games engineering. They are able to understand the solutions of complex problems in this area and apply them to similar questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): GE.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | | Abbreviation |
|---|---|---|
| **Selected Topics in Games Engineering** | | 10-I=AGE-232-m01 |

| Module coordinator | | Module offered by |
|---|---|---|
| holder of the Chair of Computer Science IX | | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected chapters of Games Engineering.

**Intended learning outcomes**

The students understand the basic approach of games engineering. They are able to understand the solutions of complex problems in this area and apply them to similar questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): GE.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Algorithms** | 10-I=AKA-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science I | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in algorithmics.

**Intended learning outcomes**

The students understand the basic approach of algorithmic computer science. They are able to understand the solutions of complex problems in this area and apply them to similar questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every seme-ster, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (ap-prox. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
AT

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Algorithms** | 10-I=AKA-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science I | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in algorithmics.

**Intended learning outcomes**

The students understand the basic approach of algorithmic computer science. They are able to understand the solutions of complex problems in this area and apply them to similar questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
AT

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | | | Abbreviation | |
|---|---|---|---|---|
| **Selected Topics in Data Science** | | | 10-I=AKDS-232-m01 | |
| **Module coordinator** | | | **Module offered by** | |
| Dean of Studies Informatik (Computer Science) | | | Institute of Computer Science | |
| **ECTS** | **Method of grading** | | **Only after succ. compl. of module(s)** | |
| 5 | numerical grade | | -- | |
| **Duration** | **Module level** | | **Other prerequisites** | |
| 1 semester | graduate | | -- | |

**Contents**

Selected topics in data science

**Intended learning outcomes**

Students understand the basic approach of data science. They are able to understand how to solve complex problems in this field and transfer them to related issues.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: German and/or English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): KI

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Embedded Systems** | 10-I=AKES-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in embedded systems.

**Intended learning outcomes**

The students possess specialised knowledge in the area of embedded systems. They are able to understand solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): ES.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Embedded Systems** | 10-I=AKES-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in embedded systems.

**Intended learning outcomes**

The students possess specialised knowledge in the area of embedded systems. They are able to understand solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): ES.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I**  (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in HCI** | 10-I=AKHCI-182-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science IX | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 5 | numerical grade | -- | |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in HCI.

**Intended learning outcomes**

The students understand the basic approach of human-computer interaction. They are able to understand the solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü/S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): HCI.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in HCI** | 10-I=AKHCI-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science IX | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in HCI.

**Intended learning outcomes**

The students understand the basic approach of human-computer interaction. They are able to understand the solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü/S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): HCI.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Computer Science** | 10-I=AKII-182-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in computer science.

**Intended learning outcomes**

The students are able to understand the solutions to complex problems in computer science and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü/S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

--

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Computer Science** | 10-I=AKII-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in computer science.

**Intended learning outcomes**

The students are able to understand the solutions to complex problems in computer science and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü/S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

--

**Workload**

150 h

**Teaching cycle**

Teaching cycle: if announced

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Intelligent Systems** | 10-I=AKIS-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science VI | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in intelligent systems.

**Intended learning outcomes**

The students possess an advanced knowledge in the area of intelligent systems. They are able to understand solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IS.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | | Abbreviation |
|---|---|---|
| **Selected Topics in Intelligent Systems** | | 10-I=AKIS-212-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science VI | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in intelligent systems.

**Intended learning outcomes**

The students possess an advanced knowledge in the area of intelligent systems. They are able to understand solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): KI

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Intelligent Systems** | 10-I=AKIS-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science VI | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in intelligent systems.

**Intended learning outcomes**

The students possess an advanced knowledge in the area of intelligent systems. They are able to understand solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): KI

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Internet Technologies** | 10-I=AKIT-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science III | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in computer communication, for example design aspects of future internet structures: setup and control structures of the internet, multicast protocols, protocols for multimedia communication, optical networks, control mechanisms for redundant and real-time communication networks, p2p networks, ad-hoc networks, or -- new concepts and technologies in mobile communication: digital modulation, signal propagation, channel coding, modern transmission technologies (adaptive modulation and coding, hybrid ARQ, OFDM, MIMO), mac layer, mobileIP, routing in ad-hoc networks, vertical handover, UMTS IP multimedia subsystem, or -- planning and management methods in telecommunication networks: planning methods (forward engineering, reverse engineering), network management paradigms (central and decentral), framework for network management (IETF traffic engineering, ITU-T TMN, OSI management), planning and management methods (IP management mechanisms, network design, measurement, acquisition and evaluation of traffic and performance data, visualisation, result handling, simulation and analysis of networks), management tools, outlook and perspectives, or -- other current topics.

**Intended learning outcomes**

The students have a knowledge of advanced and current topics in the management and design of modern wired and wireless communication systems.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IT.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Internet Technologies** | 10-I=AKIT-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science III | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in computer communication, for example design aspects of future internet structures: setup and control structures of the internet, multicast protocols, protocols for multimedia communication, optical networks, control mechanisms for redundant and real-time communication networks, p2p networks, ad-hoc networks, or -- new concepts and technologies in mobile communication: digital modulation, signal propagation, channel coding, modern transmission technologies (adaptive modulation and coding, hybrid ARQ, OFDM, MIMO), mac layer, mobileIP, routing in ad-hoc networks, vertical handover, UMTS IP multimedia subsystem, or -- planning and management methods in telecommunication networks: planning methods (forward engineering, reverse engineering), network management paradigms (central and decentral), framework for network management (IETF traffic engineering, ITU-T TMN, OSI management), planning and management methods (IP management mechanisms, network design, measurement, acquisition and evaluation of traffic and performance data, visualisation, result handling, simulation and analysis of networks), management tools, outlook and perspectives, or -- other current topics.

**Intended learning outcomes**

The students have a knowledge of advanced and current topics in the management and design of modern wired and wireless communication systems.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IT.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in IT Security** | 10-I=AKITS-172-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science II | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in IT security.

**Intended learning outcomes**

The students possess an advanced knowledge in the area of IT security. They are able to understand solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IS, LR, HCI, ES.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in IT Security** | 10-I=AKITS-212-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science II | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in IT security.

**Intended learning outcomes**

The students possess an advanced knowledge in the area of IT security. They are able to understand solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, KI, LR, HCI, ES, SEC

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in IT Security** | 10-I=AKITS-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science II | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in IT security.

**Intended learning outcomes**

The students possess an advanced knowledge in the area of IT security. They are able to understand solutions to complex problems in this area and to transfer them to related questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, KI, LR, HCI, ES, SEC

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | | Abbreviation |
|---|---|---|
| **Selected Topics in Aerospace Engineering** | | 10-I=AKLR-161-m01 |

| Module coordinator | | Module offered by |
|---|---|---|
| holder of the Chair of Computer Science VII | | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

## Contents

Selected topics in aerospace engineering, for example: satellite communication, rocket science, propulsion systems, sensors and actuators for orientation control, perturbation of orbits, interplanetary orbits, rendezvous and docking, design of space ships, design of planetary bases, life support systems, special aspects of operations, payloads, optical systems, RADAR, earth monitoring, thermo management, structure of space ships, special areas of navigation, space environment, environment simulation, verification and test of space faring systems, space astronomy and planet missions, space medicine and biology, material science, quality management, space law, aeroflight topics, avionics for airplanes, air traffic control, areal navigation, pilot interfaces, air traffic control, air traffic management.

## Intended learning outcomes

The students possess an advanced knowledge about the respective topic of the selected area and are able to consider these foundations in their future plans of air or spaceborne systems.

## Courses (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

## Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Separate written examination for Master's students.
Language of assessment: German and/or English
creditable for bonus

## Allocation of places

--

## Additional information

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): LR.

## Workload

150 h

## Teaching cycle

--

## Referred to in LPO I (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Aerospace Engineering** | 10-I=AKLR-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science VII | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in aerospace engineering, for example: satellite communication, rocket science, propulsion systems, sensors and actuators for orientation control, perturbation of orbits, interplanetary orbits, rendezvous and docking, design of space ships, design of planetary bases, life support systems, special aspects of operations, payloads, optical systems, RADAR, earth monitoring, thermo management, structure of space ships, special areas of navigation, space environment, environment simulation, verification and test of space faring systems, space astronomy and planet missions, space medicine and biology, material science, quality management, space law, aeroflight topics, avionics for airplanes, air traffic control, areal navigation, pilot interfaces, air traffic control, air traffic management.

**Intended learning outcomes**

The students possess an advanced knowledge about the respective topic of the selected area and are able to consider these foundations in their future plans of air or spaceborne systems.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): LR.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Computer Science and Sustainability** | 10-I=AKNA-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in computer science and sustainability

**Intended learning outcomes**

The students understand the basic approach of topics in sustainability and IT. They are able to understand the solutions to complex problems in this area and to apply them to similar questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: German and/or English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IN

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I**  (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | | | Abbreviation | |
|---|---|---|---|---|
| **Selected Topics in Software Engineering** | | | 10-I=AKSE-161-m01 | |

| Module coordinator | | Module offered by | |
|---|---|---|---|
| holder of the Chair of Computer Science II | | Institute of Computer Science | |

| ECTS | Method of grading | | Only after succ. compl. of module(s) | |
|---|---|---|---|---|
| 5 | numerical grade | | -- | |

| Duration | Module level | Other prerequisites | |
|---|---|---|---|
| 1 semester | graduate | -- | |

| Contents |
|---|
| Selected topics in software engineering. |

| Intended learning outcomes |
|---|
| The students possess an advanced knowledge about selected aspects of software engineering. |

| Courses (type, number of weekly contact hours, language — if other than German) |
|---|
| V (2) + Ü (2) |

| Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus) |
|---|
| written examination (approx. 60 to 120 minutes).<br>If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).<br>Language of assessment: German and/or English<br>creditable for bonus |

| Allocation of places |
|---|
| -- |

| Additional information |
|---|
| Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE. |

| Workload |
|---|
| 150 h |

| Teaching cycle |
|---|
| -- |

| Referred to in LPO I  (examination regulations for teaching-degree programmes) |
|---|
| -- |

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Software Engineering** | 10-I=AKSE-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science II | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in software engineering.

**Intended learning outcomes**

The students possess an advanced knowledge about selected aspects of software engineering.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Theory** | 10-I=AKT-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science I | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 5 | numerical grade | -- | |

| Duration | Module level | Other prerequisites | |
|---|---|---|---|
| 1 semester | graduate | -- | |

**Contents**

Selected topics in theory.

**Intended learning outcomes**

The students understand the basic approach of theoretical computer science. They are able to understand the solutions of complex problems in this area and apply them to similar questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
AT

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Selected Topics in Theory** | 10-I=AKT-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science I | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Selected topics in theory.

**Intended learning outcomes**

The students understand the basic approach of theoretical computer science. They are able to understand the solutions of complex problems in this area and apply them to similar questions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 120 minutes) or
b) project work (report (approx. 20 pages) with presentation (30 to 45 minutes) and subsequent discussion on the topic) or
c) oral examination of one candidate each (approx. 20 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
AT

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | | | Abbreviation |
|---|---|---|---|
| **Approximation Algorithms** | | | 10-I=APA-161-m01 |

| Module coordinator | | Module offered by | |
|---|---|---|---|
| holder of the Chair of Computer Science I | | Institute of Computer Science | |

| ECTS | Method of grading | | Only after succ. compl. of module(s) |
|---|---|---|---|
| 5 | numerical grade | | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

The task of finding the optimal solution for a given problem is omnipresent in computer science. Unfortunately, there are many problems without an efficient algorithm for an optimal solution. As a result, in practice, methods are used which do not always give the optimal solution but always give good solutions. This lecture will discuss drafting and analysing techniques for algorithms which have a proven approximation quality. With the help of practical optimisation problems, the lecture will introduce students to important drafting techniques such as greedy, local search, scaling as well as methods based on linear programming.

**Intended learning outcomes**

The students are able to analyse easy approximation methods in terms of their quality. They understand fundamental drafting techniques such as greedy, local search and scaling as well as methods based on linear programming and are able to apply these to new problems.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT,IT,GE

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
| --- | --- |
| **Performance Evaluation of Distributed Systems** | 10-I=LVS-161-m01 |

| Module coordinator | Module offered by |
| --- | --- |
| holder of the Chair of Computer Science III | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
| --- | --- | --- |
| 8 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
| --- | --- | --- |
| 1 semester | graduate | -- |

**Contents**

Traffic theoretic models, fundamental concepts of theory of probability, transformation techniques, stochastic processes, methods for performance analysis of technical systems, queue-/traffic theory, analysis of Markov, non-Markov and time critical systems, matrix analytical method, practical examples for performance analysis of computer systems and networks: throughput and goodput analysis and other characteristics.

**Intended learning outcomes**

The students possess the methodic knowledge and the practical skills necessary to model technical systems by means of the theory of probability and mathematical statistics.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (4) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT,IT,GE

**Workload**

240 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Performance Evaluation of Distributed Systems** | 10-I=LVS-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science III | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

The performance evaluation of distributed systems is illustrated and practically performed on a contemporary example, e.g., the Internet of Things (IoT). The following topics will be conveyed:
Traffic theoretic models, fundamental concepts of theory of probability, transformation techniques, stochastic processes, methods for performance analysis of technical systems, queuing and traffic theory, discrete-time and continuous Markov chains, analysis of Markov and non-Markov systems, practical examples for performance evaluation of computer systems and networks: service quality and other characteristics.

**Intended learning outcomes**

The students possess the methodic knowledge and the practical skills necessary to model technical systems by means of the theory of probability and mathematical statistics.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
AT,IT,GE,IN

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Machine Learning for Natural Language Processing** | 10-I=NLP-182-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

The lecture conveys advanced knowledge about methods in computational text processing. To this end, it presents state of the art models and techniques in the area of machine learning, as well as their technical background, and their respective applications in Natural Language Processing. As one important building block of almost all modern NLP-models, different techniques for learning representations of words, so called Word Embeddings, are presented. Starting from this we cover, among others, models from the area of Deep Learning, like CNNs, RNNs and Sequence-to-Sequence architectures. The theoretical foundations of these models, like their training with Backpropagation, are also covered in depth. For all models presented in the lecture, we show their application to problems like sentiment analysis, text generation and machine translation in practice.

**Intended learning outcomes**

The participants have solid knowledge on problems and methods in the area of computational text processing and are able to identify and apply suitable methods for a specific task.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, IS, HCI.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Machine Learning for Natural Language Processing** | 10-I=NLP-212-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science X | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

The lecture conveys advanced knowledge about methods in computational text processing. To this end, it presents state of the art models and techniques in the area of machine learning, as well as their technical background, and their respective applications in Natural Language Processing. As one important building block of almost all modern NLP-models, different techniques for learning representations of words, so called Word Embeddings, are presented. Starting from this we cover, among others, models from the area of Deep Learning, like CNNs, RNNs and Sequence-to-Sequence architectures. The theoretical foundations of these models, like their training with Backpropagation, are also covered in depth. For all models presented in the lecture, we show their application to problems like sentiment analysis, text generation and machine translation in practice.

**Intended learning outcomes**

The participants have solid knowledge on problems and methods in the area of computational text processing and are able to identify and apply suitable methods for a specific task.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
AT,KI,HCI

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | | | Abbreviation | |
|---|---|---|---|---|
| **Performance Engineering and Benchmarking of Computer Systems** | | | 10-I=PEB-182-m01 | |

| Module coordinator | | | Module offered by | |
|---|---|---|---|---|
| holder of the Chair of Computer Science II | | | Institute of Computer Science | |

| ECTS | Method of grading | | Only after succ. compl. of module(s) | |
|---|---|---|---|---|
| 5 | numerical grade | | -- | |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Introduction to performance engineering of commercial software systems, performance measurement techniques, benchmarking of commercial software systems, modelling for performance prediction, case studies.

**Intended learning outcomes**

The students possess a fundamental and applicable knowledge in the areas of performance metrics, measurement techniques, multi-factorial variance analysis, data analysis with R, benchmark approaches, modelling with queue networks, modelling methods, resource demand approximation, petri nets.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 90 to 120 minutes)
Language of assessment: English
creditable for bonus

**Allocation of places**

--

**Additional information**

--

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | | Abbreviation |
|---|---|---|
| **Practical course - Current Topics in Computer Science** | | 10-I=PRAK-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 10 | (not) successfully completed | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Completion of a practical task.

**Intended learning outcomes**

The practical allows participants to work on a problem in computer science in teams.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (6)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

term paper (5 to 15 pages)
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, IS, ES, LR, HCI, GE

**Workload**

300 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | | Abbreviation |
|---|---|---|
| **Practical Course - Current Topics in Computer Science** | | 10-I=PRAK-212-m01 |

| Module coordinator | | Module offered by |
|---|---|---|
| Dean of Studies Informatik (Computer Science) | | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 10 | (not) successfully completed | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

| **Contents** |
|---|
| Completion of a practical task. |

| **Intended learning outcomes** |
|---|
| The practical allows participants to work on a problem in computer science in teams. |

| **Courses** (type, number of weekly contact hours, language — if other than German) |
|---|
| P (6)<br>Module taught in: German and English<br>The course is offered in parallel in both German and English. |

| **Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus) |
|---|
| term paper (5 to 15 pages)<br>Language of assessment: German and/or English |

| **Allocation of places** |
|---|
| -- |

| **Additional information** |
|---|
| Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, KI, ES, LR, HCI, GE |

| **Workload** |
|---|
| 300 h |

| **Teaching cycle** |
|---|
| -- |

| **Referred to in LPO I** (examination regulations for teaching-degree programmes) |
|---|
| -- |

| Module title | | Abbreviation |
|---|---|---|
| **Practical Course - Current Topics in Computer Science** | | 10-I=PRAK-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 10 | (not) successfully completed | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Completion of a practical task.

**Intended learning outcomes**

The practical allows participants to work on a problem in computer science in teams.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (6)
Module taught in: German and English
The course is offered in parallel in both German and English.

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

term paper (5 to 15 pages)
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, KI, ES, LR, HCI, GE, SEC, IN

**Workload**

300 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| Software Architecture | 10-I=SAR-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science II | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Introduction to software architecture, architectural styles and patterns, software metrics, evaluation of architectural styles, software components, interface models and design guidelines, design-by-contract, component-based software engineering, service-oriented architectures, microservice architectures, scalability of databases, cloud-native and serverless computing, continuous integration, continuous delivery, continuous deployment, model-driven architecture

**Intended learning outcomes**

The students possess a fundamental and applicable knowledge about advanced topics in software engineering with a focus on modern software architectures and fundamental approaches to model-driven software engineering.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
SE,IT,ES

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Seminar 1 - Current Topics in Computer Science** | 10-I=SEM3-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 5 | numerical grade | -- | |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

| Contents |
|---|
| Independent review of a current topic in computer science based on literature and, where applicable, software with written and oral presentation. |

| Intended learning outcomes |
|---|
| The students are able to independently review a current topic in computer science, to summarise the main aspects in written form and to orally present these in an appropriate way. |

| Courses (type, number of weekly contact hours, language — if other than German) |
|---|
| S (2) |

| Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus) |
|---|
| term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion on a topic from the field of computer science<br>Language of assessment: German and/or English |

| Allocation of places |
|---|
| -- |

| Additional information |
|---|
| Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, IS, ES, LR, HCI´, GE. |

| Workload |
|---|
| 150 h |

| Teaching cycle |
|---|
| -- |

| Referred to in LPO I  (examination regulations for teaching-degree programmes) |
|---|
| -- |

| Module title | | Abbreviation |
|---|---|---|
| **Seminar 1 - Current Topics in Computer Science** | | 10-I=SEM3-212-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Independent review of a current topic in computer science based on literature and, where applicable, software with written and oral presentation.

**Intended learning outcomes**

The students are able to independently review a current topic in computer science, to summarise the main aspects in written form and to orally present these in an appropriate way.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and English
The course is offered in parallel in both German and English.

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion on a topic from the field of computer science
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, KI, ES, LR, HCI, GE

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Seminar 1 - Current Topics in Computer Science** | 10-I=SEM3-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Independent review of a current topic in computer science based on literature and, where applicable, software with written and oral presentation.

**Intended learning outcomes**

The students are able to independently review a current topic in computer science, to summarise the main aspects in written form and to orally present these in an appropriate way.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and English
The course is offered in parallel in both German and English.

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion on a topic from the field of computer science
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, KI, ES, LR, HCI, GE, SEC, IN

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Seminar 2 - Current Topics in Computer Science** | 10-I=SEM4-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 5 | numerical grade | -- | |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Independent review of a current topic in computer science based on literature and, where applicable, software with written and oral presentation.

**Intended learning outcomes**

The students are able to independently review a current topic in computer science, to summarise the main aspects in written form and to orally present these in an appropriate way.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion on the topic of the seminar
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, IS, ES, LR, HCI, GE

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Seminar 2 - Current Topics in Computer Science** | 10-I=SEM4-212-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Independent review of a current topic in computer science based on literature and, where applicable, software with written and oral presentation.

**Intended learning outcomes**

The students are able to independently review a current topic in computer science, to summarise the main aspects in written form and to orally present these in an appropriate way.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and English
The course is offered in parallel in both German and English.

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion on the topic of the seminar
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, KI, ES, LR, HCI, GE

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Seminar 2 - Current Topics in Computer Science** | 10-I=SEM4-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| Dean of Studies Informatik (Computer Science) | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Independent review of a current topic in computer science based on literature and, where applicable, software with written and oral presentation.

**Intended learning outcomes**

The students are able to independently review a current topic in computer science, to summarise the main aspects in written form and to orally present these in an appropriate way.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and English
The course is offered in parallel in both German and English.

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion on the topic of the seminar
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): AT, SE, IT, KI, ES, LR, HCI, GE, SEC, IN

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Security of Software Systems** | 10-I=SSS-172-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science II | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

The lecture provides an overview of common software vulnerabilities, state-of-the-art attack techniques on modern computer systems, as well as the measures implemented to protect against these attacks. In the course, the following topics are discussed:
- x86-64 instruction set architecture and assembly language
- Runtime attacks (code injection, code reuse, defenses)
- Web security
- Blockchains and smart contracts
- Side-channel attacks
- Hardware security

**Intended learning outcomes**

Students gain a deep understanding of software security, from hardware and low-level attacks to modern concepts such as blockchains. The lecture prepares for research in the area of security and privacy, while the exercises allow students to gain hands-on experience with attacks and analysis of systems from an attacker's perspective.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, IS, LR, HCI, ES.
Basic programming knowledge in C is required.

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Security of Software Systems** | 10-I=SSS-212-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science II | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

The lecture provides an overview of common software vulnerabilities, state-of-the-art attack techniques on modern computer systems, as well as the measures implemented to protect against these attacks. In the course, the following topics are discussed:
- x86-64 instruction set architecture and assembly language
- Runtime attacks (code injection, code reuse, defenses)
- Web security
- Blockchains and smart contracts
- Side-channel attacks
- Hardware security

**Intended learning outcomes**

Students gain a deep understanding of software security, from hardware and low-level attacks to modern concepts such as blockchains. The lecture prepares for research in the area of security and privacy, while the exercises allow students to gain hands-on experience with attacks and analysis of systems from an attacker's perspective.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE, KI, LR, HCI, ES, SEC

**Workload**

150 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Security of Software Systems** | 10-I=SSS-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science II | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 5 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

## Contents

The lecture provides an overview of common software vulnerabilities, state-of-the-art attack techniques on modern computer systems, as well as the measures implemented to protect against these attacks. In the course, the following topics are discussed:

- x86-64 instruction set architecture and assembly language
- Runtime attacks (code injection, code reuse, defenses)
- Web security
- Blockchains and smart contracts
- Side-channel attacks
- Hardware security

## Intended learning outcomes

Students gain a deep understanding of software security, from hardware and low-level attacks to modern concepts such as blockchains. The lecture prepares for research in the area of security and privacy, while the exercises allow students to gain hands-on experience with attacks and analysis of systems from an attacker's perspective.

## Courses (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)
Module taught in: English

## Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: English
creditable for bonus

## Allocation of places

--

## Additional information

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): SE,KI,LR, HCI, ES, SEC,IN

## Workload

150 h

## Teaching cycle

Teaching cycle: every year, summer semester

## Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Discrete Event Simulation** | 10-I=ST-161-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science III | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 8 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

Introduction to simulation techniques, statistical groundwork, creation of random numbers and random variables, random sample theory and estimation techniques, statistical analysis of simulation values, inspection of measured data, planning and evaluation of simulation experiments, special random processes, possibilities and limits of model creation and simulation, advanced concepts and techniques, practical execution of simulation projects.

**Intended learning outcomes**

The students possess the methodic knowledge and the practical skills necessary for the stochastic simulation of (technical) systems, the evaluation of results and the correct assessment of the possibilities and limits of simulation methods.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (4) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
IT,IS,ES,GE

**Workload**

240 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | | | Abbreviation |
|---|---|---|---|
| **Discrete Event Simulation** | | | 10-I=ST-212-m01 |

| Module coordinator | | Module offered by | |
|---|---|---|---|
| holder of the Chair of Computer Science III | | Institute of Computer Science | |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 8 | numerical grade | -- | |

| Duration | Module level | Other prerequisites | |
|---|---|---|---|
| 1 semester | graduate | -- | |

**Contents**

Introduction to simulation techniques, statistical groundwork, creation of random numbers and random variables, random sample theory and estimation techniques, statistical analysis of simulation values, inspection of measured data, planning and evaluation of simulation experiments, special random processes, possibilities and limits of model creation and simulation, advanced concepts and techniques, practical execution of simulation projects.

**Intended learning outcomes**

The students possess the methodic knowledge and the practical skills necessary for the stochastic simulation of (technical) systems, the evaluation of results and the correct assessment of the possibilities and limits of simulation methods.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (4) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits):
IT,KI,ES,GE

**Workload**

240 h

**Teaching cycle**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--

| Module title | Abbreviation |
|---|---|
| **Discrete Event Simulation** | 10-I=ST-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science III | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) | |
|---|---|---|---|
| 5 | numerical grade | -- | |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

The simulation of communication systems is illustrated and practically performed on contemporary examples, e.g., popular Internet services or the Internet of Things (IoT). The following topics will be conveyed: Introduction to simulation techniques, discrete-event simulation and process-oriented simulation, generating random numbers and random variables, statistical analysis of simulation results, evaluation of measured data, designing and evaluating simulation experiments, special random processes, possibilities and limitations of modelling and simulation, advanced concepts and techniques, practical execution of simulation projects.

**Intended learning outcomes**

The students possess the methodic knowledge and the practical skills necessary for the stochastic simulation of (technical) systems, the evaluation of results and the correct assessment of the possibilities and limits of simulation methods.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IT,KI,ES,GE,IN

**Workload**

150 h

**Teaching cycle**

Teaching cycle: every year, summer semester

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)

| Module title | Abbreviation |
|---|---|
| **Autonomous Mobile Systems** | 10-LURI=AMS-232-m01 |

| Module coordinator | Module offered by |
|---|---|
| holder of the Chair of Computer Science XVII | Institute of Computer Science |

| ECTS | Method of grading | Only after succ. compl. of module(s) |
|---|---|---|
| 10 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
|---|---|---|
| 1 semester | graduate | -- |

**Contents**

(1) What are mobile robots? (2) Sensors (3) Sensor data processing (4) Locomotion and kinematics (5) Localization (6) Localization in maps (7) Mapping and SLAM (8) Navigation (9) Sensor data interpretation (10) Robot control architectures

**Intended learning outcomes**

Students know Bayesian concepts for sensor data processing for a mobile system and are able to apply the concepts to mobile robots. Derived concepts like Kalman filter, Particle filter, POMDPs, etc. are understood. They have learned the steps to build and program mobile systems.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (4) + Ü (2)
Module taught in: German and/or English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

**Allocation of places**

--

**Additional information**

Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IT, KI, ES, LR, GE

**Workload**

300 h

**Teaching cycle**

Teaching cycle: every year, summer semester

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 22 II Nr. 3 b)