Module Catalogue
for the Subject
Computer Science
as Unterrichtsfach
with the degree "Erste Staatsprüfung für das Lehramt an
Realschulen"

Examination regulations version: 2015
Responsible: Institute of Computer Science
Contents

The subject is divided into

Abbreviations used, Conventions, Notes, In accordance with 3
Scientific Discipline 4
Compulsory Courses 5
General Compulsory Courses 7
Introduction to Programming 8
Data Bases 9
Software Technology 10
Practical course in software (German Realschule) 11
Theoretical Computer Science 12
Theoretical Informatics 13
Tutorial Theoretical Informatics 14
Compulsory Electives 15
Algorithms and Data Structures 16
Algorithms and data structures 17
Algorithms and Data Structures Level One Course 18
Programming Practical Courses 19
Practical Course in Programming 20
Introductory Programming Course 21
Teaching 22
Compulsory Courses 23
Computer Science Education 1 (incl. Practical Course in the Application of Computer Science Systems form an Educational Point of View) 24
Computer Science Education 2 (incl. Seminar in Computer Science Education at the German Realschule) 25
Paper 26
Practical Training in Classroom Teaching in Computer Science Education including Theory (German Realschule) 27
Freier Bereich (general as well as subject-specific electives) 28
Computer Science 29
Exam Tutorial for the German Staatsexamen 30
Seminar Computer Science Education 31
Advanced Topics of Computer Science Education 32
Robotics in Education (practical course) 33
Practical Course on Computer Science Education 34
Hands-on Computer Science 35
Tutor activity 1 36
Tutor activity 2 37
Paper 38
Thesis Computer Science (Teaching Degree at the German Realschule) 39
The subject is divided into

<table>
<thead>
<tr>
<th>section / sub-section</th>
<th>ECTS credits</th>
<th>starting page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific Discipline</td>
<td>60</td>
<td>5</td>
</tr>
<tr>
<td>Compulsory Courses</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>General Compulsory Courses</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>Theoretical Computer Science</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Compulsory Electives</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Algorithms and Data Structures</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Programming Practical Courses</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Teaching</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>Compulsory Courses</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Paper</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Freier Bereich (general as well as subject-specific electives)</td>
<td>0-15</td>
<td>28</td>
</tr>
<tr>
<td>Computer Science</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>Paper</td>
<td></td>
<td>38</td>
</tr>
</tbody>
</table>
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:

LASPO2015

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

8-Sep-2015 (2015-121)

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.
Scientific Discipline
(60 ECTS credits)
Compulsory Courses

(40 ECTS credits)
General Compulsory Courses

(30 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Programming</td>
<td>10-I-EinP-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>holder of the Chair of Computer Science II</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Data types, control structures, foundations of procedural programming, selected topics of C, introduction to object orientation in Java, selected topics of C++, further Java concepts, digression: scripting languages.

**Intended learning outcomes**

The students possess a fundamental knowledge about programming languages (in particular Java, C and C++) and are able to independently develop average to high level Java programs.

**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 is creditable for 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).

**Allocation of places**

--

**Additional information**

--

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

§ 49 I Nr. 1b
§ 69 I Nr. 1b
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Bases</td>
<td>10-I-DB-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Relational algebra and complex SQL statements; database planning and normal forms; transaction management.

**Intended learning outcomes**

The students possess knowledge about database modelling and queries in SQL as well as transactions.

**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 is creditable for 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**

--

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

§ 49 I Nr. 1b
§ 69 I Nr. 1b
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Technology</td>
<td>10-I-ST-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

## Contents

Object-oriented software development with UML, development of graphical user interfaces, foundations of databases and object-relational mapping, foundations of web programming (HTML, XML), software development processes, unified process, agile software development, project management, quality assurance.

## Intended learning outcomes

The students possess a fundamental theoretical and practical knowledge on the design and development of software 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 is creditable for 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).

creditable for bonus

## Allocation of places

--

## Additional information

--

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

§ 49 I Nr. 1b

§ 69 I Nr. 1b
## Module title

**Practical course in software (German Realschule)**

### Abbreviation

10-I-SWP-RS-152-m01

---

## Module coordinator

Dean of Studies Informatik (Computer Science)

---

## Module offered by

Institute of Computer Science

---

## ECTS

10

---

## Method of grading

(only) successfully completed

---

## Only after succ. compl. of module(s)

10-I-ST and either 10-I-PP or 10-I-EPP

---

## Duration

1 semester

---

## Module level

undergraduate

---

## Other prerequisites

In addition, the knowledge and skills acquired in module 10-I-ADS and/or 10-I-GADS are required. Prior attendance of these modules is therefore highly recommended.

---

## Contents

Completion of a project assignment in groups, problem analysis, creation of requirements specifications, specification of solution components (e.g. UML) and milestones, user manual, programming documentation, presentation and delivery of the runnable software product in a colloquium.

---

## Intended learning outcomes

The students possess the practical skills for the design, development and execution of a software project in small 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 is creditable for bonus)

practical project (Completion of a larger software project in groups (approx. 300 hours per person) and final presentation (approx. 10 minutes per group)

---

## Allocation of places

--

---

## Additional information

--

---

## Referred to in LPO I

(examination regulations for teaching-degree programmes)

§ 49 I Nr. 1c
Theoretical Computer Science
(10 ECTS credits)
| Module title                  | Abbreviation |}
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical Informatics</td>
<td>10-I-TIV-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

### Contents

Computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of calculations, P-NP problem, NP completeness.

### Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of computations, P-NP problem, NP completeness.

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

<table>
<thead>
<tr>
<th>Type</th>
<th>(4)</th>
</tr>
</thead>
</table>

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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).

### Allocation of places

--

### Additional information

--

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

§ 49 I Nr. 1a

§ 69 I Nr. 1a
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutorial Theoretical Informatics</td>
<td>10-I-TIT-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of calculations, P-NP problem, NP completeness.

**Intended learning outcomes**

The students possess a fundamental and applicable knowledge in the areas of computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of computations, P-NP problem, NP completeness.

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

Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) completion of approx. 11 exercises with approx. 4 components each (50% to be completed correctly) or b) written examination (approx. 180 to 240 minutes). Method of assessment to be selected by the candidate.

**Allocation of places**

--

**Additional information**

--

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

§ 49 I Nr. 1a
§ 69 I Nr. 1a
Compulsory Electives

(20 ECTS credits)
Algorithms and Data Structures
(10 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithms and data structures</td>
<td>10-I-ADS-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

### Contents
Design and analysis of algorithms, recursion vs. iteration, sort and search methods, data structures, abstract data types, lists, trees, graphs, basic graph algorithms, programming in Java.

### Intended learning outcomes
The students are able to independently design algorithms as well as to precisely describe and analyse them. The students are familiar with the basic paradigms of the design of algorithms and are able to apply them in practical programs. The students are able to estimate the run-time behaviour of algorithms and to prove their correctness.

### 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 is creditable for 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).
creditable for bonus

### Allocation of places
--

### Additional information
--

### Referred to in LPO I
(examination regulations for teaching-degree programmes)
§ 49 I Nr. 1a
§ 69 I Nr. 1a
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithms and Data Structures Level One Course</td>
<td>10-I-GADS-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**
Design and analysis of algorithms, recursion vs. iteration, sort and search methods, data structures, abstract data types, lists, trees, graphs, basic graph algorithms, programming in Java.

**Intended learning outcomes**
The students are able to independently design algorithms as well as to precisely describe and analyse them. The students are familiar with the basic paradigms of the design of algorithms and are able to apply them in practical programs. The students are able to estimate the run-time behaviour of algorithms and to prove their correctness.

**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 is creditable for bonus)
written examination (approx. 60 to 120 minutes) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups of 2 candidates (approx. 15 minutes per candidate) creditable for bonus

**Allocation of places**
--

**Additional information**
--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
Programming Practical Courses
(10 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical Course in Programming</td>
<td>10-I-PP-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

### Contents

The programming language Java. Independent creation of small to middle-sized, high-quality Java programs.

### Intended learning outcomes

The students are able to independently develop small to middle-sized, high-quality Java programs.

### 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 is creditable for 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).

### Allocation of places

- --

### Additional information

- --

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

- § 49 I Nr. 1c
- § 69 I Nr. 1d
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory Programming Course</td>
<td>10-I-EPP-152-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**

Dean of Studies Informatik (Computer Science)

**Module offered by**

Institute of Computer Science

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

**Duration**

1 semester

**Module level**

undergraduate

**Other prerequisites**

--

**Contents**

The programming language used is Java. In the practical course, small to middle-sized java programs are to be implemented independently.

**Intended learning outcomes**

The students are able to independently develop and implement small to middle sized Java programs.

**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 is creditable for bonus)

practical examination (programming exercises, approx. 240 hours) and 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).

**Allocation of places**

--

**Additional information**

--

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

§ 49 I Nr. 1c
Teaching
(12 ECTS credits)
Compulsory Courses
(12 ECTS credits)
# Computer Science Education 1

## Module title
Computer Science Education 1 (incl. Practical Course in the Application of Computer Science Systems form an Educational Point of View)

## Abbreviation
10-I-DDI1-152-m01

### Module coordinator
Dean of Studies Informatik (Computer Science)

### Module offered by
Institute of Computer Science

### ECTS
6

### Method of grading
Numerical grade

### Only after succ. compl. of module(s)

### Duration
2 semester

### Module level
Undergraduate

### Other prerequisites

### Contents
The module gives an overview of computer science didactics. It demonstrates and discusses possibilities for a practical application in the classroom.

### Intended learning outcomes
Students are familiar (in particular in the area of computer science in Sekundarstufe I) with methods, techniques and media for teaching topics in computer science. They are able to didactically analyse and prepare practical topics. Students are familiar with both historical and current teaching approaches, typical teaching methods as well as guidelines and standards for teaching computer science. They are able to plan, organise and deliver classes.

### Courses

- **V (2) + Ü (2) + P (2)**

### Method of assessment

- **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).

### Allocation of places

- --

### Additional information

- --

### Referred to in LPO I

- Examination regulations for teaching-degree programmes

  - § 49 I Nr. 2
  - § 69 I Nr. 2
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science Education 2 (incl. Seminar in Computer Science Education at the German Realschule)</td>
<td>10-I-DDI2-RS-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Only after succ. compl. of module(s)</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
</tr>
</tbody>
</table>

**Contents**

This course discusses different topics in computer science didactics in more detail. It demonstrates and discusses possibilities for a practical application in the classroom. The seminar supplementing the course focuses on topics in computer science didactics for Realschule including, in particular, relevant practical skills for use in the classroom.

**Intended learning outcomes**

The students are able to plan, execute and assess projects, are familiar with important aspects of the planning and analysis of computer science classes, master fundamental teaching and learning strategies and are able to assess these. The students are able to handle the special problems of their subject in Realschule and know how to apply selected computer science systems in practice.

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

V (2) + Ü (2) + S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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).

creditable for bonus

**Allocation of places**

—

**Additional information**

—

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

§ 49 I Nr. 2
Paper
(4 ECTS credits)

Students studying for a teaching degree Realschule must complete a practical training in didactics and teaching methodology (studienbegleitendes fachdidaktisches Praktikum) which refers to one of the subjects they selected as vertieft studiertes Fach (subject studied with a focus on the scientific discipline) pursuant to Section 34 Subsection 1 No. 4 LPO I (examination regulations for teaching-degree programmes). The obligatory accompanying tutorial is offered by the respective subject. The ECTS credits obtained are counted in the subject Erziehungswissenschaften pursuant to Section 10 Subsection 3 LASPO (general academic and examination regulations for teaching-degree programmes).
Module title
Practical Training in Classroom Teaching in Computer Science Education including Theory (German Realschule)

Abbreviation
10-I-SBFD-RS-152-m01

Module coordinator
Dean of Studies Informatik (Computer Science)

Module offered by
Institute of Computer Science

ECTS
4

Method of grading
Only after succ. compl. of module(s)

(not) successfully completed
--

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
The module introduces students to the classroom practice of their Unterrichtsfach (subject studied with a focus on the scientific discipline). Using specific teaching models, examples and projects in different grades, the module introduces students to subject-specific techniques. In the university course accompanying the placement, students reflect and structure the school type-specific experiences made during their teaching placements and explore additional subject-specific and didactic aspects. In this context, the course discusses selected practical aspects of teaching computer science in accordance with applicable guidelines and curricula. The course focuses on recent developments in classroom practice, also taking into account aspects of school pedagogy and learning psychology that can support the successful practical implementation of subject-specific conceptual designs.

Intended learning outcomes
The students are familiar with the most important components of planning and organising classes. They are able to teach the relevant topics in different grades as well as to critically reflect recent developments in education. They are able to connect ideas from school pedagogy and learning psychology with their expertise in the area of didactics and to incorporate these into their teaching.

Courses
P (0) + S (2)

Method of assessment
Written elaboration of teaching practice (15 to 20 pages)
Contents and duration of placement as specified in Section 34 Subsection 1 Sentence 1 No. 4 LPO I (examination regulations for teaching-degree programmes); participation in mandatory teaching practice, completion of all set tasks as specified by placement school.

Allocation of places
--

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
§ 34 I 1 Nr. 4
Freier Bereich (general as well as subject-specific electives)
(0-15 ECTS credits)

Teaching degree students must take modules worth a total of 15 ECTS credits in the area Freier Bereich (general as well as subject-specific electives) (Section 9 LASPO (general academic and examination regulations for teaching-degree programmes)). To achieve the required number of ECTS credits, students may take any modules from the areas below.

Freier Bereich -- interdisciplinary: The interdisciplinary additional offer for a teaching degree can be found in the respective Annex "Ergänzende Bestimmungen für den "Freien Bereich" im Rahmen des Studiums für ein Lehramt".
Computer Science
(ECTS credits)

(Freier Bereich (general as well as subject-specific electives) -- subject specific)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam Tutorial for the German Staatsexamen</td>
<td>10-I-REP-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Revision of contents of modules covering the subject as well as the subject didactics of computer science.

**Intended learning outcomes**

The students have refreshed their skills for the solution of the type of problems asked in the written state examination.

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

| Ü (2) |

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

One exercise per area covered in the state examination

**Allocation of places**

--

**Additional information**

--

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

§ 22 II Nr. 2 f)
§ 22 II Nr. 3b
### Module title
Seminar Computer Science Education

### Abbreviation
10-I-DS-152-m01

### Module coordinator
Dean of Studies Informatik (Computer Science)

### Module offered by
Institute of Computer Science

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>numerical grade</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

### ECTS
4

### Method of grading
 numerical grade

### Only after succ. compl. of module(s)
--

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
Selected topics in computer science didactics.

### Intended learning outcomes
The students gain initial experience in the area of independent scientific work. They are able to acquaint themselves with and structure a given topic, using selected literature, as well as to prepare a talk on the respective subject. They are also able to actively participate in a scientific discussion.

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

S (2)

Usually once a year

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written elaboration (approx. 20 pages) and presentation including discussion (approx. 45 to 60 minutes) on a topic from the field of computer science didactics

Assessment offered: Only in the semester in which the course is offered

### Allocation of places
--

### Additional information
--

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

§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Topics of Computer Science Education</td>
<td>10-I-DV-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

### Contents

Discussion of topics in teaching computer science in Gymnasium that takes into account different aspects, in particular subject-specific foundations, didactic analyses, the contemporary debate in computer science didactics as well as possible approaches in the classroom.

### Intended learning outcomes

The students are able to discuss central topics and issues on teaching computer science in a Gymnasium, taking into account subject-specific, didactic and methodical aspects.

### Courses

<table>
<thead>
<tr>
<th>Type, number of weekly contact hours, language — if other than German</th>
</tr>
</thead>
<tbody>
<tr>
<td>S (2)</td>
</tr>
<tr>
<td>Usually every 2 years</td>
</tr>
</tbody>
</table>

### Method of assessment

<table>
<thead>
<tr>
<th>Type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus</th>
</tr>
</thead>
<tbody>
<tr>
<td>talk (approx. 30 minutes) or practical assignment (exercise) with examination talk (approx. 15 minutes)</td>
</tr>
<tr>
<td>Assessment offered: Only in the semester in which the course is offered</td>
</tr>
</tbody>
</table>

### Allocation of places

--

### Additional information

--

### Referred to in LPO I

( examination regulations for teaching-degree programmes)

§ 22 II Nr. 2 f)
§ 22 II Nr. 2 f)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robotics in Education (practical course)</td>
<td>10-I-DRO-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

### Contents

Discussion of problems in robotics in the computer science classroom that takes into account different aspects, in particular subject-specific foundations, didactic analyses, the contemporary debate in computer science didactics as well as possible approaches in the classroom.

### Intended learning outcomes

The students are able to discuss central topics and questions of robotics in the computer science classroom, taking into account subject-specific, didactic and methodical aspects.

### Courses

<table>
<thead>
<tr>
<th>(type, number of weekly contact hours, language — if other than German)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ü (2)</td>
</tr>
<tr>
<td>Usually every 2 years</td>
</tr>
</tbody>
</table>

### Method of assessment

- practical assignment (supervision of a group of pupils) with examination talk (approx. 15 minutes)
- Assessment offered: Only in the semester in which the course is offered

### Allocation of places

--

### Additional information

--

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

- § 22 II Nr. 2 f)
- § 22 II Nr. 3 f)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical Course on Computer Science Education</td>
<td>10-I-DPR-152-m01</td>
</tr>
</tbody>
</table>

**Module coordinator**
Dean of Studies Informatik (Computer Science)

**Module offered by**
Institute of Computer Science

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

**Duration** | **Module level** | **Other prerequisites** |
1 semester   | undergraduate       | --                          |

**Contents**
Discussion of problems in programming in the computer science classroom that takes into account different aspects, in particular subject-specific foundations, didactic analyses, the contemporary debate in computer science didactics as well as possible approaches in the classroom.

**Intended learning outcomes**
The students are able to discuss central topics and questions of programming in the computer science classroom, taking into account subject-specific, didactic and methodical aspects.

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

practical assignment with examination talk (approx. 15 minutes)
Assessment offered: Only in the semester in which the course is offered

**Allocation of places**
--

**Additional information**
--

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

§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on Computer Science</td>
<td>10-I-DPP-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 semester</td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Design and implementation of a school project on a topic in computer science, e. g. for project days, school term papers (Facharbeiten), Pluskurse (additional courses for the in-depth study of areas of special interest), workshops. In the theoretical phase, the students formulate the subject-specific and didactic requirements of the topic, search for a suitable topic, elaborate this topic for the project and draw up a project plan. This is done in groups with students providing each other with advice as well as challenging and reflecting on each other’s work. In the practical phase, the students prepare the implementation of the project, implement the project with pupils and afterwards reflect the planning and implementation.

**Intended learning outcomes**

The students are able to select a topic from the area of computer science that is suitable for a school project and are able to elaborate it. They are familiar with different aspects of project planning and management and are able to critically reflect the process.

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

Ü (2) + S (2)
Usually every 2 years

**Method of assessment** (type, scope, language — if other than German, examination offered — If not every semester, information on whether module is creditable for bonus)

practical assignment (preparing and delivering a school lab session) with examination talk (approx. 15 minutes)
Assessment offered: Only in the semester in which the course is offered

**Allocation of places**

--

**Additional information**

--

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

§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutor activity 1</td>
<td>10-I-TUT1-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**Contents**

Tutoring activities in the area of computer science.

**Intended learning outcomes**

Imparting knowledge and skills to students of computer science.

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

T (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Wrap-up report on tutoring activities (5 to 10 pages)

**Allocation of places**

--

**Additional information**

--

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

§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)
### Module Catalogue for the Subject
Computer Science
LA Realschulen

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutor activity 2</td>
<td>10-I-TUT2-152-m01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of Studies Informatik (Computer Science)</td>
<td>Institute of Computer Science</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>(not) successfully completed</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>undergraduate</td>
<td>--</td>
</tr>
</tbody>
</table>

#### Contents
Tutoring activities in the area of computer science.

#### Intended learning outcomes
Imparting knowledge and skills to students of computer science.

#### Courses (type, number of weekly contact hours, language — if other than German)
- **T (2)**

#### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
Wrap-up report on tutoring activities (5 to 10 pages)

#### Allocation of places
--

#### Additional information
--

#### Referred to in LPO I (examination regulations for teaching-degree programmes)
- § 22 II Nr. 2 f)
- § 22 II Nr. 3 f)
Paper
(10 ECTS credits)

Preparation of a written Hausarbeit (thesis) in accordance with the provisions of Section 29 LPO I (examination regulations for teaching-degree programmes) is a prerequisite for teaching degree students to be admitted to the Erste Staatsprüfung (First State Examination). In accordance with the provisions of Section 29 LPO I, students studying for a teaching degree Realschule may write this thesis in one of the subjects they selected as Unterrichtsfach (subject studied with a focus on the scientific discipline) or in the subject Erziehungswissenschaften (Educational Science). Pursuant to Section 29 Subsection 1 Sentence 2 LPO I, students may also choose to write an interdisciplinary thesis.
Module title
Thesis Computer Science (Teaching Degree at the German Realschule)

Abbreviation
10-I-HA-RS-152-m01

Module coordinator
Dean of Studies Informatik (Computer Science)

Module offered by
Institute of Computer Science

ECTS
10

Method of grading
numerical grade

Only after succ. compl. of module(s)
--

Duration
undergraduate

Other prerequisites
--

Contents
Researching and writing on a defined problem in computer science or computer science didactics within a given time frame and adhering to the principles of good scientific practice.

Intended learning outcomes
The students are able to research and write on a defined problem, adhering to the principles of good scientific practice.

Courses
No courses assigned to module

Method of assessment
Hausarbeit (thesis) pursuant to Section 29 LPO I (examination regulations for teaching-degree programmes) (250 to 300 hours)
Language of assessment: German; exceptions pursuant to Section 29 Subsection 4 LPO I (examination regulations for teaching-degree programmes)

Allocation of places
--

Additional information
--

Referred to in LPO I
§ 29